PN-ABF-351

SOUTHEAST ASIA ASSOCIATION OF SEISMOLOGY
AND EARTHQUAKE ENGINEERING

Series on Seismology

VOLUME V

INDONESIA

Front Cover

Damage caused to Hindu temple gateway from the earthquakes of 1979 December, 17d 19h 48m 23s at 8.49 SX115-82E; MB6.2; H22km. The earthquake occurred off the northeastern coast of Bali and caused damage ashore many kilometres away. This photograph was taken in the city of Karangasem where damage was nearby the maximum incurred. The structure was of high quality masonry.

SOUTHEAST ASIA ASSOCIATION OF SEISMOLOGY

AND EARTHQUAKE ENGINEERING

Mr Ho Tong-Yuen, President
Dr R.L. Kintanar, Vice-President

Series on Seismology

Volume V - INDONESIA

PART A	A CATALOGUE OF DESTRUCTIVE EARTHQUAKES IN INDONESIA FOR THE PERIOD 1821-1984
PART B	ATTENUATION FUNCTION OF INTENSITY FOR EARTHQUAKES OF INDONESIA
PART C	SEISMIC SOURCE ZONES IN INDONESIA
PART D	SEISMOTECTONICS OF THE INDONESIAN REGION

by

Soetardjo, M. Untung, E.P. Arnold, R. Soetadi,
Sulaeman Ismail, and Engkon K. Kertapati

E.P. Arnold, Series Editor and Programme Co-ordinator

June 1985

ACKNOWLEDGEMENTS

This work was carried out by SEASEE under U.S. Geological Survey Grant 14-08-0001-G-713 with funding from the Office of Foreign Disaster Assistance, U.S. Agency for International Development, PASA BOF - 0999-P-IC-1107.

AVAILABILITY

Copies of this series of publications can be obtained from any of the following:

E.P. Arnold,
U.S. Geological Survey,
Box 25046 M.S. 967,
Denver Federal Center,
Denver, Colorado 80225,
U.S.A.

The Director-General,
Malaysian Meteorological Service,
Jalan Sultan, Petaling Jaya,
Selangor, Malaysia.

The Director-General,
Meteorological and Geophysical Agency,
Jalan Arief Rakhman Hakim 3,
Jakarta-Pusat, Indonesia.

The Director-General,
PAGASA,
1424 Quezon Avenue,
Quezon City,
Manila, Philippines.

The Director-General,
Meteorological Department of Thailand,
612 Sukhumvit Road,
Bangkok 10110, Thailand.

Researched, compiled and published under U.S. Geological Survey grant 14-08-0001-6-713. Supported by the Office of Foreign Disaster Assistance, Agency for International Development, United States Department of State under PASA BOF-0999-P-IC-1107
E.P. Arnold, Project Co-ordinator and Editor

ISBN No. 974-8202-19-4

6

TABLE OF CONTENTS

PART A A CATALOGUE OF DESTRUCTIVE EARTHQUAKES IN INDONESIA FOR THE PERIOD 1821-1984

Introduction 1
Acknowledgements 2
List of Abbreviations 2
List of Destructive Earthquakes 3
References 42

PART B ATTENUATION FUNCTION OF INTENSITY FOR EARTHQUAKES OF INDONESIA

Introduction 43
Attenuation Function Analysis 43
Macroseismic Data 46
References 60
Focal Mechanism Solutions for Earthquakes in Indonesia 67

PART C SEISMIC SOURCE ZONES IN INDONESIA

Introduction 107
Seismic Activity 107
Seismic Source Zone 109
Characteristics of Seismic Source Zones 110
Conclusions 152
References 153

PART D SEISMOTECTONICS OF THE INDONESIAN REGION

Introduction 161
Sumatera 161
Java 164
Kalimantan 165
Sulawesi 166
Talaud 170
Timor 171
Halmahera 174
Tectonics of the Northern Banda Arc 177
Irian Jaya 178
Active Faults of the Indonesian Archipelago 179
Lembang Fault, Java 184
Cimandiri Fault, Java 184
Citanduy Valley Fault and Banyumas Fault 184
Palu-Koro Fault Zone, Sulawesi 185
Matano Fault Zone, Sulawesi 186
The Central Structural Valley of Timor 187
Reverse Fault at Dobo, Aru Island Group 187
Irian Fault Zone 187
The Sorong Fault Zone 187
The Yapen Fault Zone, Irian 188
The Ransiki Fault Zone 188
Other Active Faults in Irian Jaya 189
References 190

PART A

A CATALOGUE OF DESTRUCTIVE EARTHQUAKES IN INDONESIA FOR THE PERIOD 1821-1984

PART A A CATALOGUE OF DESTRUCTIVE EARTHQUAKES IN INDONESIA FOR THE PERIOD 1821-1984

Introduction

This catalogue has been compiled under the Earthquake Disaster Mitigation Project coordinated by the Southeast Asia Association of Seismology and Earthquake Engineering (SEASEE).

Its purpose is to collect all available information on earthquakes that have occurred in or affected the Indonesian Archipelago and its adjacent areas in the past.

For Indonesia, the project was headed by Mr. R. Soetardjo, as the Principal Investigator. He was assisted by a team consisting of seismologists, historians and translators.

Several institutes and libraries considered as probable data sources that have been contacted during the implementation of the project are, among others:

1. The Library of the Meteorological and Geophysical Agency, Jakarta.
2. The Library of the Directorate General of Volcanology, Bundung.
3. The Library of the Geological Research and Development Centre, Bandung.
4. The National Library, Jakarta.
5. The National Archives, Jakarta.
6. The National Museum, Jakarta.
7. The National Scientific Documentation Centre, Jakarta.
8. The Library of the Royal Netherlands Meteorological Observatory, De Bilt.

The macroseismic data sources that have been collected and translated into English are chronologically arranged as follows:

1. Die Erdbeden des Indischen Archipels bis zum Jahre 1857 (by Arthur Wichmann).
2. Die Erdbeben des Indischen Archipels von 1858 bis 1877 (by Arthur Wichmann).
3. Geophysical Notes.
4. Macroseismic Survey Reports up to 1984 (published after completing the survey).

The last two mentioned were published by the Meteorological and Geophysical Agency, Jakarta.

An attempt was made to complete the missing data for the year 1878-1883 and 1942-1948 by contacting the Library of the Royal Netherlands Meteorological Observatory; unfortunately, it seems that no more data are available.

For the period 1942-1947, probably no earthquake

observations were made, due to World War II. Netherlands, some articles from daily newspapers published at that time, such as Kuang-po and Sin-po, have contributed additional information to make the data more complete.

This catalogue, of course, does not include all macroseismic data but, rather, selected destructive earthquakes which have caused at least cracks in walls and falling plaster.

Some of the missing data are still being sought and will be added as soon as they are found.

It is hoped that this catalogue will be of use to anyone who is interested in the investigation of earthquake phenomena.

Acknowledgements

The project team wishes to express its thanks to:

1. The Director General of the Meteorological and Geophysical Agency for his support and guidance.
2. The team of the Department of History, Faculty of Letters, University of Indonesia, for their kind cooperation in translating the macroseismic reports from Dutch and German into English.
3. Mr. R. Susanto, Mr. A. Koesdarjanto, Mr. R. Soetardjo and Mr. R. Sutadi for their support and guidance in the macroseismic data compilation.
4. All Indonesian seismologists who have contributed to the completion of the required information and provided additional data for interpreting the intensity levels.

Finally, it should be placed on record that the compilation of all the above-mentioned data has been supported by the U.S. Geological Survey, Department of the Interior, under USGS Agreement No. 14-08-001-G-713, without which, and the coordination efforts of SEASEE, this catalogue would never have produced its results as presented herein.

List of Abbreviations

E.I. = Earthquakes in Indonesia
E.R. = Earthquake Report (Macroseismic Survey Report)
G.N. = Geophysical Notes
N.T. = Natuurkundig Tijdschrift voor Nederlandsch - Indie, which consists of:
1. Uitbarstingen van Vulkanen en Aardbevingen in den Oost Indischen Archipel Waargenomen yaar 1884-1898.
2. Vulkanische Verschijnselen en Aardbevingen in den Oost Indischen Archipel yaar 1899-1941.

S.I. = Seismology in Indonesia

LIST OF DESTRUCTIVE EARTHQUAKES

Event	Effect	Intensity	Source
Origin Time 1821 Dec 25	Jepara: Central Java - the earthquake was felt at Jepara and reported as VI-VII as the MMI scale.	VII	NT
Origin Time 1828 Dec 29	Bulukumba: In South Sulawesi a destructive earthquake occurred and caused severe damage to buildings; hundreds of people were killed.	VIII-IX	NT
Origin Time 1830 Mar 28 01h 00m 00s	Ambon: Maluku - earthquake occurred and caused damage to buildings.	VII-VIII	NT
Origin Time 1833 Jan 28 05h 00m 00s	Batavia/Jakarta: Shocks caused damage to buildings and cracked Walls. No deaths or injuries were reported.	VII-VIII	NT
Origin Time 1833 Nov 24	Bengkulu: Sumatera - a severe earthquake occurred and caused some buildings to collapse or be damaged. A tsunami was observed. No further information.	VIII-IX	NT
Origin Time 1834 Oct 10	Bogor and Cianjur: West Java - a violent shock occurred; the earthquake caused severe damage to buildings, some of which collapsed, and cracks in the road between Bogor and Cianjur. Nodeaths or injuries were reported.	VIII-IX	NT
Origin Time 1835 Aug 26	Padang: West Sumatera - the earthquake struck Padang and caused slight damage to buildings and cracks in walls.	VII-VIII	NT
Origin Time 1835 Nov 01	Ambon: Maluku - a large earthquake occurred and caused some buildings to collapse; 60 people injured; landslides in the hills were observed.	VII-IX	NT

Event	Effect	Intensity	Source
Origin Time 1836 Mar 22	Mojokerto: East Java - at Mojokerto, about 60 km west of Surabaya, a shock occurred and caused damage and loss of property.	VII-VIII	NT
Origin Time 1837 Jan 21	Maluku: Earthquake felt at Saparua, Haruku and on Nusalaut Island. Damage to buildings and houses.	VII-VIII	NT
Origin Time 1837 Nov 28	Bima: Sumbawa - a strong earthquake occurred and caused severe damage to buildings, some of which collapsed.	VIII-IX	NT
Origin Time 1840 Jan 04	Purworejo: Central Java - a destructive earthquake occurred at Purworejo and caused severe damage to buildings; two buildings collapsed. Also felt at Semarang, Demak, Solotigo and Kendal on the north coast of Central Java.	VIII-IX	NT
Origin Time 1841 Dec 16	Ambon: a moderate earthquake occurred at Ambon. The earthquake was accompanied by a tsunami at Galaga Bay and Buru Island. The tsunami caused damage to some boats.	VII-VIII	NT
Origin Time 1843 Jan 05	Gunung Sitoli and Baras: Nias Island - a strong earthquake struck Gunungsitoli and Baras. The shock was followed by a tsunami, causing damage to some boats. Ground-slump was observed too.	VII-VIII	NT
Origin Time 1843 May 25	Bogor: West Java - a shock was felt at Bogor and caused damage to buildings and houses.	VII-VIII	NT
Origin Time 1844 Feb 15	Cianjur: West Java - the earthquake hit Cianjur on West Java and caused damage to houses.	VII-VIII	NT
Origin Time 1845 Feb 08	Menado: North Sulawesi - a strong earthquake was felt in north Sulawesi and caused the		

Event	Effect	Intensity	Source
	collapse of brick buildings and houses at Menado, Tikala, Tomohon, Tonsarongsong, Tondano and Tanawanko.	VIII-IX	NT
Origin Time 1852 Jan 09	Teluk Betung: South Sumatera - an earth tremor was felt in Teluk Betung and caused damage to buildings and houses.	VII-VIII	NT
Origin Time 1852 Oct 15	Kebumen: Central Java - a moderate earthquake was felt at Kebumen. This shock caused cracks in walls at several buildings and houses.	VI-VII	NT
Origin Time 1852 Nov 26	Bandanaira: Maluku - a strong earthquake was felt at Bandanaira - Banda Island and caused some buildings to collapse. The quake was followed by sea waves (tsunamis).	VIII-IX	NT
Origin Time 1852 Dec 20	Bogor: West Java - a strong earthquake caused some buildings to collapse.	VIII-IX	NT
Origin Time 1853 Nov 30	Cirebon: West Java - a moderate earthquake was felt and caused cracks in walls. No further information.	VII-VIII	NT
Origin Time 1855 Jul 14	Ternate: Maluku - a strong earthquake occurred. Severe damage to buildings; one house collapse and 34 people were killed.	VIII-IX	NT
Origin Time 1856 Jan 19	Semarang: Central Java - an earthquake was felt at Semarang and caused cracks in walls.	VII-VIII	NT
Origin Time 1858 Feb 27	Ternate: Maluku - a rather hard shock was felt and caused damage to walls.	VI	NT
Origin Time 1858 Jun 04	Ternate: Maluku - a rather strong earthquake was felt, causing damage to some buildings and houses.	VI	NT

Event	Effect	Intensity	Source
Origin Time 1858 Nov 09	Ambon: Some buildings suffered damage by an earthquake.	VI	NT
Origin Time 1858 Dec 13	Tondano: North Sulawesi - a moderate earthquake caused 15 sheds to fall. On Ternate, Tidore, Halmahera, Sangihe, Talaud and Banggai islands a tsunami was observed.	VII	NT
Origin Time 1859 Jul 05	Tulungagung: East Java - an earthquake occurred and some buildings and houses suffered damage.	VI	NT
Origin Time 1859 Oct 08	Halmahera Island: Maluku - at Halmahera a great number of cottages tumbled down.	VI	NT
Origin Time 1861 Feb 16	Tapanuli and Sibolga: Numerous houses tumbled down. Tsunami was observed at Singkil, Nias and Tello.	VIII-IX	NT
Origin Time 1862 Mar 29	Buleleng: Bali - a moderate earthquake occurred, causing cracks in walls, some of which tumbled down.	VII	NT
Origin Time 1862 May 24	Karawang: West Java - a rather severe shock was felt at Karawang, West Java, where walls of some houses were fissured.	VI	NT
Origin Time 1862 Sept 15	Bandanaira: Maluku - an earthquake caused cracks in walls.	VI	NT
Origin Time 1862 Nov 20	Madium: East Java - Damage to a few buildings caused by a rather severe earthquake.	VI	NT
Origin Time 1863 Aug 13	Banyumas: Central Java - the strong earthquake caused heavy damage to a sugar factory.	VII	NT
Origin Time 1864 May 23	Arfak: Irian Jaya - the destructive earthquake caused houses on Mount Arfak to be set ablaze and some were buried. 250 people killed.	VI-VII	NT

Event	Effect	Intensity	Source
Origin Time 1865 Jul 17	Banyubiru: Central Java - some buildings and houses suffered considerable damage caused by an earthquake.	VII	NT
Origin Time 1866 Apr 22	Ambarawa: Central Java - because of an earthquake, walls of some houses and barracks were fissured.	VI	NT
Origin Time 1867 Jun 10	Jogyakarta: Central Java - In Jogyakarta and Surakarta 372 houses collapsed or partially collapsed, while only 5 persons lost their lives.	VIII-IX	NT
Origin Time 1867 Nov 03	Ternate: Maluku - a moderate shock caused fissures in the walls of numerous houses.	VI	NT
Origin Time 1871 Mar 27	Banyumas: Central Java - fissures in the walls of government buildings and houses, which were caused by an earthquake.	VI	NT
Origin Time 1871 Aug 18	Bengkulu: Sumatera - the quakes caused some houses to tumble down in Bengkulu and Tebingtinggi.	VI-VII	NT
Origin Time 1872 Oct 10	Salatiga: Central Java - a rather strong shock felt at Salatiga caused fissures in walls.	VI	NT
Origin Time 1873 Feb 05	Ciamis: West Java - the walls of numerous buildings were cracked.	VI	NT
Origin Time 1873 Aug 19	Mandailing: North Sumatera - many houses were damaged, due to the earthquake.	VI	NT
Origin Time 1873 Oct 07	Tapanuli: North Sumatera - this quake caused damage to some houses and bridges.	VI	NT
Origin Time 1875 Oct 25	Kuningan: West Java - the quake was felt at Kuningan, Sumedang and Manonjaya. 628 houses		

Event	Effect	Intensity	Source
	damaged and seven people killed.	VII-VIII	NT
Origin Time 1876 May 28	Kajeli: Ceram - a few houses suffered damage and a mosque tumbled down at Kajeli-Ceram Island - Maluku.	VII	NT
Origin Time 1877 Feb 21	Kudu: Central Java - a rather strong shock, felt at Kedu and Wonosobo in Central Java, caused damage to several buildings.	VI	NT
Origin Time 1889 Nov 04	Pasuruan: East Java - the quake caused crack in walls.	VI	NT
Origin Time 1890 Jul 11	Negara: Bali - the earthquake caused three pillars of the Justice Buildings to split horizontally and walls to tumble down.	VII	NT
Origin Time 1890 Nov 23	Bandanaira: Maluku - damage to most of the houses and buildings.	VII	NT
Origin Time 1890 Dec 12	Pati: Central Java - this quake also felt at Juwana; caused many houses to fall. Several people killed and injured.	VIII	NT
Origin Time 1892 May 17	Prapat: North Sumatera - the shock caused severe damage to three buildings.	VI	NT
Origin Time 1896 Apr 18	Timor Island: The quake was also felt at Alor Island; 250 people killed and most of the settlement damaged.	VII-VIII	NT
Origin Time 1896 Jul 01	Jumajang: East Java - the walls of some houses were split.	VI	NT
Origin Time 1896 Aug 15	Wlingi: East Java - at Brangah - Wlingi many public and private buildings/houses damaged.	VII	NT
Origin Time 1896 Aug 20	Tulungagung: East Java - the shock caused severe damage to		

Event	Effect	Intensity	Source
	several Chinese houses.	VII	NT
Origin Time 1898 Jan 17	Ambon: Maluku - many houses were destroyed by this quake.	VII	NT
Origin Time 1900 Jan 14	Sukabumi: West Java - felt over Priangan, Bogor and Banten. Most damage to stone houses occurred at Sukabumi, but no lives were lost.	VII	GN-2
Origin Time 1902 Jun 27	Lais: Bengkulu - fall of plaster and cracks developed in walls.	VI	GN-2
Origin Time 1902 Aug 31	Sedayu: East Java - ground-slumps were observed, walls were disturbed. A series of aftershocks felt during the period 26 Sep - 9 Oct, the heaviest one on August 31, accompanied by a roaring sound.	VI	GN-2
Origin Time 1903 Feb 14	Bandanaira: Maluku - suspended objects swung and movable objects were thrown down.	V	GN-2
Origin Time 1903 Feb 27	Banten: West Java: this quake felt over Banten; small cracks developed in walls.	VI	GN-2
Origin Time 1904 Jul 05	Siri - Sori: West Sumatera - a part of the pier was destroyed and sailing boats on the coast of Siri-Sori sank as a result of the high waves.	VIII	GN-2
Origin Time 1907 Jul 30	Lemo: Central Sulawesi - destructive at Lemo, where 164 houses and 49 rice-warehouses collapsed; shocks were frequently felt until August 2. Damage to buildings was also done to Colo, Anja, Olu Congko and Paku.	VIII	GN-2
Origin Time 1908 Mar 24	Atapupu: Timor Island - the quake strongly felt at Atapupu in Northeast Timor. Cracks developed in the wall of a fortress; a part of the wall		

Event	Effect	Intensity	Source
	fell. Damage to buildings was also done in the Chinese blocks. Cracks developed in the beach sands about 25 m long. A tsunami was observed.	VII	GN-2
Origin Time 1910 Dec 18	Rajamandala: Cianjur - cracks developed in walls at Rajamandala - Cianjur - West Java.	VII	GN-2
Origin Time 1912 Jan 21	Campaka: Sukabumi - cracks developed in walls at Campaka - Sukabumi - West Java.	VI	GN-2
Origin Time 1914 May 26	Japen Island: Irian Jaya - all brick buildings collapsed on Japen Island. Ansus and Pom were affected by a tsunami. A few people lost their lives.	IX	GN-2
Origin Time 1914 Jun 26	Kepahyang: Bengkulu - all stone houses suffered severe damage. None of the many wooden houses sustained damage. Twenty persons were killed and 20 injured. Roads and bridges were destroyed. Damage was also done at Lais, Manna and Seluma.	IX	GN-2
Origin Time 1915 Dec 01	Madiun: East Java - nearly all buildings in the Sudono sugar estate were cracked. The chimney of the sugar factory toppled down. A certain amount of damage was also done at Maospati and Magetan.	VIII	GN-2
Origin Time 1916 Sept 09	Maos: Central Java - most destruction took place in and around Maos. About 340 brick stone buildings collapsed completely and many others were damaged at Maos and Kasugian. Cracks developed in walls, ground-slumps were reported. A few mud or sand craters were formed where jets of water spurted through holes or fissures, causing people to		

Event	Effect	Intensity	Source
Origin Time 1921 May 14	Sangkulirang: East Kalimantan - damage at Sangkulirang and more intense in the islands of Rending, Kariorang and Sekuran. Houses collapsed and gaping fissures were observed. The shock was associated with a tsunami which swept the sea, causing considerable damage at Sekuran.	VIII	GN-2
Origin Time 1921 Oct 10	Sentani: Irian Jaya - A major earthquake was felt as far as Dobo, but was destructive around Lake Sentani in south-east Irian Jaya. Ground-slides, boulders and a large mass of limestone damaged up a branch of the river temporarily in the village of Doormantop.	VII	GN-2
Origin Time 1923 Apr 19	Tarakan: East Kalimantan - the earthquake was recorded by sensitive seismographs all over the world. The shock was strongly felt at Tarakan about 140 km north of the centre and followed by a number of after-shocks. Brick buildings collapsed, cracks developed in the ground, and streams were affected. The kitchen of a house seemed to be displaced over a distance of about 1 m toward the west. Structures on solid ground suffered little damage.	VIII	GN-2
Origin Time 192[illegible] May 12 Epicentre 7.3°S-°105.8°E	Banten: West Java - the shock was felt over West Java and South Sumatera as far as Krue. Damage was done at several places; at Pelabuhanratu a water tower was thrown down.	VII	GN-2
Origin Time 1923 May 15 Epicentre 7.7°S-109.2°E	Maos: Central Java - the shock was felt intensively over western Central Java. Destructive effects were particularly pronounced in and around Maos.	IX	GN-2

Event	Effect	Intensity	Source
	panic. Four hundred houses collapsed in the Selarang district. Damage to structures and cracks in the ground were also found in various places. School buildings were among those most generally and severely damage, due in considerable part of unsuitable design for resistance to shaking. The major destruction, however, was in a more thickly settled district, where unfavourable geological conditions and poor structural work increased the damage.	IX	GN-2
Origin Time 1917 Jan 21	Bali: Ground slumps and ground-slides were observed at various places. Many houses suffered damage and about 1500 people were killed due to ground-slides.	IX	GN-2
Origin Time 1919 Nov 21	North Irian Jaya: Some damage was caused by a strong quake in the eastern part of North Irian Jaya. A few houses collapsed. Earth fissures developed in the ground and walls were disturbed.	VIII	GN-2
Origin Time 1920 May 10	Ambon: Maluku - cracks in walls reported at Ambon, Saumlaki and Banda. The quake itself had its origin about 1120 km south of Banda and Irian Jaya.	VI	GN-2
Origin Time 1921 Apr 01	Tapanuli: North Sumatera - epicentre tract occupied a narrow belt aligned northwest-southeast running for some 80 km from Pangurusan to Tarutung. The area worst hit was the region southwest of Lake Toba. Buildings and bridges collapsed at Sipoholon; furthermore ground-slides and ground-slumps were reported. The quake also felt as far as Sabang, Penang and Gunung Sitoli.	IX	GN-2

Event	Effect	Intensity	Source
Origin Time 1924 Apr 13 Epicentre 0.3°N-118.2°E	East Kalimantan: The tremor was generally felt at several places in East Kalimantan and as far north as the island of Tarakan; it was followed by aftershocks. As a result of the main shock, seven houses collapsed.	VII	GN-2
Origin Time 1924 Nov 12 Epicentre 7.3°S-109.8°E	Central Java: The centre was located in a mountainous region. Damage was generally caused by ground-slides.	VIII-IX	GN-2
Origin Time 1924 Dec 02 Epicentre 7.3°S-109.9°E	Wonosobo: Central Java - the quake seemed to be preceded by foreshocks. Destructive at Wonosobo and damage was also done to stone buildings outside Wonosobo. Approximately 2250 houses collapsed and in some villages most damage was caused by ground-slides. Altogether about 727 people were killed. The quake loss was estimated by the local authorities at about 61,000 guilders.	IX	GN-2
Origin Time 1925 Feb 14	Tarakan: East Kalimantan - the exact origin was unknown, but the shock was strongly felt at Tarakan and Lungkas and it was preceded by a rumbling sound.	VII	GN-2
Origin Time 1925 Jul 24	Bacan Island: Maluku - Exact origin unknown. Strongly felt at Labuhan (Bacan Island), accompanied by a roaring sound; cupboard overturned, a pendulum clock fell.	VII	GN-2
Origin Time 1926 Jun 28 Epicentre 0.7°S-100°E	Singkarak: West Sumatera - destructive around Lake Singkarak; Sijungjung, Muarabungo and Alahan Panjang suffered damage. The quake was followed by a train of after-shocks. These tremors were generally felt intensively over West Sumatera and in particular at Padangpanjang. A part of		

Event	Effect	Intensity	Source
	Lake Singkarak subsided and many people were injured.	VIII-IX	GN-2
Origin Time 1926 Dec 13	Prupuk: Central Java - destructive at Prupuk and Margasari; minor damage at Dubuktengah, Kaligayan, Wonosari, Danurejo, Jembayat, Pakulaut and Kalisosok. A few people were injured.	VIII-IX	GN-2
Origin Time 1927 Dec 01 Epicentre 05°S-119.5°E	Donggala: Central Sulawesi - a major earthquake caused damage to buildings at Donggala, Borowaru and neighbouring places. Earth fissures and subsidences in the ground were reported. The damage was mainly confined to the Palu Bay area. A tsunami was observed that caused serious loss of life and property in coastal villages. About 50 people sustained injuries and 50 died.	VII	GN-2
Origin Time 1930 Apr 27	Bali: Exact origin was unknown. Damage was done in south Bali by a moderate tremor. Walls were cracked at Denpasar and Tabanan, earth fissures in the ground occurred at Benoa. The shock was also felt over East Java.	V	GN-2
Origin Time 1931 Jan 21 Epicentre 7.3°S-108.9°E	Bumiayu: Central Java - in general, damage was confined mostly to older structures or buildings of poor materials and poor construction.	VIII	GN-2
Origin Time 1931 Sept 25	South Sumatera: Felt over South Sumatera and West Java and as far west as Padang. Foundations of most buildings subsided. Difficult to walk as a result of the earthquake. In Kalimantan a rumbling sound was heard.	VII-VIII	GN-2
Origin Time 1932 May 14	Tondano: North Sulawesi - the strong earthquake was felt as		

Event	Effect	Intensity	Source
Epicentre 0.5°N-126.0°E	far north as Mindanao. The major destruction took place at Kakas, south of Lake Tondano; 592 houses collapsed, 115 people sustained injuries and the death of six people was reported. Damage was also done at Langowan, Poso, Tondano, Waluyama, Rembohan, Koya and Lekupang. Ternate in north Maluku suffered minor damage. On the coast between Amurang and Tompoan vertical gaping cracks developed in the beach sands and the sea side of the cracks sagged.	VII	GN-2
Origin Time 1932 Sept 09 Epicentre 3.5°S-128.3°E	Seram: Molluce - the origin seemed to be in Tolehu Bay. A few old buildings collapsed at Wae and Tolehu. Ground-slumps and ground-slides were also reported.	VII	GN-2
Origin Time 1933 Jun 25 Epicentre 5.0°S-104.2°E	South Sumatera: The quake seemed to have been followed by a number of aftershocks. Damage to structures over the western part of south Sumatera. Gaping fissures and subsidences in the ground were observed along an imaginary line connecting Kotaagung with Makaka, crossing the Barisan mountain range (Bukit Barisan).	VIII-IX	GN-2
Origin Time 1934 Sept 21 Epicentre 1.0°N-99.0°E	South Tapanuli: Sumatera - generally felt violently. Pendulum clock stopped; doors and windows rattled. Cracks developed in walls; roofs of some houses ruined.	VII	GN-2
Origin Time 1935 Dec 28 Epicentre 0.3°S-97.9°E	Batu Island: North Sumatera - damage on Batu Island. Two mud islets, Bola and Sigata, were thrown up by the shock. At Padang cracks developed in walls. Trees and telephone poles swayed. A few buildings collapsed at Sibolga.	VII-VIII	GN-2

Event	Effect	Intensity	Source
Origin Time 1936 Mar 01	East Java: Exact origin unknown. Damage was generally done in Central and East Java. The shock was also felt over Bali and southeast Kalimantan.	VII	GN-2
Origin Time 1936 Apr 01 Epicentre 3.6°N-126.7°E	Sangir: North Sulawesi - the quake seemed to be followed by numerous aftershocks. Destructive in the Sangir-Talaud Islands. Approximately 127 houses collapsed. Cracks in walls at Lerung.	VIII-IX	GN-2
Origin Time 1936 Aug 23 Epicentre 6.1°N-94.7°E	Banda Aceh: The quake was strongly felt at Banda Aceh, Lhok Sukon, Lhoksemawe and was followed by a number of aftershocks. Caused damage to buildings; as a result of the shocks 9 people said to have perished, 20 people were badly injured.	VII-VIII	GN-2
Origin Time 1936 Sept 9 Epicentre 3.5°N-97.5°E	Tapanuli: North Sumatera - the quake caused minor damage at Medan and it was felt as far east as Malaysia. The most destructive effects of the quake were confined to the Karo region; 17 people were killed due to landslides in the hills. Numerous cracks appeared in the ground between Katacane and Kabanjahe. A certain amount of damage at Parapat, Brastagi, and Tanjung Putri. Cracks developed in walls at Langkat.	VIII	GN-2
Origin Time 1936 Oct 19 Epicentre 2.0°S-126.0°E	Sanana: Molluca - aftershocks were also felt on Sula Island. Movable objects were overthrown and a rumbling sound was heard. At Sanana 24 houses collapsed, great fissures appeared in the ground close to the market. At Wai Ipa 14 houses were damaged and at Wailau 2 buildings sustained considerable damage.	VIII	GN-2

Event	Effect	Intensity	Source
Origin Time 1936 Oct 27 Epicentre 0.2°S-98.8°E	Tapanuli: North Sumatera - the quake was felt over Tapanuli, West Sumatera and also locally in East Sumatera. At various places slight damage to structures and ground-slumps were reported.	VII	GN-2
Origin Time 1937 Sept 27 Epicentre 8.7°S-110.8°E	Jogyakarta: Central Java - Felt as far east as eastern Lombok. In general, south Central Java was badly damaged and slight cracks in walls were found in East Java. The region of greatest destruction was in Jogyakarta Province. At Klumpit one house was torn apart, one person reported killed. At Prambanan 326 brick/stone houses collapsed. At Klaten 2200 houses sustained damage; at various places underground pipelines were broken.	VIII-IX	GN-2
Origin Time 1938 Feb 02 Epicentre 5.0°S-131.5°E	Banda: Maluku - the shock was felt on the Banda and Kei islands. At Tual glassware was broken, a pendulum clock stopped. On Banda Island and also on Kei Island great damage was caused by tsunamis.	VII	GN-2
Origin Time 1938 May 20 Epicentre 0.7°S-120.3°E	Tomini Gulf: Central Sulawesi - the tremor was felt as far west as east Kalimantan and as far north as Gorontalo (Minahassa). The shock was associated with a tsunami which swept the sea, causing serious loss of life and property; 942 houses collapsed and a few persons were drowned.	VIII-IX	GN-2
Origin Time 1938 Aug 02	Exact origin unknown. Poorly built structures were badly damaged; in the mountainous regions, more damage was done due to landslides.	VII	GN-2
Origin Time 1938 Aug 18	Bengkulu: Sumatera - the shock was felt over West Sumatera,		

Event	Effect	Intensity	Source
Epicentre 3.8°S-102.8°	Palembang, Bengkulu and on the Mentawai Islands. Fall of plaster and cracks in walls were reported at some places in Bengkulu.	VII	GN-2
Origin Time 1938 Oct 20 Epicentre 9.2°S-123.2°E	Flores: Walls were badly cracked in Flores. Ground-slides at Larantuka. The quake seemed to have aftershocks.	VII	GN-2
Origin Time 1938 Oct 30 Epicentre 8.9°S-115.8°E	Bali: As a result of the shock, cracks appeared in walls and the principal mosque was badly damaged at Sakara.	VII	GN-2
Origin Time 1939 Jun 27 Epicentre 6.9°S-108.5°E	Central Java: Fall of plaster and small cracks in walls in the Cirebon Residency. More damage was done at Sodomantra, Jepara and Manis Kidul.	VII	GN-2
Origin Time 1939 Aug 11 Epicentre 6.5°S-112.4°E	East Java: Rembang and Surabaya were rocked; suspended objects swung. A brick building collapsed at Brondong.	VII	GN-2
Origin Time 1939 Dec 22 Epicentre 0.0°S-123.0°E	Central Sulawesi: This major earthquake was felt over north and central Sulawesi, East Kalimantan and as far north as the Sulu Islands. Cracks developed in walls at Gorontalo and at Langonan; cupboards overturned and a few people were injured. Houses collapsed at Kalo, Luwuk, Labuha and on the Sula Islands. At Mandar and Meulaboh in Central Sulawesi houses were shaken.	VIII	GN-2
Origin Time 1941 Oct 11 Epicentre 0.6°N-97.6°E	Tapanuli: North Sumatera - strongly felt over Tapanuli; slight damage was done at Sibolga.	VII	GN-2
Origin Time 1941 Nov 09 Epicentre 1.4°S-121.1°E	Gorontalo: North Sulawesi - brick/stone buildings collapsed at Gorontalo, Paleleh and Cibawa. Ground-slumps and land-slides in the hills were		

Event	Effect	Intensity	Source
	reported.	VIII	GN-2
Origin Time 1943 Jul 23 Epicentre 8.6°S-109.9°E	Jogyakarta: Central Java - the disturbance was most intense along the south coast of Central Java, between Garut and Surakarta, a distance of about 250 km. The deaths of 213 people have been reported and about 2096 persons were seriously injured; approximately 2800 houses were damaged.	VIII	GN-2
Origin Time 1950 Jun 19 12h 36m 54s UTC Epicentre 6.2°S-112.5°E	East Java: Destructive in and around Gresik. Felt slightly in South Kalimantan and as far west as West Java.	VII	GN-2
Origin Time 1954 Nov 02 08h 24m 54s UTC Epicentre 8.0°S-119.0°E Magnitude 6.75	Bima: Sumbawa - felt over South Sulawesi, Lombok and Flores. Ground-slumps and rock-slides were caused by the earthquake in northeast Sumbawa. Bima and Raba suffered most damage. Nearly all brick/stone houses were cracked and some collapsed completely. Two buildings made of reinforced concrete did not sustain any damage. The pier of Bima harbour was bent outward. A small Customs-house seemed to be displaced over a distance of about 0.5 m. No lives were lost.	VII-VIII	GN-2
Origin Time 1958 Oct 20 01h 12m 30s UTC Epicentre 9.5°S-112.5°E Magnitude: 6.7 Depth: 100 km	Malang: East Java - seriously damaged houses in the Malang area. Earth fissures at various places and land-slides in the mountainous regions. Eight persons lost their lives.	VII-VIII	GN-2
Origin Time 1960 Apr 29 09h 16m 20s UTC	Una-Una: Central Sulawesi - felt over North and Central Sulawesi. Destructive on the Una-Una Islands. No lives were		

Event	Effect	Intensity	Source
Epicentre 0.5°S-121.5°E	lost.	VII-VIII	GN-2
Origin Time 1960 Oct 10 21h 44m 40s UTC Epicentre 8.0°S-112.5°E	Tulungagung: East Java - the quake was strongly felt at Tulungagung, where people were awakened by creaking of buildings and where plaster cracked and fell. The shock was felt as far west as Baturetno in Surakarta and as far east as Tanggul in Besuki. This earthquake was widely felt in southern East Java over an area of about 15,000 square km.	VI-VII	E.I.
Origin Time 1961 Mar 16 18h 21m 04s UTC Epicentre 8.1°S-122.3°E	Flores: East Nusatenggara - damage in most villages in Central Flores; one person killed.	VII-VIII	S.I.
Origin Time 1961 May 07 04h 32m 05s UTC Epicentre 8.5°S-112.0°E	Campur darat: East Java - damage to brick buildings at Campur darat and Kebonagung Tulung agung. Reports indicated that the macroseismic area extended as far west as Banyumas, Central Java and as far east as Besuki in East Java. Evidence indicated that the tremor had a maximum intensity of VII in the immediate vicinity of the centre. The shock also felt at Jatisrana - Surakarta, Klaten, Maos, Malang and Klakah. To the north the macroseismic area was limited by the mountain range Kendeng; however some places, such as Demak and Watubelah to the north of the mountain range, felt this tremor as Intensity II. The great macroseismic extent suggested that the quake was deep-seated. In the vicinity of the centre slight damage was caused to old structures made of bricks bonded with lime mortar.	VI-VII	S.I.

Event	Effect	Intensity	Source
Origin Time 1962 Dec 21 00h 44m 19.7s UTC Epicentre 9.0°S-112.2°E Depth 64 km	Wlingi: East Java - cracks in walls in southern East Java. The shock was felt as far east as the Island of Bali. A moderate tremor was felt in Wlingi and neighbouring places in Kediri and also felt in most places in the Madium area. A large number of people in buildings in Madium and Kediri felt the quake and its intensity was high enough to cause some panic in public places, such as schools and markets. Macroseismic and instrumental data indicated that the tremor was of tectonic nature and deep-focused.	VI	E.I.
Origin Time 1963 Jun 27 11h 46m 58s UTC Epicentre 08.3°S-112.2°E Depth 180 km	Ponorogo: East Java - the earthquake caused slight damage in Ponorogo. The shock was felt in central and eastern Java. The western-most place was Jogyakarta and to the east, Besuki, which detected the tremor; both places reported Intensity II.	IV-V	E.I.
Origin Time 1963 Dec 16 02h 45m 35s UTC Epicentre 06.2°S-105.4°E Magnitude 5.0 Depth 55 km	Labuan: West Java - the earthquake caused slight damage in Labuan where cracks developed in walls. A large number of people felt the quake and its intensity was high enough to cause some panic among the people in Jakarta; however no damage was reported by this shock. The seismograph of the Meteorological Service was out of order. The shock was felt as far east as Tasikmalaya as Intensity II and as far west as Kotabumi in South Sumatera as Intensity II. The shock was also felt in most places in Priangan as Intensity II-III.	V	E.I.
Origin Time 1964 Apr 02 01h 11m 55s	Banda Aceh: The earthquake was the strongest shock ever recorded in this region since		

Event	Effect	Intensity	Source
UTC Epicentre 5.9°N-95.7°E Magnitude 5.2 Depth 132 km	that of August 23, 1936 which caused considerable damage to buildings. The quake was most strongly felt at Banda Aceh where the intensity was high (VII MMI). About 30-40% of the brick buildings sustained damage. The village worst hit was Krueng Raya.	VII	E.I.
Origin Time 1965 Jan 25 12h 02m 51.4s UTC Epicentre 2.6°S-126.1°E Magnitude: 6.3 Depth: 33 km	North Maluku: A rumbling sound was heard at Sanana Coastal villages destroyed and 5 persons reported killed, due to a tsunami.	VII	S.I.
Origin Time 1965 Jul 25 03h 40m 40.4s GMT Epicentre 2.0°N-99.3°E Magnitude: 5.3 Depth: 98 km	Tapanuli: North Sumatera - at Sarula and Onang Hasang in Tapanuli the intensity reached VII MMI; damage to brick buildings and ground-slumps were observed.	VII	E.I.
Origin Time 1967 Feb 19 22h 14m 55s UTC Epicentre 8.5°S-113.5°E Magnitude 6.2 Depth 80 km	Malang: East Java - the place worst hit was Dampit, a district situated just to the south of Malang; according to questionnaire reports, 1539 buildings were wrecked, 14 people were killed, 72 people were injured. Next to Dampit was Gondang where, according to a report, 9 people were killed, 49 people were injured, 119 buildings collapsed completely and another 402 buildings were cracked. 5 mosques were ruined. Attention should also be drawn to Trenggalek where 33 wooden houses were reported cracked and some houses have been moved slightly. In Besuki, the easternmost district of East Java, the intensity was of the order of III to VI MMI; in Tanggul, buildings sustained		

Event	Effect	Intensity	Source
	slight damage only. The shock was felt to the west as far as Banyumas (Cilacap); to the north a chain of hills in western East Java form a sort of barrier to the propagation of seismic waves. No report was received about a tsunami.	VIII-IX	E.I.-67
Origin Time 1967 Apr 11 05h 09m 11s UTC Epicentre 03.7°S-119.3°E Magnitude 4.9 Depth 51 km	Tinambung: South Sulawesi - the tremor was felt over a wide area. The area worst hit covered the coastal lowlands extending from Campalagian to Tinambung. A high tsunami was generated during the main shock, causing serious loss of life and property in coastal villages; 58 people were reported killed by the collapse of brick buildings, about 100 people were injured, 13 people were drowned in the sea or missing. Fissures were local in nature and might have been due to the loose formation of the soil in that area.	VII-VIII	E.I.
Origin Time 1967 Apr 12 04h 51m 50.2s UTC Epicentre 05.3°N-97.3°E Magnitude 6.1 Depth 55 km	Aceh: North Sumatera - the earthquake was felt mainly over the eastern coastal areas of Aceh, being located on alluvial deposits, and to the south as far as Kisaran. Farther inland the shock was felt in Takengeun, situated in the mountainous region. No report was received from places on the west coast of Aceh. The maximum intensity, about midway between Lhoseumawe and Sigli, probably did not exceed VIII MMI. The places worst hit were Jeunieb, Pendada and Jeumpa Bireun. Damage was done to 5 mosques, 59 brick and wooden houses which were used for religious purposes, 11 school buildings, 5 bridges and about 2000 brick and wooden dwelling houses.		

Event	Effect	Intensity	Source
	Furthermore, earth-slumps, rock-slides, cracks and fissures were observed over a wide area; mud and sand erupted from fissures in soft, water-saturated deposits at some places. In Sigli the quake was followed by an enormous tsunami. Eastern Aceh is a region of only moderate earthquake activity as compared, for example, with the west coast of Sumatera.	VII	E.I.
Origin Time 1968 Aug 14 22h 14m 15s UTC Epicentre 0.7°N-119.8°E Magnitude 6.0 Depth 23 km	Tambu: Central Sulawesi - generally along the west coast of the northern part of central Sulawesi an increase of high waves was noticed shortly after the main shock, in particular in Tambu Bay; the wave height in Tambu was about 8 to 10 metres and might have reached some coconut-tree tops; the waves swept further inland, to about 100-300 metres from the coast (Tsunami). Most of the beach of the inner part of Tambu Bay is under sea water; slumps with surface trace of faulting and hot springs in several places were observed. Loss of life and considerable damage were chiefly caused by the tsunami along the coast of Mapaga (200 people killed and missing, 790 wooden houses wrecked). In Tambu 7 wooden houses on pillars have been moved in a northwesterly direction. In Sabang a roaring sound was reported. The small island of Tuguan is uninhabited and is still intact. The main shock seemed to be followed by after shocks and one of those was shallow (11 km). A report from Central Sulawesi about a sound		

Event	Effect	Intensity	Source
	that was also heard in Tambu on October 19, 1968 would strengthen the report of the presence of the shallow earthquake which was detected at 0.1°N-119.8°E in Mapaga Bay.	VII-VIII	E.I.
Origin Time 1969 Feb 23 00h 36m 55.6s UTC Epicentre 03.1°S-118.5°E Magnitude 6.1 Depth 13 km	Majene: South Sulawesi - this quake killed 64 people, 97 others were injured and about 1287 man-made structures were wrecked including mosques which completely collapsed due to poor construction. The place worst hit was Majene.		
	Eighty percent of brick buildings sustained serious damage; some of them completely collapsed.		
	The pier of the harbour was cracked in several places possibly due to a subsidence of the submarine surface just outside the harbour; gaping cracks, about 50 m long, caused three brick buildings serious damage; the centre market completely collapsed resulting in several deaths and severe property damage.		
	Campalagian and Wonomulyo, located on alluvium and respectively about 30 km and 50 km east of Majene, also sustained structural damage. Generally wooden houses were able to resist the shaking and much of the damage there was caused by the collapse of unreinforced concrete walls.		
	A tsunami generated by the quake struck the coastal villages north of Majene.		
	The wave height reached about 4 m at Paletoang and 1.5 m at Parasanga and Palili.		

Event	Effect	Intensity	Source
	The construction in the villages was principally wood frame and, due to their location at the end of a bay, the wooden houses were swept away the tsunami. In these coastal places banana trees were almost totally destroyed. Damage to the mosque was probably due to the fact that the old structures were made of brick without reinforcing iron rods. Several bridges were damaged in this narrow lowland plain. Between Somba and Parasanga great blocks of Neogene marls and tuffs tumbled down and in some places the road was buried by these blocks. Also from the edge of the raised coral reefs greater and smaller parts were loosened and tumbled down onto the beach. Fissures were also observed at several places. People interviewed said a roaring sound was heard coming from the sea. The shock was felt as far south as Ujung pandang.	VIII	E.I.& S.I.
Origin Time 1969 Nov 02 18h 53m 06.6s Epicentre 06.5°S-107.1°E Magnitude 5.4 Depth 57 km	Sukabumi: West Java - a relatively strong earthquake was felt in southern West Java. In the Bogor area suspended objects swung as a result of the shock; in Campaka, where the intensity was highest, the only known structural damage was cracks produced in the walls of some badly constructed buildings. The shock was also slightly felt in Jakarta. In the south Bogor area, an aftershock seemed to be felt one hour later. In Sukabumi a poorly constructed brick building was		

Event	Effect	Intensity	Source
	reported collapsed as a result of this earthquake.	V	E.I.
Origin Time 1971 Jan 10 07h 17m 03.7s UTC Epicentre 03.1°S-140.1°E Magnitude 7.3 Depth normal	Sentani: Irian Jaya - the quake was felt in most places in northern Irian Jaya and rocked Jayapura and Sentani. In Jayapura cracks developed in walls of brick buildings and ten wooden buildings on pillars floating on water collapsed completely. In Sentani, 40 km away from Jayapura, a church was cracked and at 10 km further inland about 14 wooden houses on pillars toppled. In Genyem, about 40 km away from Sentani, earth-slumps and fissures which erupted mud and sand were observed. A sound was heard like gun fire. This area is sparsely inhabited and the sketchy information is due to difficult communications.	VI-VII	E.I.& S.I.
Origin Time 1971 Feb 04 15h 33m 22.0s GMT Epicentre 0.6°N-98.8°E Magnitude 6.3 Depth normal	Sibolga: North Sumatera - damage to brick buildings developed in Pasaman, Natal, Pinangsore, Sibolga and Pasir Ulu estate. Fissures were observed in Sibolga and hot springs developed in Tarutung. The shock was generally felt in various places in the eastern part of north Sumatera and as far east as Singapore. No loss of life was reported from this earthquake.	V-VI	E.I.& S.I.
Origin Time 1971 Jun 16 14h 44m 22.5s Epicentre	Bantar Kawung: Central Java - the shock was generally felt in western Central Java. The place worst hit was Buaran, about 6		

Event	Effect	Intensity	Source
7.2°S-109.1°E Magnitude 5.2 Depth 35 km	km west of Bumiayu; further, in Bantar Kawung and Jipang, respectively some 12 and 17 km west of Bumiayu, most brick buildings suffered considerable damage. In the affected area 1377 buildings sustained damage; wooden houses generally resisted shaking but some poorly constructed buildings slanted toward east or west and some collapsed completely. Despite this only one person was reported killed and 6 injured. The damage might have been due to old structures made of brick which are not well cemented and are without reinforcing iron rods. The unconsolidated river deposits may largely be responsible.	VII-VIII	E.I.& S.I.
Origin Time 1972 Sept 06 08h 00m 25.3s UTC Epicentre 2.5°S-119.1°E Magnitude 5.8 Depth 36 km	Mamuju: South Sulawesi - the quake rocked the Mamuju area in the northwestern part of south Sulawesi. Only slight damage to brick buildings resulted from the tremors. The quake was preceded by a roaring sound similar to that of a bomb. The shock was felt as far south as Majene.	IV	E.I.
Origin Time 1972 Nov 04 21h 36m 54.0s Epicentre 08.4°S-112.2°E Magnitude 6.0 Depth 126 km	East Java: Southern Blitar - Trenggalek area experienced an earthquake at 04h 36m L.T. in the morning. Gandusari reported a fairly strong shock as Intensity V-VI MMI. The tremor caused cracks in the walls of brick buildings and a great number of people were awakened from sleep. The shock was felt as far as the Jogyakarta - Surakarta broder and this far-extended felt area strengthened the view that the		

Event	Effect	Intensity	Source
	shock was deeper than normal.	V-VI	E.I.
Origin Time 1972 Dec 19 14h 47m 00s UTC Epicentre 06.9°S-107.8°E Magnitude 4.5 Depth very shallow	Sumedang: West Java - at 21h 47m L.T. on December 19th 1972 the Sumedang area experienced a tremor of moderate strength which was slightly shallower than normal, as indicated by the small area affected. The quake caused slight damage to old brick buildings and panic among the people. In Cibunar, Rancakaleng and Pasaribu villages the intensity was IV MMI. In Sindang village the same quake was felt as V MMI; ground-slides and ground fissures were observed.	V	E.I.
Origin Time 1973 Nov 26 08h 51m 12.8s UTC Epicentre 06.8°S-106.6°E Magnitude 4.9 Depth 62 km	Pelabuhanratu: West Java - in Pelabuhanratu the quake was felt as Intensity III-IV MMI. At Citarik and Cidadap villages, where the intensity was highest, the only known structural damage was slight cracks produced in the walls of old brick buildings and falling of plaster. Ground cracks and ground-slides were observed.	V	E.I.
Origin Time 1974 Feb 27 00h 21m 57.7s UTC Epicentre 2.7°N-125.4°E Magnitude 5.2 Depth normal	Siau Island: North Sulawesi - the quake was followed by an aftershock on March 02. A roaring sound was heard, indicating that the quake was shallow. On March 13, 1974 occurred a shallow earthquake again off the west coast of Siau Island. The shock caused people to panic; due to the continuous strong shocks and the loose formation of the soil in that area, it caused ground-slides,		

Event	Effect	Intensity	Source
	ground cracks and damage to buildings.	V	E.I.
Origin Time 1974 Nov 09 19h 10m 55.2s UTC Epicentre 6.5°S-105.3°E Magnitude 6.1 Depth 51 km	Banten: West Java - this quake caused people to awaken. In Leuwiliang, southern Banten, one stone building collapsed and cracks developed in the walls of some houses. The shock was felt as far as Lampung and Pringasewu in South Sumatera and also in Jakarta by some people.	VI	E.I.
Origin Time 1975 Jan 15 09h 42m 24s UTC Epicentre 5.0°S-130.0°E Magnitude 5.9 Depth: normal	Banda Island: Maluku - heavy damage at Bandanaira, 81 houses seriously damaged, 4 houses moderately damaged and 2 houses slightly damaged. The earthquake was followed by a tsunami.	VII	E.R.
Origin Time 1975 Mar 05 00h 22m 23s UTC Epicentre 02.4°S-126.1°E Magnitude 6.5 Depth normal	The shock felt by many people in Sanana - Sula Island at 01.30 UTC for 8 seconds and at 02.24 UTC for 1.5 seconds. Cracks in walls and plaster falling. The earthquake was followed by a tsunami. The height of sea water was about 1.20 m; it reached the road in Sanana and caused people to panic. No persons killed.	VI	E.R.
Origin Time 1975 Jul 30 09h 17m 11.6s UTC Epicentre 9.9°S-123.9°E Magnitude 6.1 Depth 30-50 km	Kupang: Timor Island - the walls of many houses fell, cracks in walls, plaster fell. No damage to buildings or houses of good construction. The earthquake was followed by a sound like thunder from the ground.	VII	E.R.
Origin Time 1976 Feb 14 2[illegible]h 31m 49s	Purwokerto: Almost everyone was awakened from sleep due to the earthquake and the sounds from		

Event	Effect	Intensity	Source
UTC Epicentre 7.2°S-109.3°E Magnitude 5.6 Depth: 22 km	the buildings/houses. The shock was also felt at Ajibarang, Kedungbanteng, Tegal, Brebes, Pekalongan, Magelang and Semarang. No damage reported.	IV	E.R.
Origin Time 1976 Jun 20 20h 56m 31.7s UTC Epicentre 3.2°N-96.3°E Magnitude 6.1 Depth 33 km	Kotacane: Aceh - cracks occurred in the walls of the local government office building. Sibolga - cracks in walls of the poer-house building at Pinangsore Airport. The earthquake was also felt by many people in Banda Aceh and Medan, but no damage was reported.	VII	E.R.
Origin Time 1976 Jun 25 19h 18m 29s UTC Epicentre 3.2°S-142.8°E Magnitude 6.8	Jayapura: The shock felt by many people but no damage was reported. According to the newspaper report, the earthquake caused a landslide and ground cracks in the hinterland of Irian Jaya.	IV	E.R.
Origin Time 1976 Jun 25 19h 18m 55.5s UTC Epicentre 4.6°S-139.8°E Magnitude 7.0 Depth: 33 km	Bime, Epiomek, Nalca and Okbad in Irian Jaya: Severe damage caused by this earthquake. Moderate or slight damage occurred in langda, Ambon, Japil, Oksibil. Due to the lack of transport and communications no complete report available.	VIII	E.R.
Origin Time 1976 Jul 14 07h 13m 22s UTC Epicentre 8.2°S-114.9°E Magnitude 6.2 Depth: normal	Seririt and Busungbiru: 90% brick buildings and houses collapsed. In Tabanan and Jembrana more than 75% buildings and houses severely damaged. 559 people killed, 850 people seriously injured and some than 3200 injured.	VIII	E.R.
Origin Time 1976 Oct 29 02h 51m 01s	Nalca: Bime - 62 people killed. Langda - 46 people killed.		

Event	Effect	Intensity	Source
UTC Epicentre 4.7°S-140.2°E Magnitude 6.0 Depth 30-50 km	The wooden houses of native people, which were built on the slope, collapsed and were buried by a landslide, but the wooden houses which were built on the flat ground suffered no damage.	VIII	E.R.
Origin Time 1977 Jan 26 13h 11m 29.5s UTC Epicentre 8.25°S-115.3°E Magnitude 5.0 Depth normal	Bangli: Bali - this relatively strong quake was felt in Bangli and surroundings. In Kayubihi village cracks were produced in the walls of one semi-permanent school building; a monument and temple collapsed. About 90% of houses damaged. In Banjar Antugan Jehem village more than 80% of buildings and houses cracked. Ground-slides and cracks in the ground were observed in the Melangit River, about 500 m eastward of Kayubihi and Antugan. No deaths or injuries reported.	VI	E.R.
Origin Time 1977 Mar 08 23h 17m 29s UTC Epicentre 0.4°N-99.7°E Magnitude 6.0 Depth normal	Pasaman: West Sumatera - in Sinurat the quake caused serious damage to 737 houses, one market, 7 school buildings, 8 mosques and 3 office buildings. In Talu 245 houses, 3 school buildings and 8 mosques also damaged. Almost all wooden houses in that area were slanted and shifted from their foundations. Cracks in the ground 5-75 cm wide were observed. The quake was felt at Padang and Pandangpanjang with intensity of III MMI. No deaths or injuries reported.	VIII	E.R.

Event	Effect	Intensity	Source
Origin Time 1977 Aug 19 19h 06m 08s UTC Epicentre 11.1°S-118.5°E Magnitude 7.0 Depth 33 km	Sumbawa: East Nusatenggara - the quake was an under-sea quake and its epicentre was far from the land but, due to the tsunami which accompanied it, most of the southern part of the sea coast of Bali, Lombok, Sumbawa and Sumba was damaged. In Kuta-Bali one person killed and 5 houses collapsed, 26 boats damaged or missing. In Lombok 20 persons killed, 115 houses damaged, 132 boats missing or damaged. In Sumbawa 81 people killed, 53 people missing; more than 1000 people lost their property; 63 houses, one school building, one mosque collapsed and the others were cracked. The quake also caused damage to some office building and school buildings and a mosque and market in Sumbawa and Bima. In the whole of Nusatenggara Island the quake resulted in 107 people killed, 54 people missing, 440 houses damage/ collapsed, 467 boats missing or damaged, 5 school buildings collapsed and 3 teachers' houses damaged.	VII	E.R.
Origin Time 1979 Apr 28 03h 29m 55.5s UTC Epicentre 0.7°N-99.5°E Magnitude 5.7 Depth normal	Marapi: Eest Sumatera - the quake caused cracks in some houses in Pinangsore - Sibolga. The shock also felt in Padang, Padangpanjang, Bukittinggi, Batusangkar and caused people to panic. Two days after, at midnight on April 30, the Marapi disaster occurred, because materials such as stones and soil crashed down from the top and slopes of the mountain. The materials from Marapi washed away everything and resulted in 64 people killed, 9 people missing, 193		

Event	Effect	Intensity	Source
	houses collapsed, 42 bridges damaged, 138 dams and irrigation schemes destroyed, 34 cattle killed. The disaster might have been caused not only by the quake but also by the heavy rain in Marapi and the surrounding district.	V	E.R.
Origin Time 1979 May 30 09h 38m 53s UTC Epicentre 8.2°S-115.9°E Magnitude 6.1 Depth 25 km	Lombok: Nusatenggara - in Tanjung many houses and buildings collapsed, especially the poorly designed structures and old houses/buildings. Some people killed and injured. Other affected areas were Buyan, Gangga, Kediri, Cakranegara Narmada, where many buildings and houses were also seriously damaged and some even collapsed. Two mosques in Narmada and Cakranegara suffered moderate damage, cracks developed in their walls. The tower of the mosque in Kediri cracked. In Ampenan and Mataram the quake caused only slight damage to houses/ buildings. In fact, the damage to houses/buildings was due to old or poor construction.	VIII-IX	E.R.
Origin Time 1979 Jul 23 05h 52m 53s UTC Epicentre 2.5°S-140.4°E Magnitude: 5.7 Depth: normal	Sentani, Jayapura: Irian Jaya - the shocks caused damage to buildings and houses in Sentani.	VII	E.I.
Origin Time 1979 Sept 12 05h 17m 52.4s UTC Epicentre 1.8°S-136.1°E Magnitude 6.4 Depth 50 km	Japen - Serui: Irian Jaya - this earthquake killed 2 people and injured 5 people slightly in Japen and Jobi villages. Many houses, buildings, school buildings and clinics collapsed or were seriously damaged. The villages that experienced damage are Ansus, Papuma,		

Event	Effect	Intensity	Source
	Serui, Ariepie, Aromarea, Sarawandori, Serui Laut, Kabuaena, Borai, Menawi, Kointunai, Dawai, Randawaya and Warironi. All the above-mentioned are located in the Japen District.	VII	E.R.
Origin Time 1979 Oct 20 01h 42m 9s UTC Epicentre 8.25°S-116.0°E Magnitude: 5.8 Depth: normal	Karangasem: Bali - the quake caused moderate damage to buildings and houses in Karangasem, Ampenen, and Mataram on Lombok Island, eastward of Bali.	VI	E.I.
Origin Time 1979 Nov 02 15h 53m 2.6s UTC Epicentre 8.6°S-107.8°E Magnitude 6.4 Depth 64 km	Tasikmalaya: West Java - in Tasikmalaya and surroundings the quake caused 163 houses and buildings to collapse; 1430 houses were seriously damaged; one meeting hall and 24 school buildings were damaged, 3 mosques collapsed and 29 were seriously damaged; 159 newsstand were severely damaged.		
	In Garut most old and poorly constructed stone houses collapsed; many permanent houses had cracks in walls. 10 people killed, 12 seriously injured. Cracks in the ground in an east-west direction were observed. The quake was accompanied by a roaring sound from under the ground. Abnormal sea tides were observed 2 days before the quake occurred in Pameungpeuk.	VII	E.R.
Origin Time 1979 Dec 15 00h 02m 37s UTC Epicentre 3.5°S-102.4°E Magnitude 6.0 Depth	Bengkulu: Sumatera - the quake caused damage in Kepahiang and Curup. No-one killed or injured by this quake, but many houses and building seriously damaged.		
	In Kepahiang, more than 550 houses seriously damaged and in the Rejang Lebong area around		

Event	Effect	Intensity	Source
25 km	630 houses also seriously damaged; many others cracked on walls. Ground-slides and cracks were observed. Near Bengkulu, many houses were shifted from their foundations and water pipes were broken.	VII-VIII-IX	E.R.
Origin Time 1979 Dec 17 19h 58m 26s UTC Epicentre 8.4°S-115.8° Magnitude 5.0 Depth 28 km	Karangasem: Bali - in Karangasem this earthquake killed 5 persons, seriously injured 34 and slightly injured 250. Some houses collapsed, some were seriously damaged, many slightly damaged. In Abang, 17 people killed, 9 seriously injured, 300 slightly injured. Some houses collapsed, others seriously or slightly damaged. In Culik many houses collapsed. In Kubu, one person killed, 2 persons seriously injured and 18 slightly injured. Most buildings seriously or slightly damaged, but no building collapsed. In Bebandem, one person killed, 2 seriously injured and 4 slightly injured. Buildings and houses seriously or slightly damaged. Cracks in the road and land were observed along 0.5 km.	VII-VIII	E.R.
Origin Time 1980 Feb 22 03h 51m 46s UTC Epicentre 1.5°N-124.65°E Magnitude: 5.5 Depth: normal	Manado: North Sulawesi - in Manado cracks developed in some buildings and houses. No one reported killed or injured.	VI	E.I.
Original Time 1980 Apr 16 12h 18m 19s	Tasikmalaya: West Java - in Singaparna many houses had cracks in walls but in Tasikma-		

Event	Effect	Intensity	Source
UTC Epicentre 8.25°S-108.8°E Magnitude 6.4 Depth normal	laya itself only some houses were cracked. In Garut and surroundings the poorly constructed houses had cracks in walls; also in the districts of Sukawening, Pasanggrahan, Jamberea, Caringin etc. many cracks developed in walls. In the Singajaya district 10 elementary school buildings slanted. The quake also caused cracks in houses in Cilacap, Central Java. The shocks were felt in Bandung at Intensity III.	V-VI	E.R.
Origin Time 1980 Aug 17 09h 01m 58s UTC Epicentre 3.7°S-128.5°E Magnitude: 5.4 Depth: normal	Ambon: Maluku - cracks in walls developed in some houses in the city of Ambon. No more damage was observed.	V	E.I.
Origin Time 1981 Jan 01 02h 09m 52s UTC Epicentre 7.7°S-111.0°E Magnitude: 6.0 Depth: Shallow	Karanganyar: Central Jaya - the quake shook Karanganyar and surroundings and caused slight damage to some houses.	VI	E.I.
Origin Time 1981 Mar 13 23h 22m 35s UTC Epicentre 8.95°S-110.4°E Magnitude: 6.0 Depth: normal	Jogyakarta: Central Java - the shock was felt in Jogyakarta and caused small cracks in the walls of the Ambarukmo Hotel. No other buildings or houses damaged.	VII	E.I.
Origin Time 1982 Feb 10 09h 17m 50.2s UTC Epicentre	Sukabumi: West Java - the quake was felt in some places in the Sukabumi and Bogor areas. The shock caused serious or slight damage to many houses and		

Event	Effect	Intensity	Source
7.0°S-106.9°E Magnitude 5.3 Depth: 25 km	buildings and 4 people were injured. No loss of life.	VII	E.I.
Origin Time 1982 Aug 06 20h 40m 52.5s UTC Epicentre 8.35°S-120.35°E Magnitude 5.6 Depth 18 km	Ruteng: Flores Island - in Ruteng the quake was strong enough to make people panic and run out from their houses. No building or house collapsed, but one hospital, one school building and one government office building and some houses were seriously damaged, and a microwave station building was slightly damaged.		
	In Pagal, north of Ruteng, two school buildings, one church and 2 clinics were slightly damaged, cracks developed in walls and plaster fell. Cracks in the ground were observed.	VI-VII	E.R.
Origin Time 1982 Aug 23 16h 46m 34.7s UTC Epicentre 0.06°N-121.23°E Magnitude 4.7 Depth: 5 km	Una-Una: Central Sulawesi - a small island in Central Sulawesi Province was hit by a moderate earthquake. The walls of several houses fell. Cracks developed in walls and plaster fell. No deaths or injuries were reported.	VII	E.R.
Origin Time 1982 Dec 25 12h 28m 2.7s UTC Epicentre 8.4°S-123.04°E Magnitude 5.1 Depth normal	Larantuka: Flores Island - the quake caused serious damage in Larantuka, Solor and on Adonara Island in east Nusatenggara Province.		
	Hundreds of houses collapsed and thousands were slightly damaged, 13 people were killed, 17 injured and more than 400 slightly injured.	VII-VIII	E.I.
Origin Time 1983 Mar 12 00h 53m 36s UTC	Ambon: Maluku - the shock caused slight damage in Ambon. The quake was accompanied by a tsunami along the coast of		

Event	Effect	Intensity	Source
Epicentre 4.4°S-128.05°E Magnitude: 5.8 Depth: 25 km	Ambon.	VI	E.I.
Origin Time 1983 Apr 04 02h 51m 13.9s UTC Epicentre 5.8°N-93.27°E Magnitude 6.6 Depth 51 km	Banda Aceh: North Sumatera - the quake caused both serious and slight damage at Banda Aceh. The walls of school buildings collapsed and window panes were broken. Some of the Government buildings, for example the Treasure building, TV station building, one room of the University building and the telephone office building, were damaged.		
	In Meulaboh on the west coast of Aceh one building was slanted.	VI	E.I.
Origin Time 1983 Oct 16 05h 32m 24.8s UTC Epicentre 1.48°N-121.01°E Magnitude: 5.9 Depth: 46 km	Toli-Toli: Central Sulawesi - according to the news in the Kompas newspaper, on October 21, 1983 the quake caused 20 houses in Toli-Toli to collapse and 15 aborigines' houses were seriously damaged.	VI	E.I.
Origin Time 1983 Oct 22 21h 48m 44.4s UTC Epicentre 4.0°N-126.6°E Magnitude: 4.9 Depth: 118 km	Sangihe-Talaud: North Sulawesi - in the Sangihe-Talaud Islands cracks developed in the walls of buildings. No loss of life was reported.	V	E.I.
Origin Time 1983 Oct 25 00h 36m 19.4s UTC Epicentre 1.6°N-120.8°E Magnitude: 6 Depth: 50 km	Central Sulawesi: The quake was strong enough to cause 2 people killed, 4 injuried and 24 houses seriously damaged, of which 20 collapsed. The shock was also felt in Palu, the capital of Central Sulawesi Province.	VII	E.I.

Event	Effect	Intensity	Source
Origin Time 1983 Oct 31 03h 37m 54.5s UTC Epicentre 9.55°-119.09°E Magnitude: 6.5 Depth: 179 km	Waingapu - Sumba - Nusatenggara: Some houses around Mauhau Airport in Waingapu had cracks in their walls. The quake was felt in Ujungpandang and Denpasar (Bali).	V	E.I.
Origin Time 1984 Jan 08 15h 24m 14.4s UTC Epicentre 2.94°S-118.73°E Magnitude 5.9 Depth 95 km	Mamuju: Central Sulawesi - this quake killed 2 persons, seriously injured 5, slightly injured 84.		
	In the affected area 15 government office buildings, 23 government houses, 31 school buildings, one clinic, one news-stand seriously damaged and about 16 government office buildings, 12 government houses, 14 school buildings and two clinics slightly damaged. Besides this above-mentioned damage, 213 local people's houses, 4 shops, 18 mosques and one church were seriously damaged and 321 people's houses, 4 shops, 13 mosques and 1 church were slightly damaged. Ground-slumps were observed in Tapalang. The shock was also accompanied by a tsunami.	VII	E.R.
Origin Time 1984 Aug 27 06h 41m 25.5s UTC Epicentre 1.5°-98.94°E Magnitude 4.8 Depth 53 km	Pahae Jae - Tapanuli - North Sumatera: In Sarula, three elementary school buildings and one junior high school building collapsed, one senior high school building was seriously damaged and the school caretaker's house shifted 30 cm from its foundations. Cracks developed in the walls of the local authority office, post office building, clinic.		
	In Perdamaian And Selangkitang villages two elementary school buildings partly collapsed.		

Event	Effect	Intensity	Source
	Groundslides were observed. On the road between Tarutung and Padangsidempuan cracks in the ground developed and sulphurous gas was emitted.	VIII	E.R.
	In Pinangsori-Sibolga small cracks developed in the walls of houses.		
	The quake was felt as far as Gunung Sitili on Nias Island, Rantau Prapat and Balige (Toba Lake).		
	According to the news, the shock was also felt along the west coast of Malaysia.		

REFERENCES

Bullen, K.E. 1947, An Introduction to the Theory of Seismology, Cambridge University Press.

Hodgson, J.H. 1984, Earthquake and Earth Structure, Englewood Cliffs, New Jersey, Prentice-Hall.

Milne, 1911, A Catalogue of Destruction Earthquakes A.D. 7 to A.D. 1899., London, Offices of the British Association for the Advancement of Science.

Richter, C.F. 1958, Elementary Seismology, San Francisco, W.H. Freeman and Company.

Sutadi, R., 1962, Seismic Zones in Indonesia, Jakarta, Meteorological and Geophysical Service.

Sutadi, R., 1971, Seismology in Indonesia, Jakarta, Meteorological and Geophysical Service.

PART B

ATTENUATION FUNCTION OF INTENSITY FOR EARTHQUAKES OF INDONESIA

PART B ATTENUATION FUNCTION OF INTENSITY FOR EARTHQUAKES OF INDONESIA

Introduction

Attenuation rate of intensity is calculated based on the assumption that intensity level decreases exponentially with respect to epicentral distance.

Mathematical formulation of the attenuation of intensity is:

$$I_x = I_o \cdot e^{-bx} \text{ (in MMI)}$$

where I_x = intensity level at x km epicentral distance
I_o = intensity level at the epicentre
b = attenuation rate of intensity
x = epicentral distance in km

Intensity levels are interpreted from macroseismic reports of destructive earthquakes in Indonesia which, for this paper, are limited to mediterranean events only.

Twelve out of twenty examples from macroseismic data have yielded a correlation coefficient greater than 0.65. Attenuation rates range from 0.001 up to 0.021. Due to lack of data, it is still difficult to determine the dependence of attenuation rate on magnitude and focal depth. However, it can be roughly concluded that shallow inland earthquakes have greater attenuation rates than deep submarine earthquakes. Of course, local conditions, such as population density, soil stability and building quality also make a considerable effect.

Attenuation Function Analysis

The relation between intensity level (in MMI scale) and epicentral distance (in km) has been calculated for several destructive earthquakes in Indonesia. The hypothetical attenuation form used in this analysis is taken from Bolt and Abrahamson (1982).

For the purpose of simplification and easy comparison, this paper will deal with mediterranean earthquakes only. Another reason is that their epicentres are distributed along densely populated areas, such as Java, Sumatera and Bali. Therefore, it can be expected that the macroseismic reports for these areas are relatively complete.

Twenty examples of macroseismic data have been analyzed to determined their attenuation rates of intensity.

Table 1 shows those earthquakes in chronological order. There are actually many more examples of macroseismic data, but

most do not contain complete reports, especially those for MMI below III and IV. Even in this analysis not all data could be taken into calculation either because the report was doubtful or the location could not be identified.

Attenuation function of intensity is calculated here based on the assumption that intensity level decreases exponentially with respect to epicentral distance, without taking into account geometrical spreading. The reason for not considering geometrical spreading is that intensity level is partly a matter of interpretation; consequently, exact values cannot be expected. The case would be different if the data to be analyzed related to ground acceleration.

By means of linear regression analysis, it was found that 12 out of 20 examples of macroseismic data have given good correlation between intensity level and epicentral distance. Their attenuation curves are shown in Figures 1-12, while their attenuation rates are listed in Table 2. From this Table, it is seen that 9 out of 12 linear regressions have a correlation coefficient even greater than 0.80.

The only unexpected result encountered in the attenuation function analysis is that the earthquake of Pudjon (see Fig. 12) has an I_o greater than XII which should have been impossible. Fortunately, it was a submarine earthquake, therefore its I_o should not be physically interpreted. Probably the result might have been better if focal distance had been used instead of epicentral distance, because the focal depth of the Pudjon earthquake was found to be approximately 100 km. A suggestion to include geometrical spreading, which would lead to a regression analysis of three variables might probably also produce a better result.

Table 1 Destructive Earthquakes in Indonesia
(Selected for Attenuation Function Analysis)

No.	Date	Epicentre	Area of Greatest Destruction	Intensity	Mag	No. of Intensities Interpreted
1.	16 Feb 1861	0.1°S-97.9°E	Simuk, West of Sumatera	VIII	-	8
2.	01 Apr 1921	2.4°N-98.8°E	North Sumatera	VII-VIII	6.7	12
3.	28 Jun 1926	0.7°S-100.6°E	Padang Panjang	IX	6.7	10
4.	24 Aug 1936	6.1°N-94.7°E	Banda Aceh	VIII-IX	7.3	4
5.	09 Sep 1936	3.8°N-97.5°E	Kotacane	VIII	7.2	9
6.	27 Sep 1937	8.7°S-110.8°E	Jogyakarta	IX	7.2	18
7.	20 Oct 1958	9.5°S-112.5°E	Podjon, East Java	IX	6.7	7
8.	02 Apr 1964	5.9°N-95.7°E	Banda Aceh	VII-VIII	5.2	11
9.	12 Apr 1967	5.5°N-97.3°E	North Sumatera	VIII	6.1	7
10.	04 Feb 1971	0.4°N-98.5°E	Sibolga, North Sumatera	IX	6.3	8
11.	09 Feb 1975	6.7°S-106.7°E	Sukabumi, West Java	VIII	5.2	12
12.	15 Feb 1976	7.2°S-109.3°E	Purwokerto, Central Java	IV	5.6	15
13.	21 Jun 1976	3.2°N-96.3°E	Kotacane, North Sumatera	VI-VII	6.1	6
14.	09 Mar 1977	0.4°N-99.7°E	West Sumatera	VIII	6.4	10
15.	02 Nov 1979	8.6°S-107.8°E	Tasik Malaya, West Java	VII-VIII	6.4	21
16.	15 Dec 1979	3.5°S-102.4°E	Kepahiang, Bengkulu	IX	6.0	10
17.	18 Dec 1979	8.4°S-115.8°E	Karangasem, Bali	IX	5.8	27
18.	16 Apr 1980	8.3°S-108.8°E	Tasikmalaya, West Java	VI	6.4	29
19.	10 Feb 1982	6.9°S-106.9°E	Sukabumi, West Java	VII-VIII	5.3	9
20.	27 Aug 1984	1.5°N-98.9°E	Pahae Jae, North Sumatera	VIII	4.8	11

Macroseismic Data

Earthquake of Banda Aceh, 2 April 1964
Epicentre: 05.9°N - 95.7°E
Magnitude: 5.2, Depth: 132 km
Data Source: Geophysical Notes No. 3, "Preliminary Notes on the Atjeh Earthquake of April 2, 1964"

No.	Location	x (km)	Reported Effects	MMI
1.	Banda Aceh	47	30-40% of the brick buildings were severely damaged; cracks appeared in a two-storey shopping centre building.	VII-VIII
2.	Sigli	58	Cracks in walls of buildings.	VI
3.	Padangtiji	55	20 brick buildings were severely damaged, some even tumbled down.	VII
4.	Lho Semawe	181	Medium shocks were felt.	V
5.	Langsa	300	Weak shocks were felt.	II
6.	Takengon	191	Rather weak shocks were felt.	II
7.	Meulaboh	194	Rather weak shocks were felt.	II

Macroseismic Data

Earthquake of Tapanuli, 1 April 1921
Epicentre: 02.4°N-98.8°E
Magnitude: 6.75, Depth:
Data source: Volcanic Phenomena and Earthquakes in the East-Indian Archipelago Observed during the Year 1921 (Translation from Dutch)

No.	Location	x (km)	Reported Effects	MMI
1.	Banda Aceh	522	Shocks were noticeably felt.	II-III
2.	Deli	124	Shocks were noticeably felt.	II-III
3.	Penang	376	Shocks were noticeably felt.	II-III
4.	Gunung Sitoli	182	Shocks were noticeably felt	II-III
5.	Medan	131	Shocks caused water to pour from a reservoir.	IV-V
6.	Tarutung	131	Slight damage to buildings	VI
7.	Muara	12	Strong quakes disturbed water in Lake Toba.	VII
8.	Nainggolan	12	Strong quakes disturbed water in Lake Toba.	VII
9.	Batangtoru	103	Cracks appeared in the ground surface.	VII-VIII
10.	Sipoholan	33	Cracks appeared in the ground surface.	VII-VIII

Macroseismic Data

Earthquake of Kotacane, 9 September 1936
Epicentre: 03.8°N-97.5°E
Magnitude: 7.2, Depth:
Data source: Volcanic Phenomena and Earthquakes in the East-Indian Archipelago Observed during the Year 1936 (Translation from Dutch)

No.	Location	x (km)	Reported Effects	MMI
1.	Medan	135	People were panic-stricken and running down the street. Clock pendulum stopped swinging, lamp swung, slight damage to buildings.	VI
2.	Karo region	115	Shocks caused severe damage, 17 people were killed by landslides.	VIII
3.	Kotacane	50	Asphalt-constructed road cracked in several places.	VII
4.	Kabanjahe	135	Asphalt-constructed road cracked in several places.	VII
5.	Prapat	203	A strange roaring sound was heard.	IV
6.	Brastagi	127	Walls of a hotel cracked, some glasses were thrown down and broken.	VI
7.	Langkat	90	Walls of a building cracked.	VI
8.	Kuala Lumpur	477	Shock was felt by a few people.	II

Macroseismic Data

Earthquake of Simuk, 16 February 1861
Epicentre: $1^{o}S-97.8^{o}E$
Magnitude: , Depth:
Data source: Earthquakes in the Indonesian Archipelago 1858-1877 (Translation from German)

No.	Location	x (km)	Reported Effects	MMI
1.	Lagundi	57	The shocks lasted for 3 minutes. A tsunami was generated and 50 people were killed.	VII
2.	Gunung Sitoli	135	Strong quakes were felt. A tsunami was also generated. Several houses damaged.	VII
3.	Batu Island	252	A part of the island sank.	VII
4.	Simuk	21	Earthquake caused severe damage 96 out of 120 people's houses damaged, 675 out of 1045 people killed.	VII
5.	Tello Island	50	Severe shocks lasted about 5 minutes and weak shocks lasted for almost a whole night. Tsunamis were generated 4 times.	VII

Macroseismic Data

Earthquake of Pasaman, 9 March 1977
Epicentre: 0.4°N-99.7°E
Magnitude: 6.0, Depth: 30 km
Data source: Pusat Meteorologi dan Geofisika: "Laporan Gempa Bumi Pasaman-Sumatera Barat tanggal 9 Maret 1977

No.	Location	x (km)	Reported Effects	MMI
1.	Padang	171	Shocks were felt by almost everyone.	III
2.	Padang Panjang	125	Shocks were felt by almost everyone.	III
3.	Lubuk Sikaping	62	Shocks were felt severely; a wooden house slanted.	V
4.	Panti	39	Strong quakes caused panic. Light bodies were thrown down, while heavy bodies were shifted.	VI
5.	Talu	31	This region experienced severe damage. About 50% of wooden buildings were destroyed, some permanent stone buildings cracked, some brick buildings even damaged totally.	VII
6.	Sinurut	24	Thir region experienced the severest damage. Almost all wooden buildings were shifted, some even up to 50 cm, from their foundations. Semi-permanent stone houses mostly tumbled down.	VIII
7.	Tinggam	15	The earthquake caused ground fissures 5-75 cm wide and several hundred kilometres long.	VIII
8.	Air Bangis	40	Strong quakes caused people to panic.	VI
9.	Rao	37	Strong quakes caused people to panic.	VI

Macroseismic Data

Earthquake of Pahae Jae, 27 August 1984
Epicentre: 01.5°N-98.9°E
Magnitude: 4.8, Depth: 53 km
Data source: Badan Meteorologi dan Geofisika, "Laporan Bencana Gempa Bumi, Gempa Pahae Jae 27 Agustus 1984"

No.	Location	x (km)	Reported Effects	MMI
1.	Sarula	34	Four school buildings tumbled down, one was severely damaged. A house was shifted 30 cm from its foundations, ground was cracked.	VIII
2.	Tarutung	56	Strong quakes were felt.	IV
3.	Padang Sidempuan	45	Strong quakes were felt.	IV
4.	Sibolga	25	Strong quakes were felt.	IV
5.	Pinang Sori	10	Some houses cracked.	V
6.	Sipirok	44	Official house of military district commandant slightly cracked.	V
7.	Adian Koting	40	Bottles containing water were thrown down from tables.	IV-V
8.	Gunung Sitoli	148	The shocks were noticeably felt.	III
9.	Rantau Parapat	123	The shocks were noticeably felt.	III
10.	Balige	95	The quakes were felt by several people.	II

Macroseismic Data

Earthquake of Sibolga, 4 February 1971
Epicentre: 0.4°N-98.5°E
Magnitude: 6.3, Depth: 33 km
Data source: Meteorological and Geophysical Institute, "Earthquakes in Indonesia 1971"

No.	Location	x (km)	Reported Effects	MMI
1.	Pasaman	152	The quakes caused damaged to brick buildings.	VII
2.	Natal	75	Brick buildings were severely damaged.	IX
3.	Pinang Sori	134	The shocks destroyed some brick houses.	VII
4.	Sibolga	148	Some stone houses were damaged, ground was cracked.	IX
5.	Tarutung	185	Ground was cracked and a hot water foundation was generated.	VIII
6.	Tanjung Balai	315	The shocks were noticeably felt.	III
7.	Pematang Siantar	287	People felt noticeable quakes.	III
8.	Singapura	608	The shocks were felt by many people.	II

Macroseismic Data

Earthquake of Bengkulu, 15 December 1979
Epicentre: 03.5°S-102.4°E
Magnitude: 6.0, Depth: 25 km
Data source: Pusat Meteorologi dan Geofisika, "Laporan Survay Gempa Bumi tanggal 15 Desember 1979 di daerah Bengkulu"

No.	Location	x (km)	Reported Effects	MMI
1.	Kepahiang	25	Most of the platform houses seriously damaged and thrown down from their foundations. Cracks appeared along the road.	IX
2.	Curup	16	Some platform houses broke their pillars. A concrete water tower was also broken.	VIII
3.	Aur Gading	13	Taken from isoseismal maps.	VII-VIII
4.	Tebatembilang	26	Taken from isoseismal maps.	VI
5.	Baru Manis	15	Taken from isoseismal maps.	VII
6.	Gunung Sailan	29	Taken from isoseismal maps.	V
7.	Rimba Pengadang	17	Taken from isoseismal maps.	V-VI
8.	Tesa Penanjung	25	Taken from isoseismal maps.	IV-V
9.	Bengkulu	37	Taken from isoseismal maps.	IV
10.	Muara Aman	45	Taken from isoseismal maps.	IV

Macroseismic Data

Earthquake of Sukabumi, 10 February 1982
Epicentre: 06.95°S-106.94°E
Magnitude: 5.3, Depth: 10 km
Data source: Bandan Meteorologi dan Geofisika, "Laporan Bencana Gempa Bumi, Gempa Sukabumi (Gandasoli) tanggal 10 Februari 1982"

No.	Location	x (km)	Reported Effects	MMI
1.	Nyalindung	9	104 out of 17035 houses were seriously damaged.	VII
2.	Sukabumi	8	36 out of 6819 houses were seriously damaged.	VII
3.	Cisaat	11	8 out of 3406 houses were seriously damaged.	VI-VII
4.	Sukaraja	6	527 out of 34070 houses were seriously damaged.	VII-VIII
5.	Ciomas	49	A house was slightly damaged.	V-VI
6.	Bangung	68	The shocks were noticeably felt.	III
7.	Bogor	45	The shocks were noticeably felt.	III
8.	Pelabuhan Ratu	45	The shocks were noticeably felt.	III

Macroseismic Data

Earthquake of Sukabumi, 9 February 1975
Epicentre: 06.7°S-106.7°E
Magnitude: 5.2, Depth: 27 km
Data source: Pusat Meteorologi dan Geofisika: "Gempa Bumi di Indonesia 1975"

No.	Location	x (km)	Reported Effects	MMI
1.	Cibadak	37	Strong quakes caused damage to buildings.	VIII
2.	Kelapanunggal	25	Strong quakes caused damage to buildings.	VIII
3.	Parangkuda	31	Strong quakes caused damage to buildings.	VIII
4.	Nograk	36	Strong quakes caused damage to buildings.	VIII
5.	Cisaat	43	Strong quakes caused land-slides.	VII
6.	Sukabumi	48	Strong quakes caused land-slides.	VII
7.	Jampang Tengah	57	Strong quakes caused land-slides.	VII
8.	Pelabuhan Ratu	38	Taken from isoseismal maps.	VI
9.	Bogor	9	Taken from isoseismal maps.	VI
10.	Bandung	112	The shocks were noticeably felt.	III
11.	Lembang	111	The shocks were noticeably felt.	III
12.	Jakarta	62	The shocks were noticeably felt.	III

Macroseismic Data

Earthquake of Jogyakarta, 27 September 1937
Epicentre: 08.7°S-110.8°E
Magnitude: 7.2, Depth:
Data source: Earthquakes in the East-Indian Archipelago Observed and analyzed during the Year 1937 (Translation from Dutch)

No.	Location	x (km)	Reported Effects	MMI
1.	Den Pasar	488	The shocks were felt by many people.	III
2.	Mataram	590	The shocks were felt by many people.	III
3.	Singaraja	480	The shocks were felt by many people.	III
4.	Prambanan	110	526 wooden and stone houses collapsed.	IX
5.	Klaten	113	2200 houses were seriously damaged; about half of them were poorly designed structures.	IX
6.	Semarang	195	The shocks were noticeably felt by many people.	IV
7.	Jogyakarta	110	Several chimneys of sugar factories were broken and slanted; houses were destroyed.	IX
8.	Cilacap	224	Cracks developed in walls, roofs were shifted and slanted.	VI
9.	Grabag	156	Cracks developed in the ground, causing sand and mud to be emitted.	VII
10.	Rembun	154	Chimneys of sugar factories swayed strongly.	VI
11.	Padokan	104	Cracks developed in walls and chimneys of sugar factories.	VII
12.	Kutoardjo	146	90 local people's houses totally damaged, 210 others moderately damaged.	VIII-IX

No.	Location	x (km)	Reported Effects	MMI
13.	Papantayan	360	Stones on the slope of a mountain fell down.	V-VI
14.	Kediri	167	Some buildings collapsed, well-designed structures cracked.	VIII
15.	Surabaya	270	The door of an apron cracked severely.	VI-VII

Macroseismic Data

Earthquake of Podjon, 20 October 1958
Epicentre: 09.5°S-112.5°E
Magnitude: 6.7, Depth: 100 km
Data source: Meteorological and Geophysical Service: "Earthquakes in Indonesia 1957-1958"

No.	Location	x (km)	Reported Effects	MMI
1.	Malang	170	Brick buildings were severely damaged.	VIII
2.	Kediri	197	The quakes caused moderate damage to buildings.	VII
3.	Podjon	188	All brick buildings collapsed.	IX
4.	Dawuhan	144	All stone buildings were severely damaged.	VIII-IX
5.	Semarang	362	The shocks were felt by many people.	IV
6.	Sumenep	314	The shocks were felt by many people.	IV
7.	Banyuwangi	246	The shocks were felt by many people.	IV

Table 2 Attenuation Function of Intensity for Mediterranean Earthquakes of Indonesia

No.	Earthquake	Epicentre	Magnitude (R.S)	Depth (km)	Attenuation rate	Correlation coefficient	Data Source
1.	Banda Aceh 2 Apr 1964	5.9°N-95.7°E Submarine	5.2	132	0.006	0.87	GN, no. 3, 1964
2.	Tapanuli 1 Apr 1921	2.4°N-98.8°E Inland	6.7	-	0.002	0.76	VPE, 1921
3.	Kotacane 9 Sept 1936	3.8°N-97.5°E Inland	7.2	-	0.003	0.95	VPE, 1036
4.	Simuk 16 Feb 1861	0.1°S-97.9°E Submarine	-	-	0.001	0.86	AW, 1861
5.	Pasaman 9 Mar 1977	0.4°N-99.7°E Inland	6.0	30	0.007	0.96	BMG-SR, 1977
6.	Pahae Jae 27 Aug 1984	1.5°N-98.9°E Submarine	4.8	53	0.006	0.68	BMG-SR, 1984
7.	Sibolga 4 Feb 1971	0.4°N-98.5°E Submarine	6.3	33	0.003	0.91	BMG-EI, 1971
8.	Bengkulu 15 Dec 1979	3.5°S-102.4°E Inland	6.0	25	0.021	0.73	BMG-SR, 1980
9.	Sukabmi 10 Feb 1982	6.9°S-106.9°E	5.3	10	0.015	0.87	BMG-SR, 1982
10.	Sukabmi 9 Feb 1975	6.7°S-106.7°E Inland	5.2	27	0.010	0.82	BMG-EI, 1975
11.	Jogyakarta 27 Sept 1937	8.7°S-110.8°E	7.2	-	0.003	0.92	VPE, 1937
12.	Podjon 20 Oct 1958	9.5°S-112.5°E	6.7	100	0.88	BMG-EI, 1957-58	

Notes:

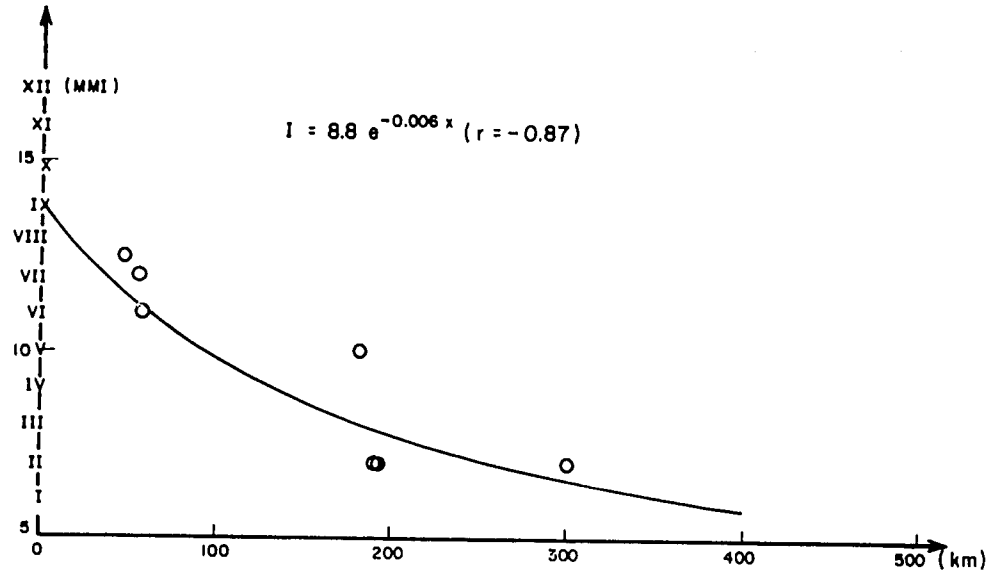
1. GN = Geophysical Notes, published by BMG.
2. VPE = Volcanic Phenomena and Earthquakes in the East-Indian Archipelago.
3. AW = Arthur Wichman : Earthquakes in the Indonesian Archipelago 1858-1877.
4. BMG-SR = BMG's Survey Report.
5. BMG-EI = BMG's Earthquakes in Indonesia, Annual Report.

REFERENCES

Bolt, B.A. and N.A. Abrahamson (1982), New Attenuation Relations for Peak and Expected Accelerations of Strong Ground Motion, Bull. Seism. Soc. Am. 72, 2307-2321.

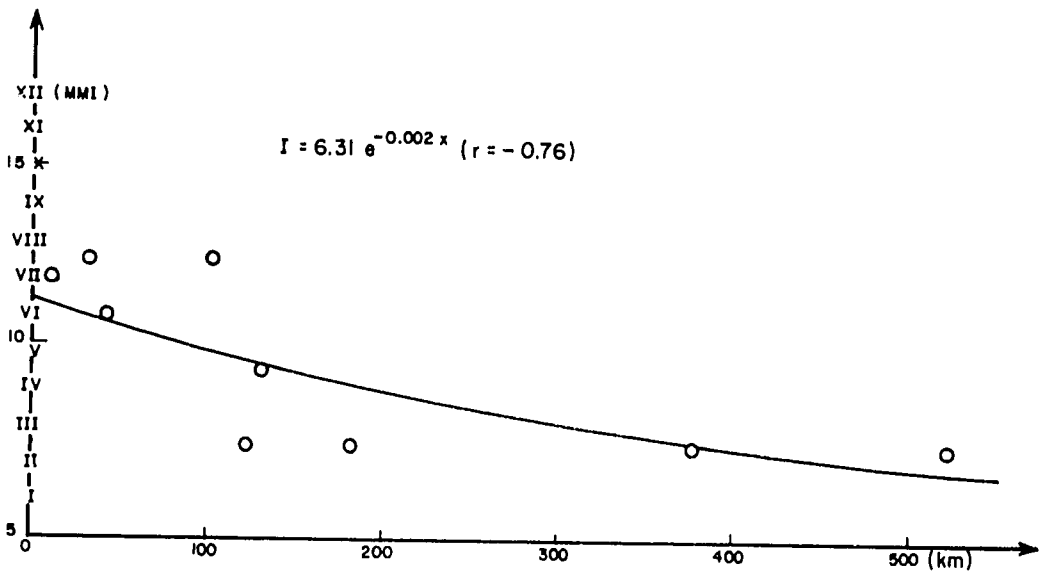
Campbell, W. (1981), Near-source Attenuation of Peak Horizontal Acceleration, Bull. Seism. Soc. Am. 71, 2039-2070.

Schnabel, P.B. and H.B. Seed (1973), Accelerations in Rock for Earthquakes in the Western United States, Bull. Seism. Soc. Am. 63, 501-516.



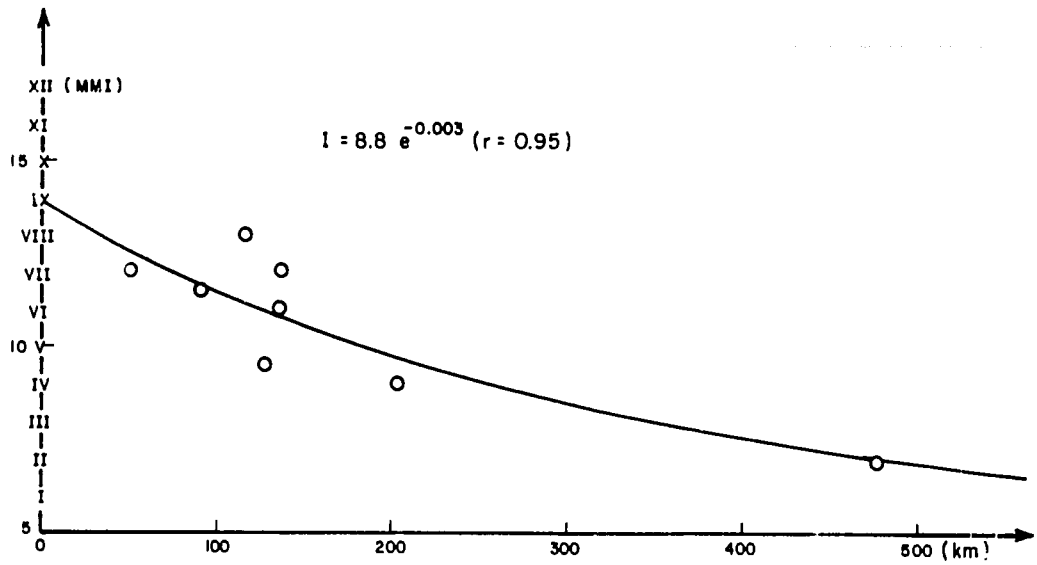
Earthquake of Banda Aceh, 2 April 1964
Epic. 5.9°N -95.7°E, M = 5.2, H = 132 km

Fig. 1 Attenuation Function of Intensity



Earthquake of Tapanuli, 1 April 1921
Epic. 2.4°N - 98.8°E, M = 6.75, H =

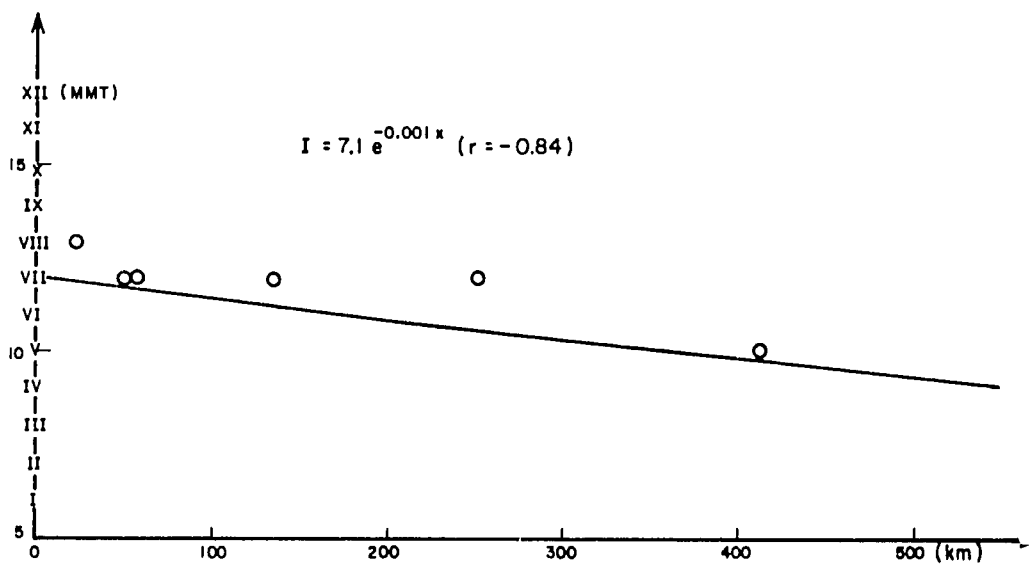
Fig. 2 Attenuation Function of Intensity



Earthquake of Kotacane , 9 September 1936

Epic. 3.8°N - 97.5°E , M = 7.2 , H =

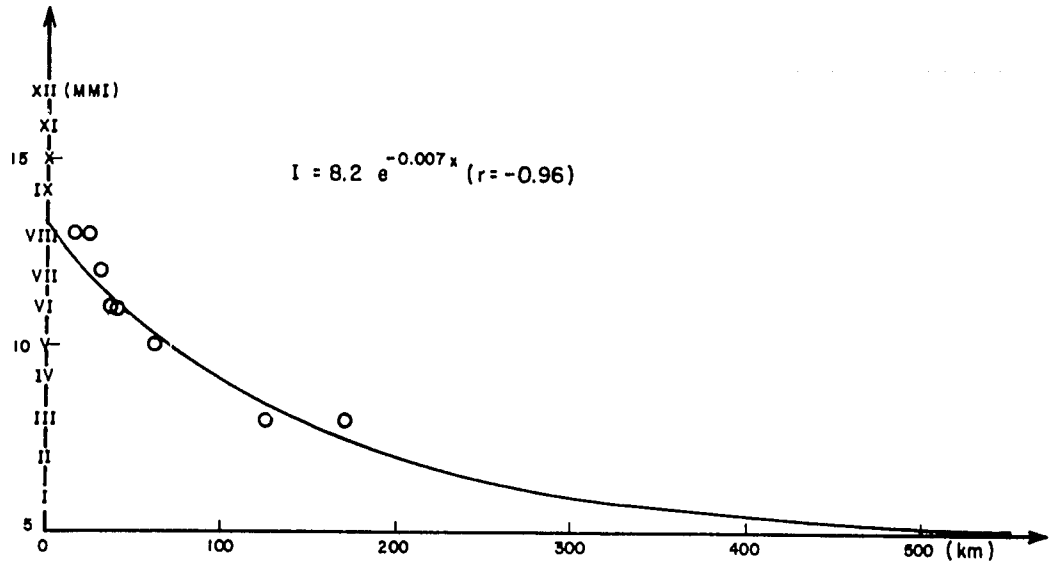
Fig. 3 Attenuation Function of Intensity



Earthquak of Simuk , 16 February 1861

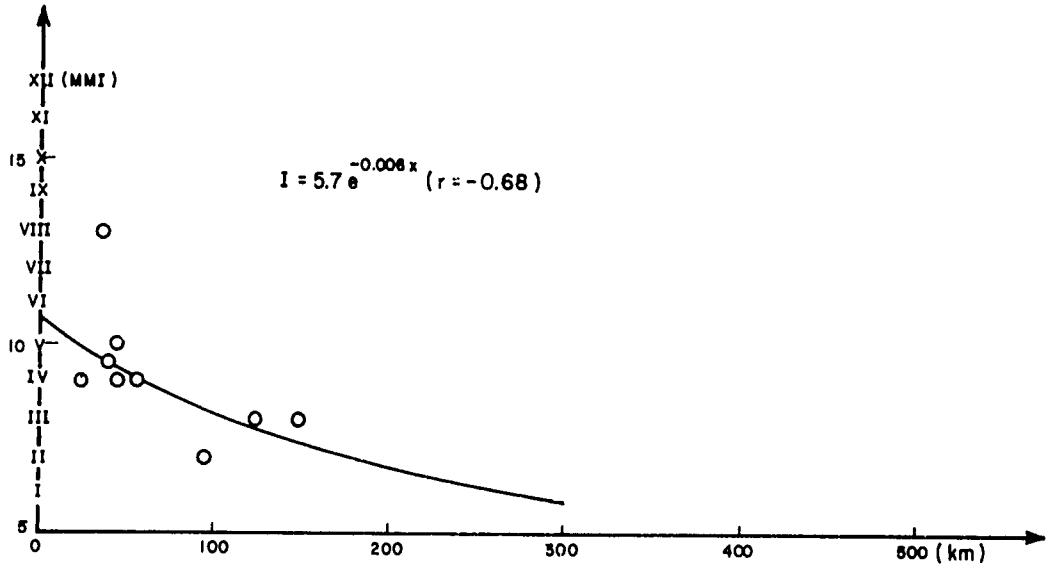
Epic. 0.1°S -97.9°E , M = , H =

Fig. 4 Attenuation Function of Intensity



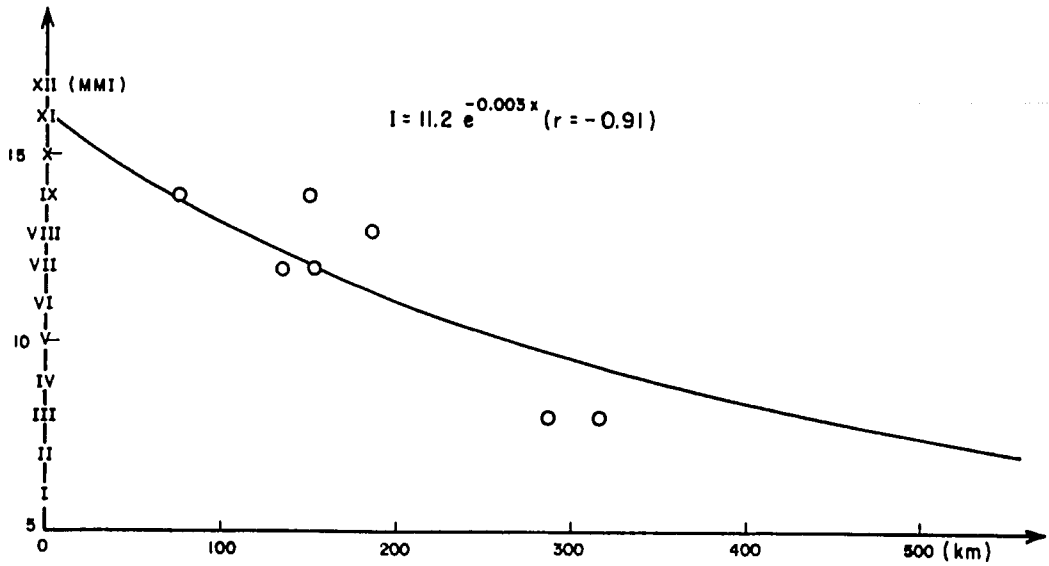
Earthquake of Pasomon , 9 March 1977
Epic. 0.4°N - 99.7°E , M = 6.0 , H = 30 km

Fig. 5 Attenuation Function of Intensity



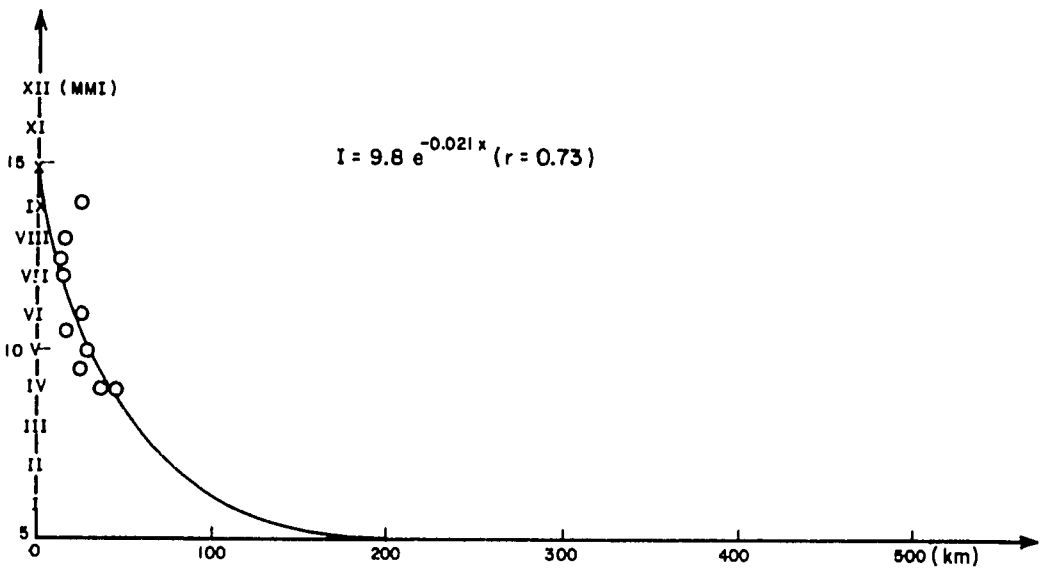
Earthquake of Pahae Jae , 27 August 1984
Epic. 1.5°N -98.9°E , M = 4.8 , H = 53 km

Fig. 6 Attenuation Function of Intensity



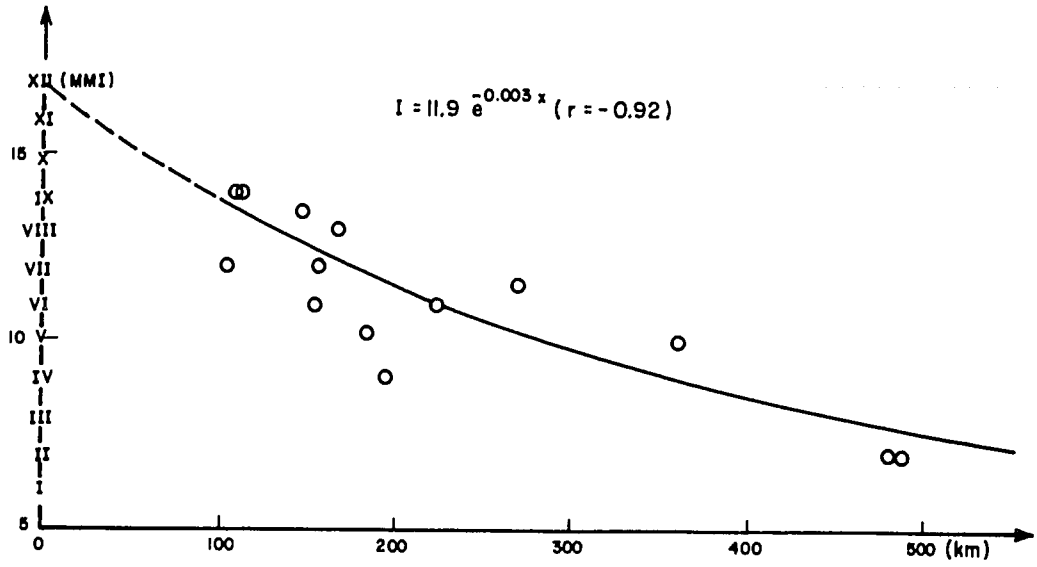
Earthquake of Sibolga , 4 February 1971
Epic. 0.4°N - 98.5° E , M = 6.3 , H = 33 km

Fig. 7 Attenuation Function of Intensity



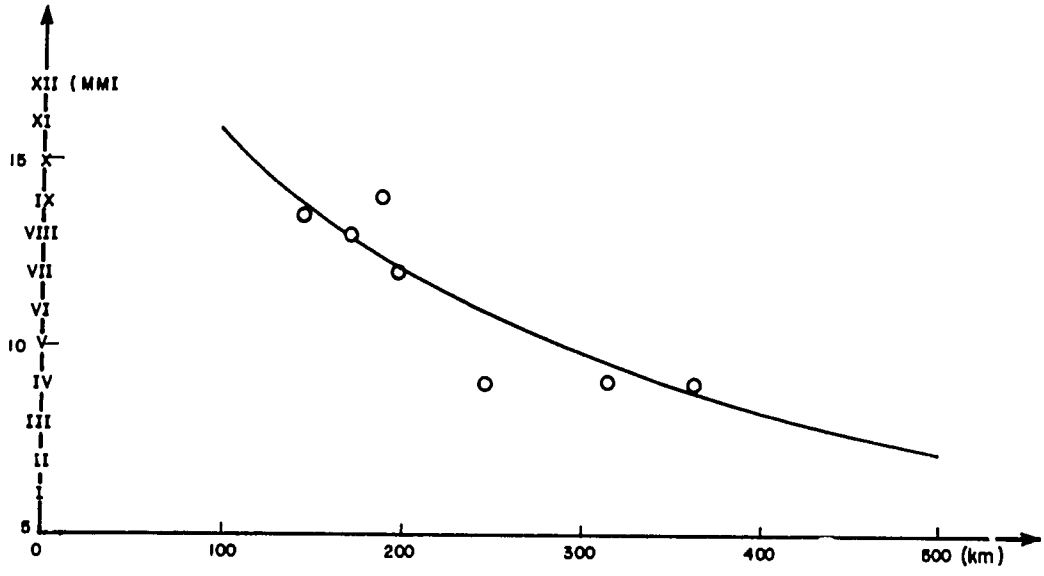
Earthquake of Bengkulu , 15 December 1979
Epic. 3.5°S - 102.4°E , M = 6.0 , H = 25 km

Fig. 8 Attenuation Function of Intensity



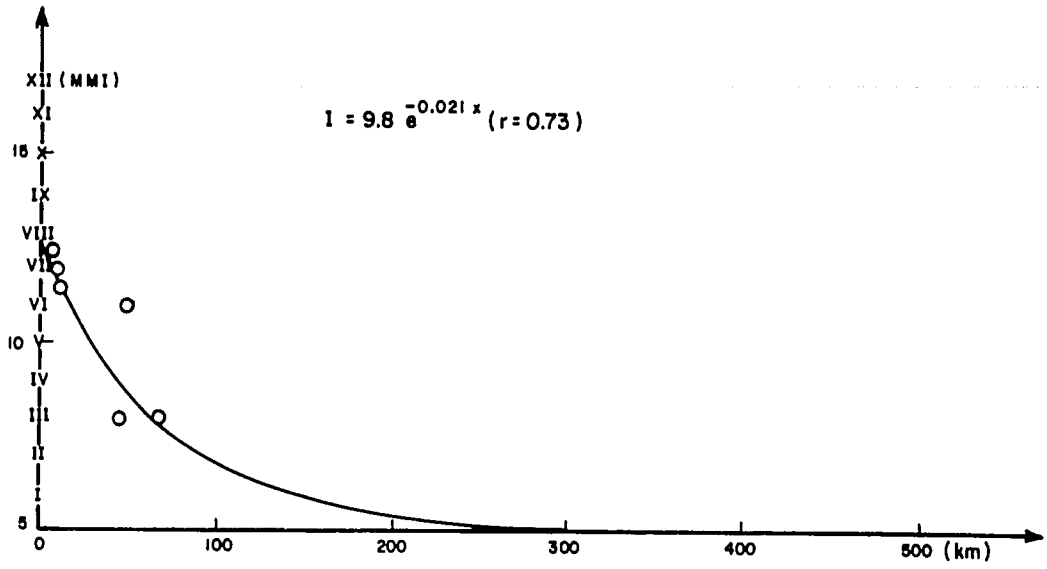
Earthquake of Jogyakarta , 27 September 1937
Epic. 8.7°S - 110.8°E , M = 7.2 , H =

Fig. 11 Attenuation Function of Intensity



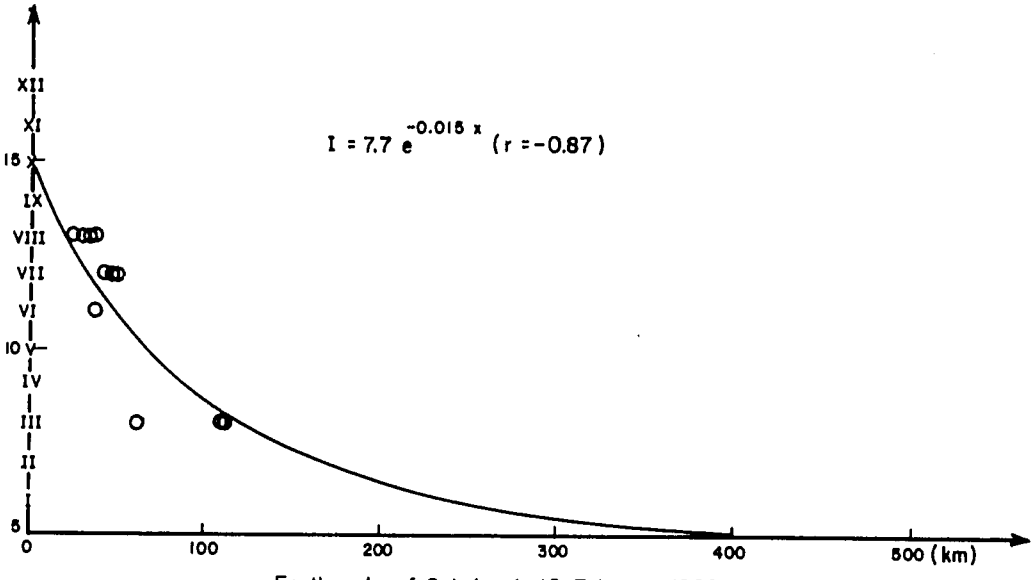
Earthquake of Podjon , 27 October 1958
Epic. 9.5° S - 112.5°E , M = 6.7 , H = 100km

Fig. 12 Attenuation Function of Intensity



Earthquake of Bengkulu , 15 December 1979
Epic. 3.5° S - 102.4° E , M = 6.0 , H = 25 km

Fig. 9 Attenuation Function of Intensity



Earthquake of Sukabumi , 10 February 1982
Epic. 6.95° S - 106.94° E , M = 5.3 , H = 10 km

Fig. 10 Attenuation Function of Intensity

NOTE:

A. World Data Center

1. DS/73 Soedarmo, P. Darmoatmod Jo, 1973. Focal mechanisms and earthquake generting stress system in the Indonesian region. Paper presented at Sumposium on Recent Crustal Movement, Bandung.

2. F/72 Fitch, T.J., 1972. Plate convergence, transurrent faults, and internal deformation adjacent to Southeast Asia and the Western Pacific. J. Geophys. Res., 77, 4432-4460.

3. FA/70 Fitch, T.J., 1970. Earthquake mechanisms and island arc tectonics in the Indonesian-Philippine region. Bull. Seism. Soc. Am., 60, 565-591.

4. FM/70 Fitch, T.J. and P. Molnar, 1970. Focal mechanisms along inclined earthquake zones in the Indonesian-Philippine region. J. Geophys. Res., 75, 1431-1444.

5. JM/72 Johnson, T. and P. Molnar, 1972. Focal mechanisms and plate tectonics of the Southwest Pacific. J. Geophys. Res., 77, 5000-5032.

6. O/1/71 Oike, K., 1971. On the nature of the occurrence of intermediate and deep earthquakes. 1. Bull. Disaster Prev. Res. Inst. Kyoto Univ., 20, 145-182.

7. O/3/72 Oike, K., 1971. On the nature of the occurrence of intermediate and deep earthquake. 3. Bull. Disaster Prev. Res. Inst. Kyoto Univ., 21, 153-178.

8. R/75 Ripper, I.D., 1975. Some earthquake focal mechanisms in the New Guinea-Solomon Islands region, 1969-1971. Rep. Bur. Miner. Resour. Aust., No. 192.

9. SB/74 Sykes, L.R. and M.L. Sbar, 1974. Focal mechanism solutions of intraplate earthquakes and stresses in the lithosphere, in Geodynamics of Iceland and the North Atlantic area, edited by L. Kristjansson. D. Reidel Publishing Company, Dordrecht-Holland, 207-224.

10. TB/65 Teng, T. and A. Ben-Menahem, 1965. Mechanism of deep earthquakes from spectrums of isolated body wave signals. J. Geophys. Res., 70, 5157-5170.

11. WH/67 Wickens, A.U. and J.H. Hodgson, 1967. Computer re-

evaluation of earthquake mechanism solutions. Publ. Obs. (Ottawa), 33, No. 1.

B. JK/79 Djoko Santoso, 1979. Focal mechanism of the Sumbawa Earthquake of August 19, 1977 and tectonic implication. Individual studies by Participants at the International Institute of Seismology and Earthquake Engineering, 15, 33-48.

C. BMG Analysed by BMG, before 1981.

D. BMG Analysed by MBG, on SEASEE project (1982 - June 1983).

E. BMG/84 Analysed by BMG, on SEASEE project (Complement).

Number of Focal Mechanism Solutions on Some Data Sources

Data Source	Frequency
DS/73	35
F/72	64
F4/70	1
FM/70	25
JM/72	4
O /71	10
O3/71	1
R /75	2
R /56	27
RCB/78	20
SB/74	1
TB/65	1
WH/67	2
BMG	465
BMG/84	234
JK/79	9
Total	901

EARTHQUAKE FOCAL MECHANISM SOLUTIONS

Classification	NOE	Solution	N	R	SS	Data Sources						
						Before SEASEE Project					On SEASEE Project	
						Others				Solution by BMG	Others	Solution by BMG
						WDC	R/56	RCBI	JOKO/79		BMG	BMG 84
A. Shallow EQ.	425	458	69	194	195	76	16	7	9	231	94	27
B. Intermediate EQ.	352	353	69	153	131	66	4	9		197	76	16
C. Deep EQ.	71	76	43	19	14	19	8	2		38	9	1

Note:

NOE = Number of Earthquakes
N = Normal Fault
R = Reverse Fault
SS = Strike-slip Fault
WDC = World Data Center
R/56 = Ritsema
RCBI = Richard Cardwell
BMG = Badan Meteorologi dan Geofisika

EARTHQUAKE FOCAL MECHANISM SOLUTIONS

Classification	NOE	Solution	N	R	SS	Data Sources						
						Before SEASEE Project					On SEASEE Project	
						Others				Solution by BMG	Others	Solution by BMG
						WDC	R/56	RCBI	JOKO/79		BMG	BMG 84
Shallow EQ.	425	458	69	194	195	76	16	7	9	231	94	27

EARTHQUAKE FOCAL MECHANISM SOLUTIONS

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB	Magnitude ML	Magnitude MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7			8	9	10	11	12	13	14	15	16
1.	R/56	18 08 38	09 30 04.0	03.80S	102.80E	64			6.9	330/63	150/27	330/18	150/72	060/00	Reverse	-	-	Ritsema
2.	R/56	20 10 38	02 19 29.0	09.20S	123.00E	64			7.3	264/42	156/19	200/44	305/14	048/51	Normal	-	-	Ritsema
3.	R/56	14 02 52	03 38 15.0	07.70S	126.50E	0			7.25	217/03	126/16	173/13	081/10	318/77	Strike-slip	-	-	Ritsema
4.	R/56	19 03 52	10 57 09.0	09.50N	126.00E	0			7.75	228/37	102/38	165/59	075/01	344/29	Normal	-	-	Ritsema
5.	R/56	13 07 52	17 34 30.0	03.10S	127.40E	0			6.75	121/64	253/18	087/25	227/59	349/27	Reverse	-	-	Ritsema
6.	R/56	20 01 53	17 33 07.0	01.50N	126.00E	0				065/01	155/01	111/08	019/06	250/81	Strike-slip	-	-	Ritsema
7.	R/56	06 04 53	00 36 16.0	07.30S	131.00E	0			6.1	217/31	112/23	162/40	256/05	350/58	Strike-slip	-	-	Ritsema
8.	R/56	25 06 53	10 44 57.0	08.50S	123.50E	0			7.1	204/03	114/03	069/00	159/04	320/87	Strike-slip	-	-	Ritsema
9.	R/56	13 11 53	16 17 05.0	03.50N	096.00E	0				018/02	288/01	063/01	333/02	150/88	Strike-slip	-	-	Ritsema
10.	R/56	01 12 53	04 24 51.0	02.75S	141.50E	0			6.6	040/02	130/01	355/01	085/02	260/89	Strike-slip	-	-	Ritsema
11.	R/56	01 01 54	13 04 19.0	09.00S	123.50E	63.7				236/26	327/01	188/17	285/19	059/69	Strike-slip	-	-	Ritsema
12.	R/56	06 06 54	16 50 40.0	03.00S	135.50E	0			6.8	069/88	249/02	069/43	249/47	160/00	Reverse	-	-	Ritsema
13.	R/56	03 07 54	22 31 25.0	06.50S	105.50E	64				217/66	073/24	217/21	037/69	127/00	Reverse	-	-	Ritsema
14.	R/56	20 09 54	00 39 28.0	01.50S	120.50E	0			6.0	254/14	145/52	100/23	217/47	352/45	Reverse	-	-	Ritsema
15.	R/56	03 10 54	23 21 35.0	01.50S	127.50E	0			6.2	201/03	110/10	065/05	155/09	310/82	Strike-slip	-	-	Ritsema
16.	R/56	02 11 54	08 24 10.0	08.00S	119.00E	0			6.6	182/16	091/03	228/09	135/13	350/77	Strike-slip	-	-	Ritsema
17.	WH/67	07 10 60	15 18 29.0	07.72S	130.81E	16			7.3	149/21	043/25	007/04	274/42	102/48	Reverse	-	-	World Data Centre
18.	F/72	24 03 63	02 07 08.0	09.07S	120.54E		5.5			118/38	243/37	090/00	180/59	000/31	Reverse	-	-	World Data Centre
19.	F/72	07 04 63	23 36 02.0	04.94S	103.18E	46	5.7		6.5	024/24	204/66	204/21	024/69	114/00	Reverse	-	-	World Data Centre
20.	JMC2/72	13 04 63	14 31 23.0	03.41S	135.68E	44	5.4		6.1	183/00	000/90	003/45	183/45	000/00	Reverse	-	-	World Data Centre
21.	F/72	16 04 63	01 29 22.0	01.07S	128.03E		5.3		6.6	096/02	006/05	051/04	321/02	204/84	Strike-slip	-	-	World Data Centre
22.	F/72	30 04 63	00 58 16.0	01.23S	128.56E	32	5.2		6.4	270/20	015/40	057/13	315/42	136/59	Reverse	-	-	World Data Centre
23.	F/72	04 06 63	21 10 38.0	01.14S	127.34E	20	5.2		6.1	077/26	333/29	025/39	294/02	204/53	Strike-slip	-	-	World Data Centre
24.	F/72	24 10 63	07 26 29.0	05.07S	102.90E	65	5.7		6.4	028/16	208/74	208/29	028/61	118/00	Reverse	-	-	World Data Centre
25.	F/72	06 11 63	02 13 12.0	02.73S	138.30E		5.4		6.1	211/16	031/74	031/29	211/61	120/00	Reverse	-	-	World Data Centre
26.	F/72	02 04 64	01 11 48.6	05.75N	095.42E	16	5.6			240/04	331/00	196/03	285/03	060/26	Strike-slip	-	-	World Data Centre
	DS/73	02 04 64	01 11 48.6	05.75N	095.42E	65	5.6			250/10	158/10	204/14	294/00	024/74	Strike-slip	0.70	57	World Data Centre
27.	DS/73	23 04 64	03 32 51.0	05.42S	133.99E	33	6.5			272/21	021/41	318/46	061/12	162/42	Normal	0.72	71	World Data Centre
28.	FM/70	10 06 64	22 15 39.0	05.02N	127.43E	23	5.1			148/40	328/50	328/05	148/85	058/00	Reverse			World Data Centre

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
29.	DS/73	12 06 64	10 50 08.3	02.06S	141.10E	23	5.1	340/20	242/20	021/00	291/29	111/61	Reverse	0.88	17	World Data Centre
30.	F/72	30 06 64	13 46 18.5	00.50S	122.61E		5.8	060/11	240/79	060/55	240/35	330/00	Normal			World Data Centre
	DS/73	30 06 64	13 46 18.5	00.50S	122.61E	15	5.8	316/61	136/29	136/29	316/16	226/00	Normal	0.87	32	World Data Centre
31.	DS/73	25 07 64	21 29 35.6	02.80N	128.40E	22	5.3	301/31	051/30	266/01	357/46	175/44	Reverse	0.83	18	World Data Centre
32.	DS/73	04 09 64	10 34 13.1	03.90S	131.49E	33	5.7	287/11	017/01	242/07	333/00	112/79	Strike-slip	0.77	43	World Data Centre
33.	F/72	15 09 64	15 29 38.8	08.90N	093.03E	32	6.3	051/20	168/52	204/17	088/52	308/34	Reverse	-	-	World Data Centre
34.	F/72	11 10 64	21 15 06.2	00.62S	121.68E	45	5.7	053/31	177/42	109/56	206/06	301/33	Normal	-	-	World Data Centre
	DS/73	11 10 64	21 15 06.2	00.62S	121.68E	55	5.7	332/02	063/21	109/13	015/16	237/69	Strike-slip	0.74	66	World Data Centre
35.	F/72	12 10 64	15 42 55.1	03.02N	126.50E	53	5.5	270/18	032/60	070/22	301/56	172/24	Reverse	-	-	World Data Centre
	DS/73	12 10 64	15 42 55.1	03.02N	126.50E	62	5.5	100/08	003/40	315/21	060/34	199/49	Strike-slip	0.83	42	World Data Centre
36.	DS/73	17 10 64	03 17 27.8	00.62N	119.19E	58	5.5	340/80	232/10	030/29	262/47	137/28	Reverse	0.86	44	World Data Centre
37.	DS/73	26 10 64	14 22 55.7	02.09N	126.73E	29	5.3	290/00	200/00	245/00	155/00	000/90	Strike-slip	0.82	30	World Data Centre
38.	DS/73	23 11 64	22 15 46.3	00.24S	124.34E	63	5.5	240/20	132/40	092/12	194/44	350/43	Reverse	0.80	25	World Data Centre
39.	F/72	30 11 64	12 27 37.9	06.75N	094.54E	32	5.7	236/00	326/00	191/06	281/06	000/90	Strike-slip	-	-	World Data Centre
	DS/73	30 11 64	12 27 37.9	06.75N	094.54E	24	5.7	271/68	271/10	005/51	223/32	120/19	Normal	0.86	47	World Data Centre
40.	DS/73	15 12 64	05 06 21.9	02.39N	126.66E	35	5.3	299/03	030/06	074/02	344/06	183/83	Strike-slip	0.83	18	World Data Centre
41.	F/72	24 01 65	00 11 12.0	02.40S	125.98E	6	6.5	011/35	237/45	213/07	310/64	120/25	Reverse	-	-	World Data Centre
42.	F/72	21 03 65	11 08 16.8	01.47S	126.50E	51	5.9	014/38	242/41	310/36	215/02	127/28	Strike-slip	-	-	World Data Centre
43.	F/72	26 04 65	09 47 27.7	01.70S	126.71E	21	5.5	068/29	246/61	068/75	246/15	338/01	Normal	-	-	World Data Centre
44.	F/72	16 05 65	11 35 52.1	05.26N	125.57E	53	5.6	038/31	268/48	240/00	349/62	145/26	Reverse	-	-	World Data Centre
45.	F/72	23 04 66	00 03 33.0	00.78S	122.22E	45	6.0	023/50	213/40	256/82	029/05	118/03	Normal	-	-	World Data Centre
46.	F/72	18 08 66	14 34 01.0	00.10S	125.01E	51	5.0	291/20	120/70	114/24	286/54	023/03	Reverse	-	-	World Data Centre

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB	Magnitude ML	Magnitude MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7			8	9	10	11	12	13	14	15	16
47.	F/72	30 03 67	02 08 02.7	11.14S	115.36E	32	6.0			180/36	000/54	180/31	000/09	090/00	Normal	-	-	World Data Centre
48.	F/72	12 04 67	04 51 41.8	05.16N	096.31E	55	6.1			008/62	188/28	003/17	183/73	098/00	Reverse	-	-	World Data Centre
49.	DS/73	21 04 67	08 14 24.5	05.45S	126.77E	25	5.4			260/10	168/10	214/14	304/00	034/76	Strike-slip	0.73	37	World Data Centre
50.	F/72	22 04 67	08 37 25.7	05.56S	126.81E	22	5.3			122/53	343/30	146/12	026/66	240/21	Reverse	-	-	World Data Centre
51.	JMO4/72	27 04 67	08 07 50.0	01.85S	138.71E	49	5.2			202/10	022/80	022/35	202/55	112/00	Reverse	-	-	World Data Centre
52.	F/72	02 07 67	07 03 54.0	08.65N	093.59E	30	5.7			351/00	261/15	215/10	307/10	081/76	Strike-slip	-	-	World Data Centre
53.	F/72	21 08 67	07 33 01.5	05.72N	095.74E	33	6.1			023/12	203/78	203/33	023/57	112/00	Reverse	-	-	World Data Centre
54.	F/72	12 10 67	18 31 39.0	07.15S	129.83E	45	6.0			240/30	355/36	029/02	296/49	122/41	Reverse	-	-	World Data Centre
55.	F/72	26 10 67	17 22 05.0	00.18S	125.14E	42				341/30	123/60	130/14	329/74	221/40	Reverse	-	-	World Data Centre
56.	F/72	26 01 68	04 45 41.7	08.93S	120.32E	29	5.0			254/14	355/07	210/05	301/14	102/75	Strike-slip	-	-	World Data Centre
57.	F/72	28 05 68	13 27 18.7	02.91S	139.31E	65	6.1			204/40	029/50	026/06	130/84	296/03	Reverse	-	-	World Data Centre
58.	F/72	07 06 68	11 57 29.4	01.38N	126.24E	19	5.9		5.7	333/05	074/34	120/19	020/23	240/55	Strike-slip	-	-	World Data Centre
59.	F/72	29 07 68	23 52 15.0	00.21S	133.43E	11	6.1		6.0	352/33	222/40	196/01	233/63	106/27	Reverse	-	-	World Data Centre
60.	BMG/84	10 08 68	02 07 00.0	01.38N	126.24E	1	6.3			155/32	335/58	335/13	155/77	245/00	Reverse	0.88	102	BMG
61.	F/72	10 08 68	05 51 49.0	01.40N	126.27E	30	6.1			082/44	278/44	090/01	350/82	180/07	Reverse	-	-	World Data Centre
62.	F/72	11 08 68	20 00 45.4	01.56N	126.47E	30	5.7			284/30	094/60	100/14	296/74	191/04	Reverse	-	-	World Data Centre
63.	BMG/72	14 08 68	22 14 20.1	00.06N	119.73E	22	6.1			129/28	237/30	180/43	273/02	005/47	Normal	0.79	78	BMG
64.	F/72	17 08 68	04 00 36.5	01.31N	120.35E	30	5.7			101/20	281/70	261/25	101/65	011/00	Reverse	-	-	World Data Centre
65.	BMG/72	23 10 68	21 04 42.9	03.38S	143.29E	21	6.2			074/60	254/30	074/14	254/76	166/00	Reverse	0.86	72	BMG
66.	F/72	31 10 68	07 05 31.0	01.20N	126.34E	33	6.1			109/20	289/70	239/25	109/65	019/00	Reverse	-	-	World Data Centre
67.	F/72	09 11 68	20 30 39.0	02.39N	126.90E	30	5.4			258/50	075/40	258/05	075/85	349/00	Reverse	-	-	World Data Centre
68.	F/72	25 11 68	18 36 52.3	05.05N	126.77E	30	5.3			068/85	249/05	068/40	249/50	158/00	Reverse	-	-	World Data Centre
69.	F/72	25 01 69	05 19 17.1	00.77N	126.02E	24	5.9			117/34	297/56	297/12	117/78	027/00	Reverse	-	-	World Data Centre

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB	Magnitude ML	Magnitude MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7			8	9	10	11	12	13	14	15	16
70.	F/72	31 01 69	00 44 15.1	04.13N	128.14E	30	5.5			038/50	232/20	076/17	323/52	173/32	Reverse	-	-	World Data Centre
71.	F/72	03 02 69	21 41 43.4	04.31N	127.54E	30	6.1			291/44	053/26	260/10	003/56	162/31	Reverse	-	-	World Data Centre
72.	F/72	17 02 69	00 43 33.0	03.39N	123.40E	14	5.6			125/60	242/14	082/26	212/53	339/26	Reverse	-	-	World Data Centre
73.	F/72	23 02 69	00 37 32.0	03.17S	118.91E	13	5.8			253/68	073/22	253/22	073/68	344/00	Reverse	-	-	World Data Centre
74.	F/72	24 02 69	00 43 60.0	06.23S	131.01E	38	5.6			330/30	239/04	013/19	279/24	143/59	Strike-slip	-	-	World Data Centre
75.	F/72	05 03 69	13 53 03.0	04.04N	128.11E	30	5.5			039/60	270/20	074/22	302/60	171/22	Reverse	-	-	World Data Centre
76.	JMOI/72	09 03 69	13 47 59.4	04.13S	135.51E	14	5.5		5.6	046/06	136/00	360/04	090/04	226/84	Strike-slip	-	-	World Data Centre
77.	F/72	20 03 69	16 19 57.5	08.69N	127.35E	33	6.1			109/22	229/51	150/55	264/16	005/31	Normal	-	-	World Data Centre
78.	F/72	05 08 69	02 13 08.0	01.25N	126.23E	30	6.1			225/50	045/40	225/05	043/85	315/00	Reverse	-	-	World Data Centre
79.	F/72	21 11 69	02 05 35.4	01.94N	094.91E	20	6.4			293/04	202/06	158/01	248/08	356/83	Strike-slip	-	-	World Data Centre
80.	F/72	14 12 69	02 42 10.4	01.99N	126.94E	42	5.0			080/22	182/05	042/10	136/20	284/67	Strike-slip	-	-	World Data Centre
81.	RCBI/78	09 01 70	23 16 20.6	09.27S	117.25E	58	5.7			020/62	237/23	045/21	264/64	140/15	Reverse	-	-	World Data Centre
82.	F/72	27 03 70	18 33 47.2	00.28N	119.37E	8	6.0			046/04	138/08	182/02	092/10	287/81	Strike-slip	-	-	World Data Centre
83.	JMO5/78	12 06 70	08 06 16.6	02.83S	139.10E	32	5.7	6.7	6.1	172/36	026/50	007/07	114/71	274/17	Reverse	-	-	World Data Centre
	R61/75	12 06 70	08 06 17.0	02.90S	139.08E	32	5.9	6.7	6.1	053/50	189/31	029/09	141/65	295/22	Reverse	-	-	World Data Centre
84.	F/72	28 06 70	01 30 13.0	08.75S	124.04E	30	6.2			118/70	298/20	118/24	298/66	210/00	Reverse	-	-	World Data Centre
85.	R67/75	08 11 70	22 35 46.4	03.43S	135.65E	33	6.2	7.2	6.8	056/00	146/87	059/45	233/45	326/03	Normal	-	-	World Data Centre
86.	R10/75	10 01 71	07 17 03.7	03.13S	139.70E	33	7.3	7.7	8.1	214/24	058/64	042/20	194/58	308/09	Reverse	-	-	World Data Centre
87.	BMG/84	10 01 71	22 14 36.0	03.30S	139.90E	17	6.2			032/68	228/22	043/23	237/67	136/05	Reverse	0.85	34	BMG
88.	BMG/84	04 02 71	15 33 29.5	00.53N	098.72E	40	6.2			114/02	204/00	159/01	069/01	294/88	Strike-slip	0.86	117	BMG
89.	BMG/84	07 04 71	04 59 45.0	02.40N	129.10E	29	6.3			235/60	055/30	055/75	235/15	145/00	Normal	0.89	89	BMG
90.	BMG/84	04 05 71	02 04 31.0	06.54S	105.37E	46	5.9			338/33	233/21	018/08	282/41	117/47	Reverse	0.82	100	BMG
91.	SB/74	26 06 71	19 27 11.0	05.18S	098.90E	25	5.9		6.3	280/50	116/20	320/15	206/51	062/51	Reverse	-	-	World Data Centre
92.	RCBI/78	08 03 72	03 45 25.2	03.74S	131.39E	28	5.4		5.8	267/05	087/85	087/40	267/50	267/50	Reverse	-	-	Richard Cardwell

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB	Magnitude ML	Magnitude MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7			8	9	10	11	12	13	14	15	16
93.	RCBI/78	28 05 72	01 55 21.5	11.05S	116.97E	45	6.3		6.2	193/36	315/36	254/56	164/00	164/00	Reverse	-	-	Richard Cardwell
94.	RCBI/78	11 09 72	13 35 48.5	03.29S	130.75E	37	5.5		6.0	238/05	058/85	058/40	238/50	328/00	Reverse	-	-	Richard Cardwell
95.	BMG/84	24 09 72	20 09 36.2	06.22S	131.15E	33	6.0			277/61	148/20	179/59	310/22	049/22	Normal	0.80	61	BMG
96.	RCBI/78	24 09 72	22 05 50.2	06.22S	131.15E	33	5.5			254/08	345/06	300/10	210/02	106/80	Strike-slip	-	-	Richard Cardwell
97.	RCBI/78	05 11 72	00 05 50.2	09.82S	122.17E	45	5.8		5.9	358/25	093/10	313/10	048/26	203/63	Strike-slip	-	-	Richard Cardwell
98.	BMG/84	04 12 72	17 51 17.6	01.52S	136.67E	0	6.1			145/35	257/28	109/05	203/48	014/42	Reverse	0.83	54	BMG
99.	BMG/84	16 03 73	00 51 46.5	02.18N	126.65E	11	5.9			185/30	076/27	219/02	127/45	316/45	Reverse	0.78	76	BMG
100.	BMG/84	18 03 73	11 06 14.8	02.09N	126.65E	33	5.9			220/42	010/44	205/00	295/74	116/14	Reverse	0.86	81	BMG
101.	RCBI/78	10 04 73	19 55 55.8	09.81S	119.29E	55	5.8			254/20	095/68	080/24	244/64	347/07	Reverse	-	-	Richard Cardwell
102.	BMG/84	27 02 74	18 01 49.1	01.27N	097.60E	37	6.0			344/46	130/28	070/72	326/04	234/17	Normal	0.87	153	BMG
103.	RCBI/78	06 03 74	19 29 08.1	06.60S	128.98E	26	5.7			046/06	316/08	001/06	270/06	136/82	Strike-slip	-	-	Richard Cardwell
104.	BMG/84	11 05 74	00 43 45.9	01.87N	126.48E	43	6.1			112/30	205/05	063/16	162/25	30/065	Strike-slip	0.81	31	BMG
105.	BMG/84	07 09 74	20 43 15.0	09.80S	108.49E	60	6.0			190/60	059/19	091/60	219/30	321/20	Normal	0.80	65	BMG
106.	BMG/84	09 11 74	19 10 55.8	06.44S	105.38E	55	6.1			308/60	165/25	332/16	197/65	067/15	Reverse	0.84	31	BMG
107.	BMG/84	03 12 74	03 06 35.7	05.04S	129.99E	32	6.0			189/28	097/04	139/22	236/16	359/62	Strike-slip	0.80	83	BMG
108.	BMG/84	24 12 74	06 55 47.0	02.30S	099.01E	32	5.9			220/48	040/42	220/03	040/87	310/00	Reverse	0.82	81	BMG
109.	BMG/84	05 03 75	00 22 17.0	02.39S	126.15E	7	6.1			332/15	068/20	019/27	111/02	208/64	Normal	0.88	50	BMG
110.	BMG/84	03 03 76	22 50 12.4	08.36S	121.46E	50	5.9			039/50	219/40	039/05	219/85	129/00	Reverse	0.80	64	BMG
111.	BMG/84	15 06 76	06 09 02.5	00.52N	134.74E	36	5.9			041/22	147/34	184/10	089/41	287/46	Reverse	0.80	70	BMG
112.	BMG/84	20 06 76	20 53 09.0	03.40N	096.28E	1	6.3			245/26	120/49	087/12	197/59	350/29	Reverse	0.80	126	BMG
113.	BMG/84	25 06 76	19 18 57.5	04.58S	140.14E	33	6.3			074/20	186/20	216/04	123/32	312/56	Strike-slip	0.85	80	BMG
114.	BMG/84	26 06 76	10 30 58.6	03.78N	126.81E	26	6.0			315/28	216/16	262/31	358/07	099/57	Strike-slip	0.80	58	BMG
115.	BMG/84	14 07 76	07 13 23.7	08.21S	114.87E	37	6.1			355/37	225/40	200/01	293/62	109/27	Reverse	0.92	111	BMG
116.	BMG/84	14 07 76	10 23 46.8	08.17S	114.84E	41	5.9			339/40	203/40	180/01	273/67	092/24	Reverse	0.92	73	BMG
117.	BMG/84	29 10 76	02 51 07.4	04.54S	139.93E	33	6.0			152/16	256/39	198/40	298/13	046/45	Reverse	0.80	61	BMG
118.	BMG/84	29 10 76	03 55 22.0	04.69S	139.30E	10	5.2			233/26	138/10	183/26	276/06	028/62	Normal	0.87	31	BMG
119.	BMG	05 01 77	03 26 23.7	02.10N	097.18E	52	4.9			270/20	174/16	314/02	222/27	042/02	Strike-slip	0.92	13	BMG
120.	BMG	15 03 77	08 54 58.8	04.95S	131.01E	41	5.8			272/35	181/05	322/20	219/29	082/61	Strike-slip	0.94	62	BMG
121.	BMG	18 03 77	06 34 17.4	04.66S	103.12E	33	5.0			298/15	038/05	344/06	253/05	136/74	Strike-slip	0.84	19	BMG
122.	BMG	24 03 77	07 01 58.3	06.76S	129.99E	35	5.5			280/27	184/20	231/32	316/10	066/70	Strike-slip	1.00	17	
123.	BMG	03 05 77	07 01 58.3	06.76S	129.99E	45	5.0			290/18	194/18	152/00	241/27	064/64	Strike-slip	0.87	15	BMG
124.	BMG	09 06 77	03 34 37.0	05.98S	123.64E	42.7	5.0			162/62	342/28	342/73	162/17	252/00	Normal	0.86	21	BMG
125.	BMG	29 07 77	21 05 59.5	02.36S	099.98E	33	5.3			090/14	356/22	044/30	311/05	208/62	Strike-slip	0.82	28	BMG
126.	JOKO 79	19 08 77	05 08 41.0	11.19S	118.36E	33	6.1		5.4	316/26	214/24	264/37	356/02	086/54	Strike-slip	-	-	Joko Santoso
127.	JOKO 79	19 08 77	06 08 55.2	11.10S	118.50E	33	7.0		7.9	321/23	216/28	271/36	178/03	084/53	Strike-slip	-	-	Joko Santoso
128.	JOKO 79	19 08 77	11 33 27.8	11.02S	118.73E	33	5.6			339/31	083/24	304/10	083/40	206/53	Strike-slip	-	-	Joko Santoso

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB	Magnitude ML	Magnitude MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7			8	9	10	11	12	13	14	15	16
129.	BMG	19 08 77	13 23 37.0	10.80S	119.17E	33	5.8			204/85	024/40	204/40	024/50	294/00	Reverse	0.80	15	BMG
130.	BMG	19 08 77	20 20 18.6	10.92S	119.15E	33	5.8			274/18	319/10	319/10	227019	067/70	Strike-slip	0.87	23	BMG
131.	BMG	19 08 77	20 51 16.6	11.24S	118.87E	33	5.3			250/30	205/09	205/09	303/33	104/55	Strike-slip	0.88	17	BMG
132.	JOKO 79	20 08 77	09 21 50.3	11.11S	119.13E	33	5.7		5.8	321/24	289/64	289/64	154/18	060/20	Normal	-	-	Joko Santoso
133.	JOKO 79	20 08 77	19 16 32.7	11.04S	119.13E	33	6.0		6.1	326/14	279/28	279/28	014/02	081/58	Strike-slip	-	-	Joko Santoso
	BMG	20 08 77	19 16 32.7	11.04S	119.14E	136	6.0			160/72	340/18	160/27	340/63	250/00	Reverse	0.83	41	BMG
134.	BMG	21 08 77	06 50 33.1	11.16S	118.83E	33	5.4			070/00	000/10	315/07	045/07	180/77	Strike-slip	1.00	12	BMG
135.	BMG	24 08 77	09 42 13.2	11.30S	118.14E	33	5.6			298/48	175/26	221/56	332/13	080/27	Normal	-	-	Joko Santoso
136.	JOKO 79	25 08 77	18 05 09.8	10.78S	119.26E	33	6.1		6.0	325/20	201/64	288/57	165/20	066/26	Normal	-	-	Joko Santoso
	BMG	25 08 77	18 05 10.8	10.74S	119.27E	33	6.1			114/50	215/29	168/36	072/06	332/53	Strike-slip	0.85	65	BMG
137.	JOKO 79	02 09 77	10 36 27.7	10.97S	119.08E	33	6.0		5.9	336/36	211/40	276/58	182/02	090/25	Normal	-	-	Joko Santoso
138.	JOKO 79	05 09 77	11 16 59.7	11.13S	118.26E	33	5.7		4.9	339/31	206/48	288/63	179/09	085/24	Normal	-	-	Joko Santoso
139.	BMG	23 09 77	05 57 55.6	11.21S	118.22E	33	6.0			170/60	320/27	291/69	149/16	057/11	Normal	0.85	65	BMG
140.	BMG	25 09 77	18 31 39.1	11.30S	117.25E	33	5.6			100/49	352/22	141/10	026/42	239/44	Reverse	0.83	23	BMG
141.	BMG	29 09 77	02 16 48.3	11.43S	118.30E	33	5.4			050/26	150/19	101/31	007/05	278/51	Strike-slip	0.88	32	BMG
142.	BMG	05 10 77	18 04 11.8	11.48S	117.38E	33	5.5			105/16	285/74	105/29	285/61	015/29	Normal	0.89	37	BMG
143.	BMG	08 10 77	01 58 54.2	10.08S	117.19E	33	5.4			254/20	158/21	117/02	207/29	027/62	Strike-slip	0.82	22	BMG
144.	BMG	18 10 77	06 07 21.8	02.01S	132.66E	33	5.1			278/22	180/20	229/30	317/02	053/60	Strike-slip	0.91	22	BMG
145.	BMG	06 11 77	17 17 44.2	00.19N	123.28E	33	5.5			200/13	020/77	020/58	200/32	110/00	Reverse	0.91	22	BMG
146.	BMG	10 11 77	09 13 37.0	09.52S	123.26E	37	5.0			209/42	314/19	271/45	166/16	061/48	Normal	0.80	25	BMG
147.	BMG	14 11 77	16 45 12.6	00.52S	098.72E	33	4.8			270/21	008/23	050/00	319/31	140/31	Strike-slip	0.98	24	BMG
148.	BMG	18 11 77	10 17 41.0	04.35S	102.02E	33	5.5			074/20	338/18	028/27	117/03	209/63	Strike-slip	1.00	23	BMG
149.	BMG	22 11 77	16 46 40.7	06.51S	129.42E	33	5.6			196/85	016/05	016/50	196/40	286/00	Normal	1.00	22	BMG
150.	BMG	27 11 77	09 33 47.1	00.83S	120.60E	65	5.5			068/12	330/31	022/30	287/14	180/56	Strike-slip	0.82	38	BMG
151.	BMG	03 12 77	13 41 20.9	03.51S	095.89E	41	5.8			286/23	188/20	327/02	236/32	052/64	Strike-slip	0.86	55	BMG
152.	BMG	21 12 77	18 06 10.6	00.96S	126.77E	20	5.4			264/32	160/20	208/39	306/10	047/46	Strike-slip	0.93	30	BMG
153.	BMG	07 01 78	13 44 18.5	04.98S	102.49E	33	5.1			058/23	162/30	203/03	108/39	298/51	Strike-slip	0.88	17	BMG
154.	BMG	15 01 78	21 50 22.1	07.27S	127.92E	34	5.2			115/70	264/18	091/24	248/64	357/14	Reverse	0.82	18	BMG
155.	BMG	20 01 78	21 31 16.7	04.17S	123.36E	50.9	5.8			146/36	020/39	352/02	085/61	261/32	Reverse	0.94	67	BMG
156.	BMG	01 02 78	22 50 04.0	01.51N	127.25E	11	5.4			260/16	356/26	041/06	307/30	144/58	Strike-slip	0.94	53	BMG
157.	BMG	01 02 78	23 41 54.0	04.82S	140.30E	33	5.2			206/60	028/30	206/15	028/75	116/00	Reverse	1.00	11	BMG
158.	BMG	15 02 78	07 00 27.1	04.54S	139.31E	33	5.6			219/38	346/38	009/01	282/60	104/29	Reverse	1.00	24	BMG
159.	BMG	16 02 78	23 31 15.8	03.39S	129.69E	33	5.5			343/18	155/72	161/28	342/60	253/02	Reverse	0.84	25	BMG
160.	BMG	18 02 78	03 43 14.2	04.65S	102.94E	52.8	5.5			074/17	338/18	023/26	298/01	207/60	Strike-slip	0.83	52	BMG
161.	BMG	19 02 78	02 53 07.1	02.92N	129.11E	46.3	5.1			071/09	173/50	107/43	221/24	327/47	Normal	1.00	14	BMG
162.	BMG	20 02 78	23 51 48.5	07.04S	128.90E	33	5.6			081/30	339/20	024/35	123/06	218/56	Strike-slip	0.80	34	BMG
163.	BMG	25 02 78	06 10 35.8	09.66S	117.11E	33	5.6			007/21	113/33	055/40	153/07	246/46	Strike-slip	0.84	45	BMG
164.	BMG	04 03 78	02 43 59.7	07.06S	103.08E	46.4	5.2			250/19	347/22	297/30	029/03	122/60	Strike-slip	0.84	19	BMG
165.	BMG	10 03 78	13 58 40.5	11.13S	119.12E	33	5.3			075/05	343/17	298/10	030/17	180/72	Strike-slip	0.85	20	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
166.	BMG	10 03 78	17 25 30.7	10.92S	119.05E	33	5.3	264/00	345/22	306/14	038/14	174/61	Strike-slip	0.90	20	BMG
167.	BMG	11 03 78	04 18 03.6	01.75N	126.01E	63	5.7	058/25	320/17	103/15	008/29	192/57	Strike-slip	0.88	72	BMG
168.	BMG	11 03 78	11 54 42.1	10.86S	119.11E	33	5.5	280/20	020/28	063/28	328/33	154/60	Strike-slip	0.80	20	BMG
169.	BMG	26 03 78	06 50 28.6	04.74N	125.42E	50.3	5.2	015/20	118/30	066/34	159/06	261/50	Strike-slip	0.90	25	BMG
170.	BMG	26 03 78	07 21 17.8	04.75N	125.42E	28.4	5.0	112/28	010/21	059/35	153/06	247/52	Strike-slip	0.88	20	BMG
171.	BMG	03 04 78	12 09 46.7	04.95S	133.92E	33	5.3	257/20	357/30	305/34	038/16	136/55	Strike-slip	0.93	14	BMG
172.	BMG	07 04 78	14 15 20.2	06.46S	131.21E	33	5.1	110/50	290/40	110/15	290/85	020/00	Reverse	0.83	12	BMG
173.	BMG	07 04 78	22 48 07.6	03.24N	096.47E	22	5.3	335/23	226/40	187/12	293/55	088/42	Reverse	0.88	24	BMG
174.	BMG	11 04 78	10 27 04.8	11.84S	116.86E	33	5.1	086/00	356/34	305/24	046/21	176/67	Strike-slip	0.88	8	BMG
175.	BMG	18 04 78	17 57 26.2	03.79S	128.44E	40.2	5.5	096/17	035/32	079/09	340/35	179/56	Strike-slip	0.81	47	BMG
176.	BMG	25 04 78	00 34 15.1	06.41N	123.98E	33	5.4	281/21	101/69	101/25	281/65	010/00	Reverse	0.90	50	BMG
177.	BMG	25 04 78	04 24 53.7	04.72N	124.59E	42.9	5.9	345/20	230/50	302/51	191/17	088/34	Reverse	0.83	64	BMG
178.	BMG	29 04 78	02 26 48.8	05.85S	103.97E	50	5.8	013/10	110/30	059/28	155/12	268/59	Strike-slip	0.84	86	BMG
179.	BMG	03 05 78	02 29 54.8	03.57N	127.25E	42.6	5.7	317/20	052/14	274/06	004/22	183/63	Strike-slip	0.87	38	BMG
180.	BMG	04 05 78	18 11 43.3	10.24S	117.02E	35.3	5.5	337/20	075/20	026/29	116/00	206/60	Strike-slip	0.89	35	BMG
181.	BMG	05 05 78	10 39 44.0	00.80N	126.15E	47.1	5.2	314/30	224/00	267/12	360/15	134/70	Strike-slip	0.90	15	BMG
182.	BMG	25 05 78	01 50 58.8	05.25S	102.79E	33	5.1	040/10	138/39	186/20	083/35	298/48	Strike-slip	0.92	13	BMG
183.	BMG	11 06 78	16 02 18.7	00.17N	126.61E	65	5.2	270/12	170/39	124/18	227/37	014/48	Strike-slip	0.88	16	BMG
184.	BMG	15 06 78	20 38 18.1	02.93S	127.37E	53.3	5.2	028/11	292/30	248/12	342/30	135/58	Strike-slip	0.83	18	BMG
185.	BMG	22 06 78	06 37 51.5	08.51N	126.63E	59.3	5.5	162/26	342/54	342/08	162/82	252/00	Reverse	0.86	42	BMG
186.	BMG	24 06 78	09 35 17.9	05.03S	102.37E	33	5.8	111/10	020/10	065/12	335/02	248/76	Strike-slip	1.00	10	BMG
187.	BMG	24 06 78	11 01 37.2	05.08S	102.28E	33	5.6	049/30	300/30	086/00	354/45	175/46	Reverse	0.92	38	BMG
188.	BMG	25 06 78	06 05 57.2	05.15S	102.28E	33	5.1	000/32	110/32	146/00	055/48	236/43	Reverse	0.86	21	BMG
189.	BMG	02 07 78	13 24 33.9	06.18S	103.91E	56	5.3	026/10	355/30	040/13	305/27	155/58	Strike-slip	0.85	27	BMG
190.	BMG	03 07 78	06 18 29.8	00.84S	098.08E	33	5.3	053/38	298/20	087/14	341/51	193/38	Reverse	0.89	9	BMG
191.	BMG	08 07 78	03 06 47.7	00.56N	126.19E	41	5.3	261/25	148/43	111/11	210/47	010/40	Reverse	0.94	78	BMG
192.	BMG	10 07 78	09 22 09.9	02.81S	126.60E	33	5.2	244/08	334/16	289/20	019/05	118/75	Strike-slip	0.84	25	BMG
193.	BMG	14 07 78	06 13 43.2	00.84N	126.03E	62.4	5.1	245/10	148/22	102/14	201/32	351/58	Strike-slip	0.80	15	BMG
194.	BMG	19 07 78	15 25 12.2	01.89S	126.90E	33	5.0	203/20	300/22	252/30	341/03	070/61	Strike-slip	1.00	9	BMG
195.	BMG	26 07 78	20 58 23.3	08.14S	117.73E	33	5.4	245/20	342/23	025/03	293/28	117/59	Strike-slip	0.89	19	BMG
196.	BMG	03 08 78	15 15 51.2	00.42S	097.03E	33	5.2	038/08	307/02	352/08	084/04	202/82	Strike-slip	1.00	25	BMG
197.	BMG	14 08 78	00 42 44.8	05.52N	094.69E	55	5.1	270/18	016/40	058/15	315/41	162/45	Reverse	1.00	16	BMG
198.	BMG	15 08 78	20 57 29.6	05.49S	131.11E	33	5.1	294/10	025/04	250/05	339/10	134/80	Strike-slip	0.93	15	BMG
199.	BMG	08 09 78	12 28 39.7	03.95N	126.45E	46.4	5.4	164/33	270/26	126/05	220/42	029/48	Reverse	0.82	50	BMG
200.	BMG	21 09 78	06 27 17.6	06.67S	105.57E	63	5.5	254/10	074/80	074/35	254/55	164/00	Reverse	0.83	30	BMG
201.	BMG	26 09 78	06 07 44.1	01.15N	120.29E	33	5.7	102/28	004/13	146/11	050/29	256/56	Strike-slip	0.88	51	BMG
202.	BMG	06 10 78	01 49 09.0	10.21S	118.99E	35.9	5.3	205/20	025/70	025/24	205/66	115/00	Reverse	0.89	19	BMG
203.	BMG	26 10 78	09 14 51.0	08.18N	125.84E	42.2	5.3	350/39	256/09	301/22	034/06	142/68	Strike-slip	0.95	20	BMG
204.	BMG	30 10 78	13 43 14.6	08.05N	122.26E	33	5.7	212/10	116/39	168/26	072/13	318/60	Strike-slip	1.00	16	BMG
205.	BMG	16 11 78	10 45 08.8	08.03N	126.59E	55.7	5.4	290/40	110/50	110/15	290/85	020/00	Reverse	0.90	50	BMG
206.	BMG	16 11 78	16 47 35.5	03.14S	135.13E	33	5.4	280/43	160/37	130/04	224/54	037/36	Reverse	0.80	44	BMG
207.	BMG	21 11 78	17 28 29.2	00.07S	125.68E	43.4	5.1	114/26	221/27	166/39	077/00	350/47	Strike-slip	0.90	20	BMG
208.	BMG	22 11 78	00 07 36.1	01.59N	126.43E	49.6	5.4	267/10	000/16	045/03	312/19	148/72	Strike-slip	0.89	36	BMG
209.	BMG	25 11 78	05 22 45.5	05.21S	125.46E	35.2	5.3	336/25	242/10	021/09	286/26	130/62	Strike-slip	0.94	18	BMG
210.	BMG	01 12 78	17 10 29.5	08.66N	122.21E	40	5.8	195/22	096/20	236/02	145/31	328/26	Strike-slip	0.90	72	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
211.	BMG	02 12 78	18 07 16.2	09.94N	126.32E	57.7	5.3	220/36	350/26	277/47	145/05	096/44	Normal	0.80	20	BMG
212.	BMG	20 12 78	13 02 30.8	06.59S	105.34E	50.6	5.3	344/20	244/30	203/07	297/35	105/53	Strike-slip	0.85	39	BMG
213.	BMG	08 01 79	07 27 04.8	04.17S	135.99E	33	5.5	218/10	038/80	038/35	218/55	128/00	Reverse	0.82	33	BMG
214.	BMG	30 01 79	17 04 15.7	02.83S	136.19E	46.0	5.4	222/20	118/30	172/36	078/05	340/54	Strike-slip	1.00	18	BMG
215.	BMG	02 02 79	11 54 57.0	06.43N	124.27E	49.4	5.1	207/30	117/00	158/19	256/19	027/59	Strike-slip	0.94	18	BMG
216.	BMG	18 02 79	02 42 34.6	06.83S	116.13E	33	5.5	160/40	340/50	340/05	160/85	070/00	Reverse	0.84	44	BMG
217.	BMG	19 02 79	00 35 46.3	05.68N	123.69E	61.3	5.5	344/33	228/38	196/02	290/54	101/35	Reverse	0.87	53	BMG
218.	BMG	25 02 79	04 38 07.3	06.11S	131.56E	52.8	5.2	330/50	150/40	150/85	330/05	060/00	Normal	0.91	23	BMG
219.	BMG	08 03 79	14 49 52.8	01.03N	120.40E	28.2	6.0	008/10	107/41	154/20	050/36	268/44	Strike-slip	0.88	104	BMG
220.	BMG	18 03 79	16 44 15.0	08.25S	125.24E	33	5.2	212/10	310/37	357/18	255/34	110/51	Strike-slip	0.96	26	BMG
221.	BMG	30 03 79	22 15 33.2	04.16S	131.45E	33	5.6	057/10	188/60	221/23	089/59	319/21	Reverse	0.92	63	BMG
222.	BMG	01 04 79	13 13 24.9	07.27N	123.27E	39.8	5.4	011/16	103/03	05/05	059/16	206/72	Strike-slip	0.88	32	BMG
223.	BMG	20 04 79	01 15 11.4	11.23S	118.38E	33	5.3	162/40	342/50	102/85	342/05	082/00	Normal	0.96	22	BMG
224.	BMG	01 05 79	10 47 01.9	09.45N	125.04E	42.2	5.3	307/18	038/01	262/10	354/13	134/71	Strike-slip	0.96	26	BMG
225.	BMG	02 05 79	12 44 06.0	01.34N	123.35E	33	5.3	356/19	262/08	041/07	307/19	150/67	Strike-slip	1.00	27	BMG
226.	BMG	08 05 79	01 19 43.9	00.38S	098.25E	34.7	5.4	320/49	221/09	009/23	259/41	123/37	Strike-slip	0.98	47	BMG
227.	BMG	18 05 79	23 22 25.2	00.68N	126.00E	33	6.1	282/00	012/34	063/21	320/24	192/55	Strike-slip	0.81	79	BMG
228.	BMG	24 05 79	13 35 51.5	00.79N	126.04E	52.5	5.5	042/20	144/29	090/36	185/16	284/52	Strike-slip	0.90	42	BMG
229.	BMG	28 05 79	19 02 22.7	01.93S	100.39E	50	5.1	000/20	094/10	048/20	315/07	207/67	Strike-slip	1.00	12	BMG
230.	BMG	30 05 79	09 38 52.9	08.21S	115.39E	25	6.1	320/31	085/40	115/04	018/56	208/30	Reverse	0.88	113	BMG
231.	BMG	11 06 79	02 33 52.7	03.09S	134.64E	33	5.3	125/10	224/40	272/18	168/36	023/48	Strike-slip	0.82	22	BMG
232.	BMG	13 06 79	01 24 32.5	00.93S	097.28E	36	5.3	078/40	196/29	143/54	045/04	310/35	Normal	0.93	69	BMG
233.	BMG	16 06 79	17 42 39.1	04.93S	131.86E	50.5	5.2	028/11	127/39	071/36	174/17	287/48	Strike-slip	0.85	40	BMG
234.	BMG	17 06 79	14 56 46.2	06.28S	100.55E	33	5.4	113/20	293/70	113/65	293/25	024/00	Normal	0.92	48	BMG
235.	BMG	21 06 79	09 45 15.0	08.45S	115.90E	33	5.1	099/29	191/09	050/11	150/28	301/58	Strike-slip	0.88	17	BMG
236.	BMG	30 06 79	01 10 04.4	02.17S	138.84E	36.6	5.3	222/33	334/29	187/02	287/48	096/42	Reverse	0.88	25	BMG
237.	BMG	08 07 79	02 24 11.5	07.36N	124.23E	43.9	5.1	255/18	160/08	299/04	206/20	047/67	Strike-slip	0.81	27	BMG
238.	BMG	17 07 79	16 01 15.1	04.43S	098.76E	31	5.7	303/53	134/32	311/05	170/81	042/05	Reverse	0.93	120	BMG
239.	BMG	17 07 79	17 46 37.4	04.46S	098.73E	33	5.0	260/65	080/25	260/19	080/71	170/00	Reverse	0.82	22	BMG
240.	BMG	23 07 79	05 52 52.3	02.57S	140.35E	15.0	5.3	106/22	010/12	148/03	057/26	253/37	Strike-slip	0.86	36	BMG
241.	BMG	24 07 79	19 31 19.8	11.15S	107.71E	31.0	6.3	247/00	337/00	292/00	202/00	999/00	Strike-slip	0.88	156	BMG
242.	BMG	27 07 79	23 53 24.8	03.60S	131.33E	33.0	5.1	332/38	200/39	266/64	356/00	087/24	Normal	0.89	27	BMG
243.	BMG	28 07 79	04 46 34.0	03.64S	131.33E	33.0	5.1	288/13	020/08	143/01	333/17	142/72	Strike-slip	0.83	24	BMG
244.	BMG	02 08 79	22 11 02.9	10.22S	117.78E	33.0	5.0	220/04	122/56	068/31	190/39	312/31	Strike-slip	0.89	18	BMG
245.	BMG	13 08 79	23 58 39.0	05.57S	130.71E	52.0	5.4	262/29	020/39	054/03	315/55	147/35	Reverse	1.00	37	BMG
246.	BMG	24 08 79	02 13 48.5	01.33N	122.76E	44.4	5.2	194/60	339/24	306/65	166/17	076/13	Normal	0.84	19	BMG
247.	BMG	12 09 79	05 17 51.4	01.68S	136.04E	05.0	6.3	225/10	130/26	085/11	180/24	332/53	Strike-slip	0.81	150	BMG
248.	BMG	13 09 79	06 41 20.8	01.03S	136.53E	33	5.6	093/04	001/28	314/15	052/24	187/59	Strike-slip	0.95	21	BMG
249.	BMG	13 09 79	09 00 12.3	01.15S	136.56E	33	5.1	129/32	240/30	274/00	183/45	004/42	Reverse	0.88	17	BMG
250.	BMG	26 09 79	03 08 17.5	01.40N	126.26E	63.5	5.3	236/10	141/19	097/05	190/21	348/67	Strike-slip	0.83	30	BMG
251.	BMG	05 10 79	01 02 56.9	09.79N	126.29E	52.8	5.3	318/40	210/20	358/13	257/42	100/43	Reverse	0.81	37	BMG
252.	BMG	10 10 79	13 39 14.0	07.21S	106.03E	33	5.9	118/39	225/20	077/10	177/44	335/44	Reverse	0.97	102	BMG
253.	BMG	16 10 79	10 04 27.8	01.15S	136.42E	33	5.5	332/40	152/50	152/05	332/85	062/00	Reverse	0.92	26	BMG
254.	BMG	17 10 79	23 29 26.4	01.16S	136.59E	33	6.0	342/19	251/04	029/10	295/17	152/70	Strike-slip	0.80	52	BMG
255.	BMG	18 10 79	00 57 21.8	01.18S	136.51E	33	5.4	215/21	035/12	035/25	215/65	125/00	Reverse	0.80	15	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
256.	BMG	19 10 79	02 38 22.2	00.52N	126.58E	51.1	5.6	246/27	342/12	201/10	296/28	088/58	Strike-slip	0.91	56	BMG
257.	BMG	20 10 79	01 41 10.4	08.25S	115.85E	38	6.0	049/25	294/38	259/06	357/49	161/40	Reverse	0.91	93	BMG
258.	BMG	22 10 79	05 58 48.7	00.67S	125.92E	33	6.2	264/14	110/71	089/27	252/60	354/06	Reverse	0.84	109	BMG
259.	BMG	28 10 79	23 54 51.7	00.75S	126.07E	49.1	5.3	292/39	158/40	136/00	228/64	045/24	Reverse	0.95	22	BMG
260.	BMG	31 10 79	09 58 49.8	01.20S	136.60E	33	5.3	239/39	000/30	209/02	304/57	114/33	Reverse	1.00	12	BMG
261.	BMG	03 11 79	23 17 37.2	04.26S	129.65E	33	5.7	022/01	114/42	060/31	166/25	289/46	Strike-slip	0.87	60	BMG
262.	BMG	13 11 79	19 05 02.5	04.47S	102.01E	47	5.8	214/10	034/80	034/35	214/55	124/00	Reverse	0.84	76	BMG
263.	BMG	16 11 79	18 10 48.5	01.92S	134.17E	33	5.8	180/50	048/28	100/63	210/09	302/24	Normal	0.85	52	BMG
264.	BMG	07 12 79	16 12 44.0	05.09S	129.81E	33	5.5	348/20	168/70	168/25	348/65	078/00	Reverse	0.83	24	BMG
265.	BMG	14 12 79	11 08 26.2	03.09N	127.09E	56	5.3	280/46	138/38	300/05	197/69	032/20	Reverse	0.91	34	BMG
266.	BMG	15 12 79	00 02 41.6	03.29S	102.71E	33	5.8	016/30	134/39	342/03	082/54	050/36	Reverse	0.80	50	BMG
267.	BMG	17 12 79	19 58 23.8	08.39S	115.89E	33	5.6	232/45	358/29	201/08	306/58	107/30	Reverse	0.85	52	BMG
268.	BMG	18 12 79	19 24 04.5	03.22S	102.24E	33	5.0	054/75	234/15	054/30	234/60	144/00	Reverse	0.80	20	BMG
269.	BMG	22 12 79	02 29 02.2	07.75N	122.14E	44.3	5.2	308/20	128/70	128/24	308/66	038/00	Reverse	0.86	28	BMG
270.	BMG	22 12 79	22 01 04.1	06.05S	105.01E	63.9	5.3	029/34	160/44	186/05	087/63	279/27	Reverse	0.89	28	BMG
271.	BMG	23 12 79	08 33 59.1	03.50N	126.84E	33	5.8	250/70	056/19	240/24	050/65	147/04	Reverse	0.83	70	BMG
272.	BMG	01 01 80	19 19 05.9	03.49N	126.72E	54.2	5.0	260/20	354/10	216/08	308/20	105/68	Strike-slip	1.00	12	BMG
273.	BMG	11 01 80	12 39 42.6	03.64N	128.26E	56.4	5.0	277/34	152/40	17[illegible]/04	220/59	031/30	Reverse	1.00	13	BMG
274.	BMG	13 01 80	15 26 49.0	00.36N	129.89E	33	5.0	170/40	305/40	328/00	238/65	059/25	Reverse	0.92	12	BMG
275.	BMG	21 01 80	16 29 20.9	08.44S	116.09E	33	5.2	102/25	196/06	152/23	056/11	297/64	Strike-slip	0.88	17	BMG
276.	BMG	28 01 80	10 23 56.4	03.75N	128.48E	53.5	5.0	051/19	231/71	231/26	051/64	141/00	Reverse	0.85	13	BMG
277.	BMG	29 01 80	07 04 40.0	02.44N	128.11E	47.2	5.6	010/40	254/29	306/53	090/13	140/36	Normal	0.85	41	BMG
278.	BMG	03 02 80	03 56 00.6	01.70N	126.33E	44.6	5.0	170/30	350/60	170/75	350/15	080/00	Normal	1.00	13	BMG
279.	BMG	07 02 80	08 25 01.0	11.23S	118.77E	33	5.1	106/50	286/40	286/85	106/05	016/00	Normal	0.88	17	BMG
280.	BMG	22 02 80	03 51 45.0	01.61S	124.93E	26.1	5.3	076/20	168/05	030/07	124/19	270/70	Strike-slip	0.82	22	BMG
281.	BMG	04 03 80	14 17 31.3	08.24S	116.35E	33	5.1	160/15	340/75	160/60	340/30	070/00	Normal	0.80	25	BMG
282.	BMG	08 03 80	07 44 34.0	09.77S	119.03E	35.5	5.3	056/44	296/28	346/56	089/07	186/33	Normal	0.90	20	BMG
283.	BMG	14 03 80	21 29 22.8	06.84S	130.27E	41.7	5.2	042/20	294/41	253/12	356/46	151/42	Reverse	0.88	24	BMG
284.	BMG	16 03 80	10 33 09.4	03.06N	126.94E	45	5.6	030/50	340/16	300/48	186/20	082/30	Normal	0.88	43	BMG
285.	BMG	18 03 80	00 43 29.7	04.29S	102.05E	47	5.4	060/30	290/48	263/10	011/62	167/27	Reverse	0.82	28	BMG
286.	BMG	20 03 80	19 50 22.4	07.04S	106.17E	33	5.3	024/50	259/25	057/12	304/58	154/28	Reverse	0.89	19	BMG
287.	BMG	24 03 80	07 09 37.4	00.35S	124.98E	60	5.0	069/10	330/40	283/20	027/36	171/48	Strike-slip	0.83	12	BMG
288.	BMG	31 03 80	13 14 46.6	08.89S	112.97E	49	5.2	132/38	230/10	087/18	191/34	333/50	Strike-slip	0.82	11	BMG
289.	BMG	01 04 80	16 21 48.4	04.03N	097.55E	41	5.6	270/22	161/40	122/12	223/46	022/42	Reverse	0.81	48	BMG
290.	BMG	03 04 80	10 18 21.0	05.59S	103.17E	33	5.7	034/20	131/19	083/30	352/00	262/61	Strike-slip	0.84	62	BMG
291.	BMG	08 04 80	09 30 33.8	01.75S	100.57E	65	5.1	173/60	353/30	173/15	353/75	083/00	Reverse	0.90	30	BMG
292.	BMG	27 05 80	04 31 08.6	03.30S	138.36E	33	5.3	308/42	180/35	334/03	238/61	067/30	Reverse	0.90	21	BMG
293.	BMG	13 06 80	02 17 45.5	09.46N	126.55E	31	5.3	234/20	350/50	029/16	277/50	130/33	Reverse	0.94	17	BMG
294.	BMG	18 06 80	23 50 43.8	09.33N	126.79E	52.9	5.2	322/20	225/20	274/30	184/00	092/61	Strike-slip	0.94	16	BMG
295.	BMG	19 06 80	14 14 52.1	09.35N	126.55E	36	5.5	192/27	096/10	236/11	140/27	350/57	Strike-slip	0.88	26	BMG
296.	BMG	20 06 80	18 51 31.4	10.96S	119.10E	33	5.6	355/30	130/47	048/64	156/10	252/23	Normal	0.90	47	BMG
297.	BMG	21 06 80	02 21 59.2	08.90N	126.83E	50.7	5.1	064/50	244/40	064/85	244/85	344/00	Reverse	1.00	10	BMG
298.	BMG	23 06 80	13 46 14.4	09.36N	126.56E	53.3	5.1	194/34	090/20	138/38	236/10	337/47	Strike-slip	0.94	16	BMG
299.	BMG	24 06 80	06 27 52.4	05.98S	105.96E	33	5.2	065/22	326/22	015/30	285/00	200/68	Strike-slip	1.00	12	BMG
300.	BMG	17 07 80	00 39 00.9	04.95S	103.10E	59	5.4	052/30	163/30	018/00	107/46	288/45	Reverse	0.93	14	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
301.	BMG	23 07 80	21 15 15.4	02.79S	101.20E	54.5	5.5	037/38	277/33	067/03	330/57	160/35	Reverse	0.88	51	BMG
302.	BMG	17 08 80	09 01 55.7	03.77S	128.24E	24.4	5.4	166/00	256/23	209/15	303/16	076/73	Strike-slip	0.83	30	BMG
303.	BMG	19 08 80	21 01 26.0	03.58S	140.04E	33	5.8	009/00	099/37	047/25	151/25	279/53	Strike-slip	0.87	38	BMG
304.	BMG	22 08 80	13 08 51.3	04.99S	103.06E	50	5.1	044/65	188/20	020/23	166/64	283/13	Reverse	0.96	25	BMG
305.	BMG	28 08 80	03 11 40.6	10.63S	116.66E	39.6	5.2	018/20	258/54	220/20	340/55	120/29	Reverse	0.92	13	BMG
306.	BMG	16 09 80	15 23 45.6	03.90N	095.61E	40	5.2	186/28	056/48	027/09	132/61	261/26	Reverse	0.91	34	BMG
307.	BMG	20 09 80	17 44 24.8	05.12S	102.41E	20	5.5	116/25	022/10	066/25	161/10	272/62	Strike-slip	0.94	31	BMG
308.	BMG	26 09 80	02 56 10.5	11.37S	118.26E	33	5.2	240/10	138/50	204/40	091/25	337/38	Strike-slip	1.00	12	BMG
309.	BMG	05 10 80	17 18 41.1	11.38S	114.57E	33	5.7	348/41	090/14	048/38	302/17	195/46	Strike-slip	0.87	53	BMG
310.	BMG	30 11 80	02 44 55.2	05.45S	102.95E	57.7	5.4	194/20	089/44	048/08	146/38	308/49	Strike-slip	0.91	35	BMG
311.	BMG	20 12 80	14 50 32.4	00.99S	138.56E	33	5.5	290/32	042/28	254/05	348/49	163/47	Reverse	0.90	30	BMG
312.	BMG	24 12 80	23 55 06.4	08.95S	112.04E	63	5.6	139/20	044/13	091/25	183/04	282/65	Strike-slip	0.95	38	BMG
313.	BMG	01 01 81	12 44 07.3	07.78S	126.31E	23	5.2	075/29	325/31	110/00	020/44	200/96	Reverse	1.0	9	BMG
314.	BMG	19 01 81	15 11 01.0	04.58S	139.25E	33	6.0	030/18	210/72	210/27	030/63	300/00	Reverse	0.88	41	BMG
315.	BMG	19 01 81	15 54 00.4	04.70S	139.40E	33	5.4	136/50	252/20	097/16	210/51	355/32	Reverse	0.95	19	BMG
316.	BMG	19 01 81	17 08 02.6	04.73S	139.41E	33	5.4	100/00	010/00	055/00	145/00	999/90	Strike-slip	1.00	12	BMG
317.	BMG	20 01 81	07 18 25.2	04.59S	139.34E	33	5.1	288/29	169/40	136/08	236/52	042/35	Reverse	0.94	18	BMG
318.	BMG	01 02 81	04 35 25.8	11.14S	117.31E	33	5.6	123/30	003/40	070/55	330/04	238/36	Normal	0.94	62	BMG
319.	BMG	05 02 81	20 26 31.6	11.47S	116.86E	33	5.2	066/24	296/48	020/54	272/12	163/32	Normal	0.91	29	BMG
320.	BMG	13 02 81	19 09 28.2	04.57N	139.36E	33	5.1	244/30	353/30	300/45	210/00	119/45	Normal	0.90	20	BMG
321.	BMG	19 02 81	11 45 36.1	05.68S	129.98E	53	5.3	267/29	015/30	232/00	321/45	143/46	Reverse	0.96	28	BMG
322.	BMG	01 03 81	23 58 08.1	09.46S	107.75E	33	5.0	137/30	047/00	088/19	188/21	317/60	Strike-slip	0.93	15	BMG
323.	BMG	13 08 81	23 22 35.7	08.76S	110.43E	51	5.6	346/30	096/29	042/46	312/01	209/52	Normal	0.87	23	BMG
324.	BMG	16 03 81	17 55 28.2	01.98N	129.49E	33.5	5.4	246/29	117/48	198/60	087/10	352/27	Normal	0.94	31	BMG
325.	BMG	20 03 81	23 31 43.2	00.45N	126.18E	33.6	5.2	100/70	280/30	100/65	280/25	010/00	Normal	0.93	27	BMG
326.	BMG	26 03 81	21 30 04.7	03.41N	127.99E	60.5	6.1	350/20	170/70	170/25	350/65	080/00	Reverse	0.83	83	BMG
327.	BMG	01 04 81	21 49 04.2	09.66S	118.96E	25.2	5.5	251/28	146/28	199/39	108/00	019/49	Strike-slip	0.86	47	BMG
328.	BMG	13 04 81	16 38 59.2	01.07S	136.52E	21.3	5.4	012/05	279/40	333/31	228/23	107/49	Strike-slip	0.84	38	BMG
329.	BMG	27 04 81	05 53 30.9	06.90S	102.66E	33	5.0	069/00	159/10	113/07	205/07	338/80	Strike-slip	0.93	27	BMG
330.	BMG	03 05 81	08 48 57.2	04.76S	102.29E	33	5.2	038/55	259/28	064/13	300/66	159/18	Reverse	0.90	29	BMG
331.	BMG	05 05 81	15 18 26.6	03.49S	099.62E	31	5.2	039/30	296/20	080/05	324/37	180/52	Strike-slip	0.91	21	BMG
332.	BMG	25 05 81	16 27 49.6	01.98N	129.39E	28	5.4	083/42	083/42	143/36	036/20	282/46	Strike-slip	0.97	33	BMG
333.	BMG	11 06 81	18 43 41.6	06.95S	123.22E	48.5	5.1	127/64	350/20	157/25	015/61	253/16	Reverse	0.90	31	BMG
334.	BMG	18 06 81	20 44 58.9	06.68S	102.78E	33	5.1	010/10	274/30	329/36	229/12	116/58	Strike-slip	0.90	21	BMG
335.	BMG	27 06 81	19 51 59.5	00.02N	126.77E	52.7	5.2	252/10	072/80	072/35	252/55	162/00	Reverse	0.95	32	BMG
336.	BMG	03 08 81	17 21 32.9	04.71S	103.23E	51.9	5.0	049/12	150/20	193/03	101/26	295/68	Strike-slip	0.84	9	BMG
337.	BMG	11 08 81	20 16 59.1	04.71S	139.40E	27.6	5.2	211/16	311/32	257/36	354/10	099/53	Strike-slip	1.00	17	BMG
338.	BMG	14 08 81	06 24 42.9	02.45N	127.04E	38.2	5.5	296/40	060/32	266/05	003/58	175/32	Reverse	0.88	25	BMG
339.	BMG	18 08 81	03 12 52.6	04.04S	127.33E	41.5	5.0	265/74	085/10	266/29	085/61	175/00	Reverse	0.80	20	BMG
340.	BMG	18 08 81	05 29 34.6	04.09S	127.34E	33.6	5.1	231/24	051/66	051/21	231/69	141/00	Reverse	0.85	40	BMG
341.	BMG	22 08 81	02 45 18.6	03.98S	140.41E	58.7	5.5	250/34	070/56	070/11	250/79	160/00	Reverse	0.88	19	BMG
342.	BMG	12 09 81	16 30 46.8	06.49S	131.66E	35.6	5.1	005/00	095/00	050/00	140/00	099/90	Strike-slip	0.94	17	BMG
343.	BMG	13 09 81	10 22 59.1	05.51S	131.01E	33	5.3	174/50	078/04	228/29	113/35	344/40	Strike-slip	0.89	27	BMG
344.	BMG	13 09 81	17 03 14.5	05.47S	130.99E	33	5.2	234/22	144/00	282/14	086/14	055/68	Strike-slip	0.90	22	BMG
345.	BMG	17 09 81	06 19 08.8	06.49S	127.93E	33	5.7	051/00	142/16	187/10	094/10	321/74	Strike-slip	0.82	60	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB	Magnitude ML	Magnitude MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7			8	9	10	11	12	13	14	15	16
346.	BMG	28 09 81	03 41 44.7	02.37S	140.32E	33	5.2			036/70	216/20	216/65	036/25	126/00	Normal	1.00	10	BMG
347.	BMG	16 10 81	14 40 56.7	04.27N	128.33E	56	5.3			263/50	039/30	238/10	350/66	143/22	Reverse	0.82	45	BMG
348.	BMG	17 10 81	12 08 26.3	03.20S	142.25E	26	5.9			239/44	014/37	215/04	313/66	123/00	Reverse	0.82	67	BMG
349.	BMG	17 10 81	15 43 04.6	10.27S	116.84E	33	5.1			097/00	007/26	319/16	055/18	187/64	Strike-slip	0.81	21	BMG
350.	BMG	23 10 81	13 05 57.5	08.78S	106.45E	33	5.5			090/34	197/26	052/07	150/44	312/46	Strike-slip	0.94	31	BMG
351.	BMG	10 11 81	18 25 05.5	07.17S	132.03E	33	5.3			179/40	279/12	238/38	133/16	022/48	Strike-slip	0.90	20	BMG
352.	BMG	23 11 81	04 46 13.3	07.00N	125.64E	53.2	5.0			207/24	300/08	162/09	256/23	047/64	Strike-slip	0.85	14	BMG
353.	BMG	12 12 81	07 27 15.6	01.16S	127.32E	60.4	5.4			290/60	007/24	037/66	264/17	169/16	Reverse	0.92	37	BMG
354.	BMG	25 12 81	00 28 15.8	04.76N	118.48E	39.1	5.4			255/60	355/06	326/44	200/32	089/29	Reverse	0.86	53	BMG
355.	BMG	27 12 81	10 30 [illegible]	02.12S	139.80E	33	5.7			180/18	087/07	225/06	132/18	335/70	Strike-slip	0.89	55	BMG
356.	BMG	10 01 82	12 52 13.7	03.04S	129.74E	58.3	5.1			220/14	322/40	006/16	261/38	115/46	Strike-slip	0.84	19	BMG
357.	BMG	20 01 82	04 25 11.6	06.95N	094.00E	18.9	5.6		6.3	228/00	318/08	003/06	275/06	128/82	Strike-slip	0.86	73	BMG
358.	BMG	20 01 82	05 13 25.4	07.05N	094.03E	33	5.2			189/30	060/40	037/07	136/54	303/35	Reverse	1.00	19	BMG
359.	BMG	20 01 82	07 09 17.4	07.12N	093.99E	27	5.7		6.2	175/10	265/14	221/20	311/03	048/73	Strike-slip	0.91	89	BMG
360.	BMG	21 01 82	23 00 26.5	02.42N	126.74E	57.5	5.4			252/20	072/70	072/25	252/65	162/00	Reverse	0.85	34	BMG
361.	BMG	25 01 82	10 27 09.1	06.86N	094.04E	33	5.1			195/20	015/70	095/65	015/25	105/00	Normal	0.94	10	BMG
362.	BMG	04 02 82	01 54 46.1	06.11S	102.23E	29.0	5.5			140/36	237/10	093/16	165/32	340/52	Strike-slip	0.95	21	BMG
363.	BMG	10 02 82	16 17 51.5	06.86S	106.94E	39.8	5.5			155/72	335/18	155/27	335/63	245/00	Reverse	1.00	14	BMG
364.	BMG	10 02 82	21 00 48.8	11.47S	117.99E	33	5.5		5.6	136/46	290/40	122/04	238/75	031/12	Reverse	0.89	28	BMG
365.	BMG	21 02 82	09 25 16.0	06.18S	102.41E	27	5.4		5.5	070/36	269/52	258/08	022/77	167/09	Reverse	0.97	35	BMG
366.	BMG	24 02 82	04 22 40.3	04.37N	097.75E	52.3	5.4		5.4	068/20	200/60	232/21	100/59	330/20	Reverse	0.82	68	BMG
367.	BMG	04 03 82	02 32 55.7	02.63S	140.25E	33	5.4			230/16	328/24	278/29	010/04	110/60	Strike-slip	0.91	22	BMG
368.	BMG	17 03 82	20 17 21.7	02.35S	139.05E	34.9	5.1			232/26	332/20	191/04	283/34	094/58	Strike-slip	0.94	17	BMG
369.	BMG	18 03 82	04 52 48.5	04.60S	101.91E	30	5.2		5.0	180/28	070/32	033/04	127/45	301/45	Reverse	0.80	29	BMG
370.	BMG	19 03 82	00 17 52.3	02.80S	138.81E	48	5.5		5.5	170/20	074/12	214/05	121/25	315/66	Strike-slip	0.97	29	BMG
371.	BMG	22 03 82	08 38 33.3	02.47N	097.02E	39	5.3			150/30	312/58	323/14	180/75	055/08	Reverse	0.82	34	BMG
372.	BMG	22 03 82	16 47 26.5	10.13S	121.05E	33	5.0		4.0	195/80	015/10	195/35	015/55	105/00	Reverse	0.92	12	BMG
373.	BMG	22 03 82	17 15 23.7	08.63S	106.01E	34	5.1			356/50	246/16	040/20	285/48	145/35	Reverse	0.94	19	BMG
374.	BMG	25 08 82	04 51 32.5	11.47S	119.18E	33	5.1		5.1	282/30	025824	334/40	292/05	149/50	Strike-slip	1.00	14	BMG
375.	BMG	01 04 82	10 10 10.3	02.63S	138.76E	57.3	5.1			350/14	255/20	303/28	212/04	114/65	Strike-slip	1.00	10	BMG
376.	BMG	21 04 82	11 51 33.2	05.11S	102.37E	33	5.3	4.8		108/06	017/12	064/28	334/09	227/76	Reverse	0.81	26	BMG
377.	BMG	22 04 82	02 58 39.5	05.65S	133.73E	53	5.3	4.6		010/30	210/58	198/13	345/74	105/10	Reverse	0.86	29	BMG
378.	BMG	27 04 82	08 06 24.8	04.13S	119.03E	30.8	5.5	4.8		182/24	340/64	355/20	200/68	088/08	Reverse	0.92	37	BMG
379.	BMG	27 04 82	11 49 28.7	08.29S	121.46E	33	5.2			153/26	260/30	205/42	298/03	029/48	Normal	0.89	28	BMG
380.	BMG	27 04 82	12 06 05.8	08.33S	121.48E	37.2	5.3	5.2		084/20	350/10	034/22	128/06	236/67	Strike-slip	0.96	26	BMG
381.	BMG	27 04 82	16 15 18.4	08.36S	121.52E	33	5.0			120/50	335/34	141/07	025/70	234/16	Reverse	0.95	20	BMG
382.	BMG	14 05 82	14 02 35.9	02.91S	141.92E	2.9	5.4		5.4	027/10	263/70	007/52	221/32	120/16	Normal	0.82	28	BMG
383.	BMG	18 05 82	17 32 17.0	04.71S	103.27E	6.4	5.2			117/38	350/36	144/02	048/60	235/30	Reverse	0.83	23	BMG
384.	BMG	04 06 82	13 12 15.3	01.49N	117.91E	33	5.1			000/30	250/30	305/42	038/04	125/45	Normal	1.00	10	BMG
385.	BMG	14 06 82	16 41 04.1	04.71S	103.06E	56	5.9			210/14	040/76	031/29	207/59	300/02	Reverse	0.88	129	BMG
386.	BMG	14 06 82	19 29 34.5	08.09N	121.47E	26.7	5.0		4.4	319/12	227/10	003/01	273/16	099/74	Strike-slip	0.92	24	BMG
387.	BMG	22 06 82	14 55 55.7	02.86S	126.40E	27	5.4		5.4	020/12	287/14	244/02	333/20	150/72	Strike-slip	0.94	90	BMG
388.	BMG	27 07 82	19 34 32.5	03.59N	128.48E	26	5.3		5.7	187/42	325/40	166/01	257/68	074/22	Reverse	0.91	22	BMG
389.	BMG	06 08 82	20 40 52.2	08.37S	120.58E	45.7	5.9			138/10	230/10	184/14	094/00	000/76	Strike-slip	0.82	45	BMG
390.	BMG	06 08 82	20 46 13.9	08.32S	120.42E	49.9	5.5			070/30	328/20	111/06	015/36	211/52	Strike-slip	1.00	16	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB	Magnitude ML	Magnitude MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7			8	9	10	11	12	13	14	15	16
391.	BMG	07 08 82	20 56 22.7	11.14S	115.42E	33	6.1		6.2	185/26	075/34	134/45	036/05	303/45	Normal	0.84	87	BMG
392.	BMG	09 08 82	03 15 43.4	09.85S	121.48E	33	5.6			060/30	170/30	025/00	115/46	296/45	Reverse	1.00	10	BMG
393.	BMG	10 08 82	18 56 24.3	06.16S	104.21E	63	5.4			220/22	110/40	071/10	173/46	331/52	Reverse	0.88	41	BMG
394.	BMG	11 08 82	10 28 42.3	08.78S	123.98E	33	5.5			105/30	345/40	314/06	051/54	220/35	Reverse	0.85	20	BMG
395.	BMG	11 08 82	10 42 37.9	03.06S	130.30E	20.8	5.6		5.4	047/18	303/38	261/11	002/42	157/46	Reverse	0.91	46	BMG
396.	BMG	11 08 82	10 52 16.1	03.01S	130.40E	33	5.4			087/16	178/04	134/13	041/08	283/74	Strike-slip	0.81	21	BMG
397.	BMG	19 08 82	20 05 48.9	00.09S	121.65E	44.5	5.1			120/38	281/50	292/05	177/78	022/10	Reverse	1.00	16	BMG
398.	BMG	21 08 82	05 06 09.3	08.46S	120.53E	33	5.3		4.9	280/70	100/20	100/65	280/25	010/00	Normal	0.85	20	BMG
399.	BMG	24 08 82	16 01 32.7	01.72S	136.26E	33	5.4		5.0	165/37	290/36	231/58	136/02	046/31	Normal	0.86	43	BMG
400.	BMG	27 08 82	23 30 09.0	02.31S	120.97E	54.7	5.4			258/18	076/72	256/63	076/27	346/00	Normal	0.86	29	BMG
401.	BMG	07 09 82	06 13 27.7	04.72S	139.32E	33	5.0			130/50	310/40	130/05	310/85	040/00	Reverse	0.93	14	BMG
402.	BMG	24 09 82	22 51 52.2	05.98N	126.62E	46.4	5.5		5.5	352/33	255/10	298/32	038/13	151/55	Strike-slip	0.87	39	BMG
403.	BMG	25 09 82	03 44 42.3	04.36S	102.17E	60.7	5.0			068/22	273/66	051/66	257/31	162/08	Normal	0.86	22	BMG
404.	BMG	27 09 82	08 55 34.0	01.30N	126.30E	62	5.6			057/32	175/36	206/05	113/53	099/37	Reverse	0.85	75	BMG
405.	BMG	24 09 82	15 35 25.8	03.65S	131.14E	66	5.2			237/34	006/42	033/04	295/62	126/28	Reverse	0.91	33	BMG
406.	BMG	31 10 82	02 48 13.6	02.97N	096.10E	62	5.5			305/45	045/10	066/39	258/21	145/43	Strike-slip	0.82	67	BMG
407.	BMG	03 11 82	14 48 04.8	03.24S	139.69E	33	5.2			198/36	311/28	162/05	257/50	069/40	Reverse	0.92	13	BMG
408.	BMG	09 11 82	01 36 34.8	07.04N	094.37E	33	5.1		4.7	219/00	119/00	174/00	264/00	999/90	Strike-slip	0.93	14	BMG
409.	BMG	11 11 82	00 43 45.6	06.65S	101.63E	33	6.1		6.0	237/53	057/37	057/82	237/08	327/00	Normal	0.86	127	BMG
410.	BMG	14 11 82	16 23 56.4	09.37S	122.60E	49.9	5.5			358/22	260/20	040/02	308/30	132/60	Strike-slip	0.82	60	BMG
411.	BMG	19 11 82	07 52 42.6	01.26N	121.91E	31.7	5.1			120/40	264/44	283/02	187/70	014/20	Reverse	0.92	24	BMG
412.	BMG	22 11 82	00 28 01.3	07.18S	130.08E	62.8	5.6			215/00	125/30	080/22	170/22	305/60	Strike-slip	0.80	46	BMG
413.	BMG	02 12 82	19 36 56.4	04.50S	038.95E	33	5.6		5.2	153/48	305/38	137/04	250/75	046/14	Reverse	0.91	46	BMG
414.	BMG	12 12 82	01 21 14.9	07.91S	128.31E	33	5.0			197/10	098/40	156/34	051/19	298/48	Strike-slip	0.83	18	BMG
415.	BMG	19 12 82	06 24 39.6	06.33S	100.74E	33	5.4		5.0	160/30	280/40	214/54	312/06	046/34	Normal	0.94	17	BMG
416.	BMG	25 12 82	07 53 39.6	04.36S	131.40E	33	5.4		4.4	219/10	039/80	039/35	219/55	129/00	Reverse	0.87	23	BMG
417.	BMG	02 01 83	18 29 46.4	01.99N	126.81E	57.3	5.4			200/48	110/00	120/43	280/45	020/12	Reverse	0.80	52	BMG
418.	BMG	03 01 83	03 39 47.2	04.85S	103.15E	59	5.5			195/26	079/42	043/09	147/50	306/36	Reverse	0.88	51	BMG
419.	BMG	04 01 83	03 09 02.9	03.15S	101.23E	54.1	5.4		5.2	080/40	205/34	050/04	147/58	319/32	Reverse	0.91	69	BMG
420.	BMG	10 01 83	01 57 55.8	01.93S	133.69E	33	5.2		5.7	150/40	285/40	127/00	217/66	037/25	Reverse	0.82	58	BMG
421.	BMG	15 01 83	02 20 10.6	06.29S	131.08E	43.6	5.3			120/20	215/12	077/04	170/24	333/67	Strike-slip	0.85	20	BMG
422.	BMG	22 01 83	01 24 34.6	06.67S	102.98E	41	5.3		5.5	036/40	272/34	065/04	328/59	158/30	Reverse	0.80	30	BMG
423.	BMG	22 01 83	06 44 36.4	06.71S	102.97E	29	5.7		6.1	357/30	093/10	050/30	312/13	201/58	Strike-slip	0.81	48	BMG
424.	BMG	25 01 83	06 08 07.2	03.60S	140.19E	18.4	5.1		5.8	154/69	334/21	154/24	334/66	064/00	Reverse	0.82	22	BMG
425.	BMG	29 01 83	00 34 48.6	03.21S	129.29E	45.1	5.0			310/40	049/10	263/18	008/36	150/48	Strike-slip	0.90	20	BMG
426.	BMG	01 02 83	02 07 07.8	03.49S	140.16E	33	5.0			326/20	074/40	002/45	115/11	217/43	Normal	0.90	10	BMG
427.	BMG	04 02 83	19 05 59.4	10.23S	124.40E	33	5.5			017/30	107/00	066/20	327/20	197/60	Strike-slip	0.81	38	BMG
428.	BMG	08 82 83	16 17 50.1	01.67S	096.49E	33	5.3			171/14	075/20	124/25	031/04	197/60	Strike-slip	0.93	45	BMG
429.	BMG	12 02 83	08 47 12.7	05.67N	126.29E	51	5.7			170/32	065/22	210/06	114/40	307/49	Strike-slip	0.87	62	BMG
430.	BMG	12 02 83	11 50 59.4	06.74S	102.96E	33	5.0			115/30	225/30	261/00	170/46	350/45	Reverse	0.93	15	BMG
431.	BMG	14 02 83	01 29 51.9	01.64N	126.36E	50.9	5.0			043/10	306/34	260/14	000/32	148/54	Strike-slip	0.88	17	BMG
432.	BMG	20 02 83	10 49 54.1	05.55N	126.24E	60.5	5.9			282/19	048/60	314/58	085/21	184/22	Normal	0.80	75	BMG
433.	BMG	23 02 83	09 43 05.7	06.72S	102.94E	26	5.0			182/16	002/24	182/61	002/29	092/00	Normal	0.93	15	BMG
434.	BMG	26 02 83	16 00 14.9	11.21S	115.56E	33	5.0			017/30	287/30	233/00	323/46	144/45	Reverse	0.82	13	BMG
435.	BMG	03 03 83	02 30 29.7	06.21S	100.70E	23.4	5.5			265/40	189/14	146/39	041/16	293/46	Strike-slip	0.93	54	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB	Magnitude ML	Magnitude MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7			8	9	10	11	12	13	14	15	16
436.	BMG	12 03 83	00 53 40.2	04.04S	127.89E	33	5.8		6.0	070/22	160/00	022/14	118/14	250/68	Strike-slip	0.87	62	BMG
437.	BMG	12 03 83	01 36 35.8	04.06S	127.92E	16.9	6.0		6.5	210/42	080/34	236/05	140/62	329/29	Reverse	0.89	64	BMG
438.	BMG	15 03 83	19 58 30.5	05.35N	126.56E	41	5.7		6.6	154/04	246/27	293/16	197/21	055/62	Strike-slip	0.83	46	BMG
439.	BMG	16 03 83	19 13 11.9	03.48N	095.79E	43.3	5.2		4.6	106/70	286/20	286/65	106/25	016/00	Normal	0.91	33	BMG
440.	BMG	20 03 83	11 24 46.8	02.33N	126.70E	41.6	5.5		4.5	224/30	338/35	012/02	279/50	105/40	Reverse	0.82	39	BMG
441.	BMG	22 03 83	22 44 24.9	03.84N	118.86E	57.6	5.0			128/30	230/20	086/06	182/37	348/53	Strike-slip	0.93	16	BMG
442.	BMG	30 03 83	00 49 08.1	01.68N	122.55E	22.8	5.5			074/12	338/24	295/07	028/26	187/62	Strike-slip	0.87	45	BMG
443.	BMG	07 04 83	05 04 22.2	06.09S	100.75E	33	5.1			070/30	290/52	025/66	276/11	172/20	Normal	0.88	18	BMG
444.	BMG	16 04 83	12 57 49.9	10.16S	110.89E	57.1	5.9			263/42	028/32	330/58	233/05	140/31	Normal	0.83	90	BMG
445.	BMG	21 04 83	10 25 08.1	00.86N	125.95E	52.4	5.2			130/54	310/54	310/09	130/81	040/00	Reverse	0.93	26	BMG
446.	BMG	02 05 83	06 59 58.8	08.66S	106.36E	33	5.3			143/20	239/14	100/03	192/26	001/65	Strike-slip	0.80	41	BMG
447.	BMG	03 06 83	21 51 51.3	00.64N	119.92E	25	5.0			281/22	158/54	121/16	242/57	023/29	Reverse	0.82	28	BMG
448.	BMG	08 06 83	09 54 38.8	05.23S	102.92E	40	5.2			086/16	346/30	304/08	040/34	203/55	Strike-slip	0.88	32	BMG
449.	BMG	15 06 83	07 33 43.6	05.31N	127.60E	53.9	5.2		5.0	000/34	246/30	034/02	296/49	126/41	Reverse	0.85	26	BMG
450.	BMG	18 16 83	11 29 48.2	05.57S	131.25E	55.4	5.2			105/04	197/26	245/14	148/20	008/64	Strike-slip	0.83	24	BMG
451.	BMG	21 06 83	12 57 33.8	03.78S	131.56E	33	5.0			247/24	157/10	295/08	201/25	045/64	Strike-slip	0.87	15	BMG

EARTHQUAKE FOCAL MECHANISM SOLUTIONS

Classification	NOE	Solution	N	R	SS	Data Sources						
						Before SEASEE Project					On SEASEE Project	
						Others				Solution by BMG	Others	Solution by BMG
						WDC	R/56	RCBI	JOKO/79		BMG	BMG 84
Intermediate EQ.	352	353	69	152	131	66	4	9		197	76	16

EARTHQUAKE FOCAL MECHANISM SOLUTIONS

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB	Magnitude ML	Magnitude MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7			8	9	10	11	12	13	14	15	16
1.	R/56	31 01 41	02 38 40.0	06.50S	128.50E	191			6.8	310/79	168/09	175/52	343/36	077/09	Normal	-	-	Ritsema
2.	R/56	17 09 41	06 48 04.0	00.10N	122.70E	191				345/24	090/24	040/40	306/04	213/60	Strike-slip	-	-	Ritsema
3.	R/56	27 11 41	08 37 34.0	06.60S	121.10E	446				023/53	137/17	342/21	100/51	238/41	Reverse	-	-	Ritsema
4.	R/56	07 07 53	04 07 48.0	01.00N	100.00E	191			6.75	320/53	095/28	293/14	052/64	212/49	Reverse	-	-	Ritsema
5.	WH/67	28 03 61	09 35 55.0	00.20N	123.60E	83			6.7	266/58	134/23	117/19	347/62	214/21	Reverse	-	-	World Data Centre
6.	FM/70	14 02 63	07 04 51.0	07.19S	127.85E	261	5.8		6.4	068/30	296/50	268/11	020/62	174/25	Reverse	-	-	World Data Centre
7.	F/72	22 05 63	21 53 05.0	08.21S	115.69E	76	5.3		6.2	186/06	006/84	006/39	186/51	096/00	Reverse	-	-	World Data Centre
8.	F/72	17 06 63	23 02 07.0	04.12S	102.24E	69	5.5		6.3	060/10	240/80	240/35	060/55	150/00	Reverse	-	-	World Data Centre
9.	FA/70	19 06 63	09 09 09.0	04.47N	126.34E	183	5.7			264/10	084/80	084/35	264/55	174/00	Reverse	-	-	World Data Centre
10.	FM/70	30 06 63	06 45 39.0	02.54S	102.53E	176	5.3		5.9	050/06	154/60	207/32	080/45	320/30	Reverse	-	-	World Data Centre
11.	FM/70	08 01 64	22 30 49.0	03.65S	119.54E	81	5.3			077/50	257/40	077/05	257/85	167/00	Reverse	-	-	World Data Centre
12.	DS/73	29 02 64	23 49 48.7	08.52S	112.70E	143	5.4			316/20	000/31	006/38	101/06	199/51	Normal	0.84	37	World Data Centre
	FM/70	29 02 64	23 49 48.7	08.52S	112.70E	140	5.7			003/70	183/20	183/65	003/25	093/00	Normal	-	-	World Data Centre
13.	DS/70	13 03 64	21 39 44.0	04.72N	125.67E	204	5.0			278/20	009/04	232/11	323/17	110/60	Strike-slip	0.85	20	World Data Centre
14.	FM/70	10 03 64	01 06 00.0	01.76N	127.00E	138	5.6			145/90	145/00	325/45	145/45	055/00	Reverse	-	-	World Data Centre
15.	DS/73	10 03 64	13 59 57.2	01.92N	127.49E	138	5.4			290/00	200/30	151/21	249/21	200/60	Strike-slip	0.82	33	World Data Centre
16.	TB/65	21 03 64	03 42 20.6	06.44S	127.96E	373	5.8			088/48	355/04	033/35	144/24	254/43	Strike-slip	-	-	World Data Centre
	O/71	21 03 64	03 42 20.6	06.44S	127.96E	373	5.8			051/05	318/31	009/26	270/18	149/58	Strike-slip	-	-	World Data Centre
17.	BMG/84	28 03 64	11 30 11.3	00.40N	12[illegible].11E	160	6.1			353/31	250/20	033/05	298/39	135/50	Strike-slip	0.91	33	BMG
18.	DS/73	02 04 64	15 56 52.5	05.77N	125.73E	168	5.6			099/10	088/08	054/13	144/01	240/77	Strike-slip	0.78	27	World Data Centre
	FM/70	02 04 64	15 56 52.5	05.77N	125.73E	78	5.7			078/84	258/06	078/39	258/51	168/00	Reverse	-	-	World Data Centre
19.	F/72	03 04 64	04 12 59.7	03.91N	096.56E	70	5.8			200/20	020/70	200/65	020/25	110/00	Normal	-	-	World Data Centre
20.	DS/73	07 04 64	13 18 22.7	00.02N	123.18E	184	5.8			345/01	080/30	030/21	128/20	257/60	Strike-slip	0.89	56	World Data Centre
21.	BMG/84	24 04 64	05 56 09.8	05.07S	144.20E	99	6.3			070/60	290/24	323/65	097/18	192/16	Normal	0.80	30	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
22.	DS/73	26 04 64	13 59 27.7	05.89S	104.93E	90	5.7	357/01	087/05	042/04	132/03	256/85	Strike-slip	0.89	37	World Data Centre
23.	F/72	15 06 64	00 05 36.1	05.28N	096.82E	67	5.3	350/50	214/30	016/11	264/65	102/36	Reverse	-	-	World Data Centre
	DS/73	15 06 64	00 05 36.1	05.28N	096.82E	71	5.3	190/30	088/20	231/06	136/36	329/53	Strike-slip	0.78	37	World Data Centre
24.	DS/73	08 07 64	07 45 50.8	03.19N	128.31E	70	5.2	240/10	141/40	095/19	199/35	341/48	Strike-slip	0.83	18	World Data Centre
25.	FM/70	08 07 64	11 55 41.1	05.54S	129.79E	189	6.5	024/10	274/63	225/31	357/40	119/25	Strike-slip	-	-	World Data Centre
	DS/73	08 07 64	11 55 41.1	05.54S	129.79E	189	6.5	300/40	192/20	340/12	238/44	051/43	Strike-slip	0.78	72	World Data Centre
26.	O/71	11 07 64	15 35 55.5	05.93N	126.31E	183	5.0	124/22	017/35	338/80	075/42	239/47	Strike-slip	-	-	World Data Centre
27.	DS/73	24 08 64	17 26 16.0	00.09N	123.67E	143	5.3	190/20	096/10	234/07	142/21	341/67	Strike-slip	0.87	23	World Data Centre
28.	DS/73	06 09 64	18 57 23.0	07.08N	093.62E	69	5.0	279/17	016/21	327/27	058/03	153/32	Strike-slip	-	-	World Data Centre
29.	F/72	01 11 64	12 26 07.5	03.11N	128.06E	89	5.8	128/39	241/01	094/07	192/07	356/40	Strike-slip	-	-	World Data Centre
30.	DS/73	03 11 64	12 43 04.6	00.00N	123.63E	150	5.5	291/01	021/01	338/01	246/00	156/89	Strike-slip	0.87	16	World Data Centre
31.	DS/73	09 11 64	04 44 20.1	07.25S	128.14E	133	5.3	344/48	116/31	317/09	065/63	222/25	Reverse	0.88	25	World Data Centre
32.	DS/73	24 11 64	10 41 33.5	06.24S	107.28E	130	5.5	230/00	140/20	187/14	093/14	320/70	Strike-slip	0.75	40	World Data Centre
33.	FM/70	17 01 65	20 57 41.8	06.85S	109.01E	242	5.7	134/15	238/40	176/40	280/16	026/46	Strike-slip	-	-	World Data Centre
34.	F/72	15 02 65	10 43 26.2	02.97N	125.91E	88	5.9	022/12	276/57	226/28	350/46	120/37	Reverse	-	-	World Data Centre
35.	FM/70	12 05 65	10 33 44.3	06.20S	130.33E	125	5.8	006/60	259/11	054/31	288/47	163/28	Reverse	-	-	World Data Centre
36.	FM/70	20 08 65	05 54 50.6	05.74S	128.63E	327	6.1	347/60	256/02	050/35	284/44	165/30	Reverse	-	-	World Data Centre
	DS/73	20 08 65	05 54 50.6	05.74S	128.63E	328	6.1	350/81	080/00	269/44	071/44	170/09	Reverse	0.86	86	World Data Centre
37.	O/71	07 09 65	07 12 37.7	02.66N	124.27E	288	5.6	316/34	214/18	260/38	358/40	100/50	Strike-slip	-	-	World Data Centre
38.	FM/70	16 09 65	13 58 12.2	07.13N	126.58E	178	5.9	026/34	274/31	060/02	328/48	152/42	Reverse	-	-	World Data Centre
39.	F/72	18 09 65	22 03 15.1	08.31N	126.96E	85	5.4	282/10	102/80	102/35	282/55	013/00	Reverse	-	-	World Data Centre
40.	FM/70	24 10 65	14 32 13.9	04.71N	125.81E	151	5.4	064/74	244/16	064/29	244/61	154/00	Reverse	-	-	World Data Centre

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB	Magnitude ML	Magnitude MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7			8	9	10	11	12	13	14	15	16
41.	FM/70	20 11 65	15 05 38.2	07.28S	129.16E	122	5.9			142/60	272/20	110/22	241/59	010/22	Reverse	-	-	World Data Centre
42.	FM/70	21 11 65	10 31 51.0	06.21S	130.39E	102	6.3			150/60	266/14	106/26	235/52	003/25	Reverse	-	-	World Data Centre
43.	01/71	15 12 65	08 22 22.2	00.00N	123.69E	169	5.3			272/19	181/01	225/14	318/12	081/71	Strike-slip	-	-	World Data Centre
44.	FM/70	03 02 66	05 48 11.6	00.11N	123.52E	165	5.7			104/51	333/29	170/14	019/62	228/26	Reverse	-	-	World Data Centre
45.	F/72	21 08 66	05 00 24.0	08.48N	126.62E	67	5.8			248/24	068/66	063/19	248/71	349/00	Reverse	-	-	World Data Centre
46.	FM/70	08 09 66	21 15 52.3	02.34N	128.40E	71	6.6			045/39	237/50	231/04	002/83	140/04	Reverse	-	-	World Data Centre
47.	F/72	19 02 67	22 14 36.4	09.12S	113.40E	80	5.9		6.4	229/08	051/82	229/53	051/37	140/04	Normal	-	-	World Data Centre
	DS/73	19 02 67	22 14 36.4	09.12S	113.05E	94	5.9			230/00	140/60	077/38	203/38	320/30	Strike-slip	0.77	97	World Data Centre
48.	FM/70	19 02 67	23 28 36.4	00.11S	124.22E	101	5.7			151/61	231/21	118/21	249/60	020/22	Reverse	-	-	World Data Centre
49.	BMG/84	19 03 67	01 10 48.2	06.73S	129.84E	80	6.0			229/20	080/68	057/27	214/61	322/12	Reverse	0.93	60	BMG
50.	FM/70	21 05 67	18 45 13.2	00.96S	101.39E	173	6.0			068/20	232/70	244/25	077/65	335/05	Reverse	-	-	World Data Centre
51.	FM/70	09 08 67	08 20 03.9	06.53S	130.53E	89	5.7			226/36	358/44	023/04	284/64	114/25	Reverse	-	-	World Data Centre
52.	O/71	07 09 67	07 [illegible] 37.7	02.66N	124.27E	274	5.8			213/18	316/34	260/38	358/10	100/50	Strike-slip	-	-	World Data Centre
53.	BMG/84	14 01 68	12 25 06.2	07.53S	127.91E	80	6.0			137/33	019/34	348/00	078/52	259/38	Reverse	0.89	64	BMG
54.	O/71	03 03 68	22 55 36.6	01.57N	122.03E	433	5.5			245/02	338/33	285/25	025/22	150/57	Strike-slip	-	-	World Data Centre
55.	F/72	24 10 68	15 51 16.0	06.06N	126.97E	70	5.5			073/50	309/29	107/11	356/61	204/26	Reverse	-	-	World Data Centre
56.	F/72	30 01 69	10 23 40.3	04.77N	127.50E	70	5.9			064/20	270/63	251/25	043/64	156/04	Reverse	-	-	World Data Centre
57.	RCBI/78	11 02 69	22 16 11.5	06.76S	126.74E	447	6.0			235/75	055/15	055/60	235/30	325/00	Normal	-	-	World Data Centre
58.	RCBI/78	13 04 69	23 33 15.4	06.11S	129.91E	163	5.9			184/54	004/36	184/09	004/81	274/00	Reverse	-	-	World Data Centre
59.	RCBI/78	08 08 69	20 44 21.0	06.14S	129.69E	185	5.9			044/40	157/25	006/09	108/50	270/00	Reverse	-	-	World Data Centre
60.	RCBI/78	29 09 69	16 20 01.5	07.27S	128.78E	139	5.7			255/48	046/38	240/04	346/74	148/15	Reverse	-	-	World Data Centre
61.	F/72	10 01 70	12 07 08.6	06.80N	126.75E	73	5.9			081/42	298/42	099/00	006/81	190/13	Reverse	-	-	World Data Centre
62.	F/72	30 03 70	16 45 46.2	06.78N	126.66E	76	5.8			062/30	280/54	256/13	019/66	162/10	Reverse	-	-	World Data Centre

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
63.	RCBI/78	13 08 70	04 22 38.5	09.00S	117.95E	99	6.0	323/23	118/65	135/21	340/66	228/10	Reverse	-	-	World Data Centre
64.	BMG/84	05 04 71	05 02 15.9	00.36S	124.70E	67	6.0	237/32	123/30	271/01	178/49	001/44	Reverse	0.91	84	BMG
65.	BMG/84	08 07 71	19 07 07.3	07.03S	129.70E	92	6.1	320/60	140/30	320/15	140/75	050/00	Reverse	0.91	77	BMG
66.	RCBI/78	16 09 71	06 22 37.6	05.93S	139.68E	125	6.2	112/05	292/85	112/50	292/40	021/00	Normal	-	-	World Data Centre
67.	RCBI/78	04 04 72	22 43 06.7	07.47S	125.56E	387	6.6	024/40	180/48	084/78	192/04	284/12	Normal	-	-	World Data Centre
68.	BMG/84	11 06 72	16 41 02.7	03.80N	124.30E	336	6.2	264/68	084/22	084/67	264/23	354/00	Normal	0.81	100	BMG
69.	RCBI/78	05 09 72	05 23 02.1	06.75S	129.72E	108	5.8	046/54	262/30	008/12	162/18	162/18	Reverse	-	-	World Data Centre
70.	BMG/84	05 09 72	17 18 29.5	01.90N	128.20E	154	5.9	346/43	109/30	316/07	220/32	220/32	Reverse	0.94	89	BMG
71.	RCBI/78	27 11 72	15 17 40.8	05.30S	126.62E	419	5.8	354/26	096/23	046/36	226/51	223/54	Strike-slip	-	-	World Data Centre
72.	BMG/84	27 01 73	13 08 49.9	00.14S	124.00E	112	5.9	308/43	083/38	284/02	195/24	195/24	Reverse	0.89	72	BMG
73.	BMG/84	13 08 73	08 28 19.4	04.50S	144.10E	109	5.9	105/60	015/00	041/37	285/30	285/30	Strike-slip	0.83	112	BMG
74.	BMG/84	29 10 74	03 14 18.6	06.90S	129.50E	156	6.3	311/60	182/20	343/21	083/22	083/22	Reverse	0.88	97	BMG
75.	BMG/84	14 01 75	19 49 05.0	04.93S	130.10E	82	6.0	089/20	354/12	041/24	247/57	247/57	Strike-slip	0.83	69	BMG
76.	BMG/84	27 05 75	10 18 38.9	00.75N	122.61E	97	6.0	321/34	222/13	266/34	113/54	113/54	Strike-slip	0.89	81	BMG
77.	BMG/84	17 10 75	03 31 51.8	07.54S	128.76E	106	6.1	255/42	128/33	283/05	016/29	016/29	Reverse	0.97	88	BMG
78.	BMG/84	25 12 75	23 22 20.3	04.10S	142.10E	102	6.4	168/84	348/06	348/51	078/00	078/00	Normal	0.88	104	BMG
79.	BMG/84	21 08 76	06 56 52.0	06.77S	129.62E	165	5.9	018/79	176/09	359/35	265/03	265/03	Reverse	0.90	88	BMG
80.	BMG	27 02 77	02 50 07.8	07.01S	128.38E	286	4.6	139/50	270/35	111/08	017/29	017/29	Reverse	0.81	21	BMG
81.	BMG	27 02 77	10 24 56.8	07.38S	128.48E	175	4.8	145/47	268/29	109/11	011/40	011/40	Reverse	0.89	18	BMG
82.	BMG	13 03 77	15 20 02.5	04.74S	127.46E	87	5.3	184/42	292/22	247/47	045/51	045/51	Normal	0.89	38	BMG
83.	BMG	16 06 77	00 59 45.1	06.24S	130.24E	166	5.1	087/57	340/13	012/49	242/28	242/28	Normal	1.00	13	BMG
84.	BMG	11 05 77	03 22 25.2	02.00N	126.88E	77	5.7	272/22	006/12	226/06	320/22	124/65	Strike-slip	0.82	50	BMG
85.	BMG	21 07 77	08 53 56.3	07.82S	122.52E	283	5.0	320/35	228/06	226/28	009/21	132/56	Strike-slip	0.86	22	BMG
86.	BMG	26 08 77	22 54 44.1	00.15S	123.07E	140	5.6	242/22	342/28	292/28	021/02	118/60	Strike-slip	0.74	43	BMG
87.	BMG	23 09 77	20 45 56.0	05.76S	128.83E	309	5.5	120/33	268/49	286/06	175/70	020/17	Reverse	0.87	69	BMG
88.	BMG	01 11 77	04 11 54.9	07.48S	128.47E	165	5.0	262/20	148/47	108/10	216/49	008/35	Reverse	0.89	28	BMG
89.	BMG	01 11 77	20 28 29.2	05.93S	105.79E	100	5.3	295/80	190/37	147/11	250/49	047/47	Reverse	0.88	26	BMG
90.	BMG	08 11 77	15 30 04.5	06.53S	128.19E	360	5.1	174/80	354/10	354/55	174/35	264/00	Normal	0.96	25	BMG
91.	BMG	08 01 78	22 30 58.8	04.21S	102.82E	94	5.6	200/18	302/40	346/13	245/45	083/50	Reverse	0.85	20	BMG
92.	BMG	09 01 78	21 54 12.8	06.29S	129.70E	168	5.2	090/20	218/60	122/60	251/20	351/22	Normal	0.83	12	BMG
93.	BMG	16 01 78	00 39 51.4	07.41S	126.54E	394	5.1	180/45	340/43	264/80	170/03	080/10	Normal	0.92	14	BMG
94.	BMG	30 01 78	13 14 54.1	06.79N	126.88E	69	5.3	120/56	270/30	100/13	231/69	009/14	Reverse	0.93	41	BMG
95.	BMG	02 02 78	04 05 07.0	00.23N	121.78E	172	5.3	110/34	227/34	080/02	171/51	349/39	Reverse	0.94	16	BMG
96.	BMG	03 02 78	11 03 52.9	08.68S	114.53E	123	5.1	242/21	140/21	193/39	099/03	002/54	Strike-slip	1.00	10	BMG
97.	BMG	05 02 78	18 18 15.8	03.42S	104.30E	294	5.0	048/17	380/00	084/14	002/12	228/74	Strike-slip	0.94	31	BMG
98.	BMG	08 02 78	13 05 26.6	04.23S	102.88E	83	5.4	126/35	030/12	071/32	172/16	280/68	Strike-slip	0.83	48	BMG
99.	BMG	12 02 78	03 34 29.1	08.66S	124.05E	106	5.8	120/38	240/38	090/00	180/52	000/35	Reverse	0.82	62	BMG
100.	BMG	17 02 78	15 07 42.9	07.11S	129.02E	108	5.2	209/09	111/40	063/20	168/35	311/48	Strike-slip	0.81	16	BMG
101.	BMG	20 02 78	00 39 12.5	02.95N	128.41E	231	4.8	239/39	345/20	297/42	198/10	101/43	Normal	0.85	13	BMG
102.	BMG	24 02 78	19 00 52.7	02.32N	126.63E	73	5.0	332/30	236/11	281/30	018/13	128/59	Strike-slip	1.00	10	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
103.	BMG	26 02 78	02 19 08.9	00.04N	122.85E	152	5.1	080/20	180/26	128/33	222/04	317/57	Strike-slip	0.89	26	BMG
104.	BMG	14 03 78	01 57 03.7	06.14N	126.88E	82	5.5	306/22	198/38	258/44	159/10	062/42	Normal	0.82	28	BMG
105.	BMG	14 03 78	19 42 37.6	02.95N	125.39E	185	5.0	160/40	270/22	120/13	223/46	021/42	Reverse	0.87	15	BMG
106.	BMG	15 03 78	14 46 23.7	09.62S	116.41E	94	5.4	178/20	278/22	317/06	228/28	048/61	Strike-slip	0.88	42	BMG
107.	BMG	25 03 78	12 45 59.3	01.78N	127.30E	134	4.7	100/20	280/70	100/65	280/25	010/00	Normal	0.90	10	BMG
108.	BMG	06 04 78	10 10 40.1	06.60S	129.89E	169	5.1	126/40	306/50	306/15	126/85	036/00	Reverse	0.86	14	BMG
109.	BMG	12 04 78	10 19 39.7	05.46S	131.14E	72	5.3	330/20	069/18	020/28	289/04	199/60	Strike-slip	0.94	36	BMG
110.	BMG	28 04 78	19 31 46.5	05.58S	105.93E	164	4.6	036/10	133/30	079/13	083/28	291/59	Strike-slip	1.00	13	BMG
111.	BMG	08 05 78	22 32 24.4	00.12S	124.26E	94	5.2	319/20	221/21	270/30	180/00	094/60	Strike-slip	0.87	14	BMG
112.	BMG	09 05 78	06 56 06.5	00.99N	126.13E	71	5.1	090/10	356/19	044/20	311/05	205/68	Strike-slip	0.92	12	BMG
113.	BMG	29 05 78	16 29 42.6	01.21N	124.26E	300	5.2	090/18	270/72	270/27	090/63	000/00	Reverse	0.87	37	BMG
114.	BMG	11 06 78	10 22 05.1	04.69N	126.61E	78	5.6	264/20	160/35	120/10	217/29	019/50	Strike-slip	0.84	57	BMG
115.	BMG	11 06 78	16 02 18.7	00.16N	126.61E	65	5.2	270/12	170/39	124/18	227/37	014/48	Strike-slip	0.88	16	BMG
116.	BMG	14 06 78	13 34 09.6	08.24N	122.38E	79	5.9	017/10	109/10	063/16	153/04	247/76	Strike-slip	0.81	68	BMG
117.	BMG	15 06 78	13 20 45.6	07.29S	128.88E	155	5.8	264/20	162/29	121/29	214/34	024/53	Strike-slip	0.90	58	BMG
118.	BMG	19 06 78	16 34 36.7	03.25N	124.25E	354	4.9	291/29	173/40	236/53	138/02	046/36	Normal	0.79	34	BMG
119.	BMG	24 07 78	06 07 02.4	02.66N	128.34E	166	5.1	311/27	066/40	354/50	102/07	199/39	Normal	0.86	14	BMG
120.	BMG	01 08 78	15 27 48.6	02.61N	123.94E	123	5.2	260/50	011/17	311/48	218/20	144/35	Normal	0.90	31	BMG
121.	BMG	05 08 78	18 52 09.1	34.02S	102.41E	113	5.5	066/10	102/18	055/11	146/05	250862	Strike-slip	0.86	115	BMG
122.	BMG	13 08 78	10 12 50.3	04.55N	126.63E	113	5.5	000/15	093/20	047/26	139/14	232867	Strike-slip	0.86	35	BMG
126.	BMG	13 08 78	13 34 10.9	07.07S	129.54E	124	5.1	043/04	134/11	068/08	180/06	300/76	Strike-slip	0.89	18	BMG
124.	BMG	14 08 78	08 26 59.7	06.61N	126.95E	78	5.0	258/14	357/37	042/12	302/35	148/52	Strike-slip	1.00	11	BMG
125.	BMG	25 08 78	15 56 37.0	03.92S	128.56E	131	5.1	104/40	346/28	139/10	038/52	231/36	Reverse	0.94	16	BMG
126.	BMG	10 09 78	21 33 29.3	00.46N	125.45E	71	5.1	264/10	168/24	122/18	221/30	008/54	Strike-slip	0.90	20	BMG
127.	BMG	12 09 78	14 03 59.3	03.56S	140.25E	114	5.1	180/70	285/06	264/47	120/38	017/18	Normal	0.91	11	BMG
128.	BMG	12 09 78	18 54 52.7	00.02N	123.82E	158	5.1	040/00	130/10	085/07	176/07	310/80	Strike-slip	0.85	13	BMG
129.	BMG	11 11 78	07 24 34.3	05.18S	129.72E	195	5.1	264/50	036/30	237/11	346/61	142/23	Reverse	0.94	17	BMG
130.	BMG	14 11 78	12 16 44.3	04.78S	129.03E	220	5.1	221/08	112/60	064/30	191/47	315/26	Reverse	1.00	17	BMG
131.	BMG	17 11 78	16 17 49.9	04.42S	127.46E	274	5.3	060/20	326/10	105/05	011/22	213/67	Strike-slip	0.91	56	BMG
132.	BMG	19 11 78	17 13 38.6	04.55S	129.56E	152	5.4	323/19	228/25	279/29	184/03	092/58	Strike-slip	0.90	48	BMG
133.	BMG	21 11 78	11 55 44.6	07.65S	127.41E	173	5.2	015/22	195/68	195/22	015/68	105/00	Reverse	0.87	39	BMG
134.	BMG	07 12 78	16 48 45.1	01.94N	127.38E	116	5.1	227/15	047/75	227/60	047/30	137/00	Normal	0.79	29	BMG
135.	BMG	11 12 78	13 22 14.7	00.96N	123.26E	79	4.5	294/42	192/13	236/39	339/18	088/46	Strike-slip	0.93	14	BMG
136.	BMG	18 12 78	18 57 59.1	06.17S	130.74E	92	5.6	064/24	330/10	015/23	110/10	218/64	Strike-slip	0.82	54	BMG
137.	BMG	21 12 78	11 04 42.7	08.42S	111.61E	88	4.9	252/20	072/70	072/25	252/65	160/00	Reverse	1.00	12	BMG
138.	BMG	24 12 78	12 36 39.2	02.43N	128.56E	239	5.0	300/20	042/29	082/04	348/35	182/53	Strike-slip	0.87	23	BMG
139.	BMG	26 12 78	05 14 49.3	07.70S	117.37E	290	4.6	004/30	184/60	004/75	184/15	274/00	Normal	1.00	10	BMG
140.	BMG	05 01 79	21 22 40.0	01.61N	127.34E	139	5.0	299/40	170/35	232/60	322/05	058/29	Normal	1.00	12	BMG
141.	BMG	20 01 79	05 15 45.9	07.38S	128.48E	156	5.2	210/10	300/10	345/01	345/01	077/75	Strike-slip	0.86	35	BMG
142.	BMG	07 02 79	21 02 06.8	05.21N	127.29E	129	6.2	288/22	174/39	236/48	236/48	036/34	Reverse	0.90	147	BMG
143.	BMG	02 03 79	16 38 02.9	07.19S	129.62E	159	5.2	208/18	298/00	162/12	162/12	028/72	Strike-slip	0.84	32	BMG
144.	BMG	08 03 79	12 34 17.2	06.23S	104.71E	89	5.1	193/18	295/27	335/05	242/33	076/53	Strike-slip	1.00	15	BMG
145.	BMG	15 03 79	15 06 24.7	06.18S	131.10E	93	5.2	090/24	270/66	270/21	090/69	000/00	Reverse	0.87	30	BMG
146.	BMG	20 03 79	08 53 47.2	07.56N	126.59E	147	5.3	237/26	332/13	287/27	192/10	089/58	Strike-slip	0.82	38	BMG
147.	BMG	26 03 79	07 21 03.6	07.35S	128.55E	152	5.3	040/30	220/60	220/15	040/75	130/00	Reverse	0.92	36	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
148.	BMG	28 03 79	16 54 24.5	05.92N	126.15E	111	5.1	202/40	322/30	171/04	257/55	076/34	Reverse	0.87	31	BMG
149	BMG	05 04 79	20 27 19.9	06.55N	126.76E	122	5.4	270/50	090/40	270/05	090/85	000/00	Reverse	0.90	63	BMG
150.	BMG	07 04 79	01 26 00.0	06.19S	104.65E	79	5.3	107/35	010/10	053/30	153/16	268/50	Strike-slip	0.95	22	BMG
151.	BMG	22 04 79	18 16 30.6	00.70N	122.97E	79	5.9	218/27	108/28	073/00	162/44	340/50	Reverse	0.81	62	BMG
152.	BMG	28 04 79	03 29 56.9	00.54N	098.78E	72	5.8	330/20	150/70	150/25	330/65	060/00	Reverse	0.86	80	BMG
153.	BMG	28 04 79	09 53 39.4	06.50N	126.27E	138	5.1	090/20	356/10	042/21	134/06	242/67	Strike-slip	1.00	20	BMG
154.	BMG	28 04 79	11 39 36.7	01.86N	128.27E	128	5.5	220/20	040/70	040/25	220/65	130/00	Reverse	0.88	59	BMG
155.	BMG	04 05 79	14 32 33.3	07.72S	107.15E	91	5.1	00[illegible]5	095/20	047/25	139/05	236/63	Strike-slip	0.95	19	BMG
156.	BMG	07 05 79	12 52 06.3	06.21S	105.96E	117	5.9	23[illegible]/01	140/40	068/26	194/28	322/50	Strike-slip	0.90	106	BMG
157.	BMG	16 05 79	19 13 57.7	00.75N	125.18E	91	5.3	298/39	090/46	105/02	000/74	198/13	Reverse	0.88	25	BMG
158.	BMG	07 06 79	02 47 47.4	04.26S	127.34E	272	5.0	081/09	343/39	040/35	292/16	282/48	Strike-slip	0.92	12	BMG
159.	BMG	16 06 79	05 46 43.9	06.70N	126.90E	226	4.9	058/35	171/30	024/02	117/50	294/41	Reverse	0.97	32	BMG
160.	BMG	25 06 79	07 52 25.9	07.15S	127.57E	270	5.[illegible]	066/19	182/50	220/16	103/51	323/22	Reverse	0.80	20	BMG
161.	BMG	25 06 79	12 18 26.9	05.95S	103.64E	69	5.6	232/08	122/71	066/32	212/51	325/16	Reverse	0.94	7[illegible]	BMG
162.	BMG	29 06 79	12 21 52.8	07.72S	127.69E	184	5.3	282/40	082/48	092/04	340/79	184/10	Reverse	0.85	59	BMG
163.	BMG	07 07 79	04 54 58.9	06.78S	129.69E	156	5.3	218/19	128/00	266/12	171/12	038/70	Strike-slip	0.84	51	BMG
164.	BMG	18 07 79	07 57 45.3	07.53S	127.49E	171	5.5	138/16	231/02	094/06	184/14	354/65	Strike-slip	0.83	69	BMG
165.	BMG	22 07 79	12 13 47.6	07.67S	128.00E	107	5.1	090/02	181/04	225/00	134/06	354/56	Strike-slip	0.88	17	BMG
166.	BMG	22 07 79	13 16 06.5	02.89N	126.44E	77	5.3	268/12	000/08	313/14	223/01	118/75	Strike-slip	0.90	29	BMG
167.	BMG	27 07 79	19 32 36.6	00.47N	120.67E	103	5.3	273/43	006/01	221/26	330/31	100/43	Strike-slip	0.88	34	BMG
168.	BMG	29 07 79	22 34 43.9	08.29S	109.78E	94	5.0	054/16	309/35	004/39	267/10	164/47	Strike-slip	0.85	20	BMG
169.	BMG	05 08 79	07 22 20.6	00.04N	123.42E	177	5.1	126/36	319/53	316/07	081/78	224/10	Reverse	0.85	20	BMG
170.	BMG	07 08 79	04 41 52.9	08.71S	108.85E	69	5.6	260/50	144/36	280/05	168/71	012/18	Reverse	0.94	47	BMG
171.	BMG	08 08 79	21 31 14.4	00.21S	127.52E	84	5.0	270/20	168/30	222/39	128/06	028/52	Strike-slip	0.91	11	BMG
172.	BMG	17 08 79	20 19 36.2	04.37N	127.87E	266	5.5	063/20	163/29	111/35	205/06	304/52	Strike-slip	0.90	80	BMG
173.	BMG	19 08 79	16 00 12.6	03.21N	128.10E	115	5.4	084/21	186/29	226/02	132/38	323/51	Strike-slip	0.90	58	BMG
174.	BMG	24 08 79	21 11 03.9	06.94S	129.57E	183	5.0	250/08	112/77	219/53	077/33	342/09	Normal	0.93	14	BMG
175.	BMG	31 08 79	20 35 12.6	03.21N	126.99E	73	5.2	250/23	349/20	209/01	300/31	115/57	Strike-slip	0.91	11	BMG
176.	BMG	06 09 79	16 01 32.0	06.83S	106.75E	95	5.2	042/10	310/10	088/01	356/14	176/76	Strike-slip	0.86	29	BMG
177.	BMG	21 09 79	15 08 14.3	03.45S	127.30E	72	5.1	240/09	146/30	099/12	196/17	347/58	Strike-slip	0.96	24	BMG
178.	BMG	24 09 79	00 25 08.9	08.86S	114.00E	86	5.1	254/10	074/80	054/55	074/35	164/00	Normal	1.00	13	BMG
179.	BMG	02 10 79	10 12 27.7	06.48S	130.24E	148	5.3	190/40	386/08	247/36	142/19	026/49	Strike-slip	0.93	60	BMG
180.	BMG	04 10 79	04 15 36.2	00.71N	125.11E	89	5.3	290/10	110/80	290/55	110/35	020/00	Normal	0.82	39	BMG
181.	BMG	09 10 79	01 46 56.7	00.10N	123.78E	130	5.3	223/10	313/11	269/14	177/01	096/74	Strike-slip	0.86	40	BMG
182.	BMG	02 11 79	23 21 03.3	00.26N	122.45E	198	5.3	004/07	270/20	225/07	316/20	118/68	Strike-slip	0.85	39	BMG
183.	BMG	10 11 79	20 38 01.0	01.23N	124.21E	258	5.2	150/34	330/56	330/11	150/79	060/00	Reverse	0.85	41	BMG
184.	BMG	19 11 79	22 17 20.2	05.86N	125.29E	85	6.1	120/37	300/53	300/08	120/82	030/00	Reverse	0.88	91	BMG
185.	BMG	21 11 79	17 07 53.1	02.08N	129.96E	106	5.3	236/20	137/17	185/26	095/00	007/61	Strike-slip	0.84	38	BMG
186.	BMG	03 12 79	03 20 48.5	06.[illegible]5S	105.36E	92	5.1	321/17	141/73	141/27	321/63	052/00	Reverse	0.87	15	BMG
187.	BMG	06 12 79	07 05 30.8	02.98N	126.21E	68	5.6	030/20	130/24	079/31	170/01	266/57	Strike-slip	0.81	32	BMG
188.	BMG	09 12 79	02 20 33.7	06.12N	125.91E	135	5.3	306/40	098/47	006/76	113/05	207/14	Normal	0.82	34	BMG
189.	BMG	15 12 79	16 10 59.5	00.07S	123.45E	167	5.1	034/10	298/30	253/12	349/29	140/59	Strike-slip	1.00	10	BMG
190.	BMG	25 12 79	11 32 50.7	06.49S	129.37E	209	5.6	274/20	094/70	094/24	274/66	004/00	Reverse	0.89	28	BMG
191.	BMG	16 01 80	16 07 23.9	02.65N	128.54E	240	5.1	225/40	118/20	163/46	266/13	008/44	Normal	0.92	13	BMG
192.	BMG	20 01 80	12 20 17.7	01.06S	129.36E	109	5.5	040/00	310/71	238/41	022/41	130/19	Strike-slip	0.85	34	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
193.	BMG	01 02 80	10 50 35.6	03.06N	125.46E	124	5.1	120/60	300/30	120/15	300/75	030/00	Reverse	1.00	10	BMG
194.	BMG	05 02 80	18 56 25.0	06.42S	129.03E	212	5.3	070/10	250/80	070/55	250/35	160/00	Normal	0.86	14	BMG
195.	BMG	19 02 80	07 48 37.0	02.33N	128.50E	228	5.2	150/70	330/20	150/25	330/65	060/00	Reverse	0.82	11	BMG
196.	BMG	20 02 80	22 25 51.0	03.76S	129.70E	142	5.0	118/55	257/28	215/65	092/13	357/19	Normal	0.91	11	BMG
197.	BMG	23 02 80	04 11 21.0	07.08S	129.48E	91	5.2	020/10	200/80	020/55	200/35	110/00	Normal	0.80	15	BMG
198.	BMG	27 02 80	15 34 26.1	00.61N	100.09E	158	5.1	160/60	340/30	160/15	340/75	070/00	Reverse	0.82	51	BMG
199.	BMG	29 02 80	11 13 36.7	00.30N	126.83E	104	6.1	100/27	216/40	251/08	150/52	347/37	Reverse	0.85	88	BMG
200.	BMG	08 03 80	13 21 22.3	06.40S	130.21E	123	5.1	210/43	354/40	194/01	288/70	101/20	Reverse	0.89	21	BMG
201.	BMG	10 03 80	12 57 46.9	02.41N	126.05E	87	5.1	104/16	284/74	104/61	284/29	014/00	Normal	0.82	11	BMG
202.	BMG	29 03 80	02 10 35.9	06.25S	130.93E	90	5.3	190/13	291/36	334/14	234/36	084/51	Strike-slip	0.82	22	BMG
203.	BMG	03 04 80	16 34 24.6	05.34N	125.36E	212	5.6	255/10	075/80	255/55	075/35	345/00	Normal	0.95	62	BMG
204.	BMG	16 04 80	12 18 20.6	08.08S	108.79E	84	5.8	132/60	312/30	132/15	312/75	042/00	Reverse	0.84	87	BMG
205.	BMG	23 05 80	09 16 02.5	02.69N	128.34E	109	5.2	215/40	035/50	035/05	215/85	125/00	Reverse	1.00	12	BMG
206.	BMG	24 05 80	08 23 45.6	03.03N	126.46E	68	5.2	130/29	233/22	091/06	185/37	354/00	Strike-slip	0.94	16	BMG
207.	BMG	25 05 80	12 07 12.2	07.15S	106.09E	74	5.0	040/41	270/34	066/04	328/60	158/27	Reverse	1.00	11	BMG
208.	BMG	06 06 80	23 32 34.9	04.02S	141.90E	111	5.7	315/37	210/20	356/11	258/42	099/47	Reverse	0.88	41	BMG
209.	BMG	02 07 80	09 06 32.6	05.46N	126.18E	76	5.2	242/20	340/20	019/00	290/29	111/61	Strike-slip	0.90	10	BMG
210.	BMG	02 07 80	21 54 29.9	05.45N	131.05E	88	5.1	086/10	189/50	230/31	123/43	349/38	Reverse	0.83	18	BMG
211.	BMG	08 07 80	04 39 28.7	06.63N	125.79E	178	5.9	074/31	205/49	232/09	121/03	328/25	Reverse	0.84	87	BMG
212.	BMG	14 07 80	05 53 25.4	05.13S	129.24E	258	5.4	102/48	216/20	063/15	172/52	320/35	Reverse	0.88	34	BMG
213.	BMG	16 07 80	06 31 21.1	05.94N	127.19E	116	5.2	032/20	288/34	247/09	344/39	147/49	Strike-slip	0.80	20	BMG
214.	BMG	18 07 80	03 13 10.6	01.71N	099.62E	136	5.0	062/30	320/20	102/06	008/38	202/53	Strike-slip	0.92	12	BMG
215.	BMG	20 07 80	21 51 10.9	06.86S	127.54E	394	5.2	150/43	320/46	325/02	214/86	056/05	Reverse	0.86	36	BMG
216.	BMG	22 07 80	11 25 26.7	02.63N	099.13E	163	5.0	036/30	284/32	341/49	257/09	158/43	Normal	0.87	30	BMG
217.	BMG	22 07 80	18 34 36.5	06.58S	130.07E	146	5.1	148/10	262/67	211/31	172/51	054/20	Reverse	0.82	22	BMG
218.	BMG	31 07 80	18 14 48.8	00.17S	125.10E	75	5.1	021/08	290/10	246/01	335/15	150/77	Strike-slip	0.87	23	BMG
219.	BMG	02 08 80	23 56 38.0	00.06S	124.95E	80	5.3	020/75	200/15	020/30	200/60	110/00	Reverse	0.85	26	BMG
220.	BMG	12 08 80	14 19 44.8	03.19N	128.47E	134	5.1	058/15	298/61	258/23	028/54	155/24	Reverse	0.83	12	BMG
221.	BMG	13 08 80	09 00 35.8	00.23N	122.01E	227	5.1	174/32	305/44	235/61	334/06	064/26	Normal	0.81	32	BMG
222.	BMG	25 08 80	01 40 06.0	02.91S	101.27E	72	5.1	160/70	340/20	340/65	160/25	070/00	Normal	0.84	19	BMG
223.	BMG	31 08 80	16 29 31.1	00.16S	123.00E	97	5.3	112/20	212/26	253/03	160/32	350/56	Strike-slip	0.88	24	BMG
224.	BMG	11 09 80	19 57 07.9	00.32S	123.12E	110	5.2	048/50	228/40	228/85	048/05	138/00	Normal	1.00	11	BMG
225.	BMG	13 09 80	17 13 46.2	04.32N	128.33E	67	5.1	242/28	344/20	201/06	295/33	102/53	Strike-slip	0.93	15	BMG
226.	BMG	21 09 80	01 00 51.6	05.91N	126.19E	119	5.4	110/40	350/30	143/05	047/53	237/34	Reverse	0.84	37	BMG
227.	BMG	26 09 80	09 36 55.7	00.02S	123.28E	186	5.3	040/70	220/20	040/25	220/65	130/00	Reverse	0.86	29	BMG
228.	BMG	08 10 80	09 17 35.2	00.04S	123.28E	152	5.5	286/40	108/50	108/05	288/85	018/00	Reverse	0.88	41	BMG
229.	BMG	11 10 80	22 10 20.7	06.49N	126.69E	77	5.3	294/10	153/28	204/27	108/12	355/58	Strike-slip	0.92	26	BMG
230.	BMG	23 10 80	23 10 41.2	06.60S	129.62E	160	5.8	350/50	170/40	350/05	170/85	080/00	Reverse	0.87	53	BMG
231.	BMG	04 11 80	17 39 01.9	08.56S	123.65E	151	5.0	324/19	210/50	280/50	170/16	069/32	Normal	0.92	13	BMG
232.	BMG	04 11 80	18 41 17.3	04.50S	102.97E	74	5.1	155/30	036/40	002/06	101/54	269/36	Reverse	0.89	18	BMG
233.	BMG	22 11 80	01 00 49.4	07.67N	126.93E	67	5.2	060/09	158/40	101/34	206/20	318/42	Strike-slip	0.92	13	BMG
234.	BMG	22 11 80	18 02 33.4	03.66S	140.04E	77	5.5	292/19	195/20	153/00	244/26	064/61	Strike-slip	0.88	25	BMG
235.	BMG	24 11 80	06 53 11.9	00.44N	123.91E	245	5.0	242/10	062/80	242/55	062/35	152/00	Normal	0.88	25	BMG
236.	BMG	02 12 80	02 33 59.9	06.08N	126.83E	88	5.1	208/32	320/30	204/44	174/00	083/44	Normal	0.89	18	BMG
237.	BMG	11 01 81	15 09 46.0	02.06N	098.07E	69	5.7	090/70	330/10	350/51	134/33	237/06	Normal	0.88	100	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
238.	BMG	22 01 81	03 10 12.8	02.50N	126.02E	81	5.0	135/30	315/60	315/15	135/75	045/00	Reverse	1.00	14	BMG
239.	BMG	28 01 81	02 49 37.6	07.62S	127.56E	185	5.4	085/50	065/40	085/05	265/85	355/00	Reverse	0.86	22	BMG
240.	BMG	10 02 81	18 42 41.5	03.98N	097.23E	121	5.1	257/12	349/11	304/17	213/01	120/74	Strike-slip	0.90	29	BMG
241.	BMG	14 02 81	04 12 03.7	02.56N	125.81E	140	5.1	347/23	094/34	034/44	133/07	232/48	Normal	0.88	17	BMG
242.	BMG	14 02 81	07 31 33.7	03.33N	128.13E	155	5.6	280/20	024/34	065/08	327/39	168/47	Strike-slip	0.82	61	BMG
243.	BMG	20 02 81	17 21 01.1	06.80S	130.48E	116	5.0	263/10	010/60	291/48	060/39	168/28	Normal	0.94	17	BMG
244.	BMG	13 03 81	23 49 44.2	06.38N	125.74E	146	5.0	108/00	018/00	063/00	153/00	999/90	Strike-slip	0.88	16	BMG
245.	BMG	05 04 81	09 03 37.2	06.25S	130.24E	152	5.1	100/30	234/50	261/10	146/63	355/23	Reverse	1.00	12	BMG
246.	BMG	12 04 81	23 04 44.8	00.08S	122.89E	189	5.0	158/36	297/46	217/68	319/05	051/20	Normal	0.81	21	BMG
247.	BMG	23 04 81	00 31 44.3	07.95S	123.82E	215	5.0	151/10	331/80	331/36	351/54	061/00	Reverse	0.86	23	BMG
248.	BMG	09 05 81	23 36 38.6	01.62N	127.39E	131	5.4	091/72	171/18	091/27	171/63	001/00	Reverse	0.84	32	BMG
249.	BMG	13 05 81	01 39 54.8	05.83N	127.01E	145	6.0	101/15	215/22	061/12	171/50	324/37	Reverse	0.84	98	BMG
250.	BMG	19 05 81	17 11 32.8	05.61N	126.59E	107	5.3	136/11	229/20	274/06	181/24	019/69	Strike-slip	0.86	42	BMG
251.	BMG	22 05 81	02 55 22.3	06.57S	132.25E	73	5.8	103/39	203/19	060/13	164/43	318/45	Reverse	0.86	69	BMG
252.	BMG	01 06 81	22 48 14.2	03.90S	128.36E	135	5.4	156/28	055/20	105/33	197/02	292/56	Strike-slip	0.82	27	BMG
253.	BMG	19 06 81	02 50 45.1	07.58S	127.67E	178	5.2	235/32	338/20	291/39	194/08	095/50	Strike-slip	0.88	26	BMG
254.	BMG	22 06 81	10 21 05.5	02.44N	124.55E	313	5.2	093/36	337/30	127/04	030/51	219/40	Reverse	0.83	57	BMG
255.	BMG	27 06 81	17 55 35.6	07.34S	128.93E	175	5.0	254/36	145/25	291/07	193/46	028/46	Reverse	0.96	23	BMG
256.	BMG	05 07 81	15 02 09.9	02.96N	127.82E	121	5.0	053/80	233/10	233/55	053/35	144/00	Normal	1.00	11	BMG
257.	BMG	06 07 81	00 00 39.2	08.08S	112.79E	121	5.0	058/20	320/20	009/30	279/01	190/60	Strike-slip	0.92	13	BMG
258.	BMG	15 07 81	09 56 16.5	00.55N	121.66E	122	5.0	303/18	207/18	255/27	165/01	079/63	Strike-slip	0.86	16	BMG
259.	BMG	03 08 81	00 21 21.4	06.53S	127.12E	431	5.0	266/06	015/70	290/49	070/34	175/13	Normal	0.86	22	BMG
260.	BMG	29 08 81	22 06 05.2	04.28N	127.76E	150	5.1	207/36	305/16	258/30	164/06	063/59	Strike-slip	0.89	18	BMG
261.	BMG	30 08 81	10 00 02.4	03.05N	124.63E	308	5.0	202/40	022/50	202/50	022/85	122/00	Normal	1.00	18	BMG
262.	BMG	10 09 81	14 17 43.4	05.45N	095.34E	103	5.0	010/15	266/41	222/16	330/45	115/46	Reverse	0.85	55	BMG
263.	BMG	15 09 81	14 12 06.0	06.35S	130.68E	102	5.9	182/20	307/58	343/20	218/67	083/34	Reverse	0.88	67	BMG
264.	BMG	20 09 81	17 33 55.5	02.05N	126.86E	90	5.2	045/40	162/28	109/51	010/08	276/36	Normal	0.80	40	BMG
265.	BMG	11 10 81	00 36 13.3	00.44N	120.87E	94	5.6	205/50	321/20	167/16	280/52	065/32	Reverse	0.83	76	BMG
266.	BMG	15 10 81	04 13 32.8	07.59S	127.77E	154	5.2	093/16	183/10	045/04	137/20	303/71	Strike-slip	0.92	12	BMG
267.	BMG	17 10 81	06 44 55.1	07.10S	128.97E	179	6.1	153/28	333/62	333/17	152/79	063/00	Reverse	0.90	91	BMG
268.	BMG	20 10 81	22 40 00.0	07.24S	126.64E	352	5.0	180/46	660/40	262/75	165/03	075/15	Normal	0.91	24	BMG
269.	BMG	23 10 81	08 19 01.2	07.58N	126.55E	159	5.2	037/28	217/62	217/62	037/73	127/00	Reverse	0.88	25	BMG
270.	BMG	24 10 81	10 51 52.3	03.30N	127.29E	76	5.1	147/27	247/62	105/05	198/27	008/55	Strike-slip	1.00	11	BMG
271.	BMG	31 10 81	03 40 41.5	07.45S	128.60E	169	5.4	095/40	319/40	298/01	029/66	207/24	Reverse	0.85	40	BMG
272.	BMG	02 12 81	05 17 20.1	07.41S	128.80E	133	5.7	174/30	059/34	025/02	120/49	295/50	Reverse	0.90	60	BMG
273.	BMG	13 12 81	20 35 56.6	07.35S	111.76E	83	5.7	345/20	243/30	203/06	297/37	100/53	Strike-slip	0.81	53	BMG
274.	BMG	21 12 81	01 50 00.2	08.52S	120.68E	150	5.2	255/30	138/38	202/52	103/05	011/37	Normal	0.86	35	BMG
275.	BMG	23 12 81	01 22 26.3	06.52S	130.18E	150	5.0	269/30	160/30	215/45	125/01	034/45	Normal	0.92	25	BMG
276.	BMG	31 12 81	07 20 07.0	00.91N	123.92E	303	5.0	255/24	114/60	224/64	087/18	352/16	Normal	0.90	35	BMG
277.	BMG	13 01 82	03 06 02.3	08.04S	119.76E	180	5.5	191/12	090/42	151/19	043/19	294/46	Strike-slip	0.84	32	BMG
278.	BMG	24 04 82	18 06 20.4	03.33S	128.17E	82	5.1	267/16	170/10	216/20	307/04	047/71	Strike-slip	1.00	18	BMG
279.	BMG	29 01 82	11 20 11.5	06.77N	127.07E	70	5.0	160/50	253/02	104/31	220/34	345/40	Strike-slip	0.93	14	BMG
280.	BMG	01 02 82	07 51 09.4	05.28N	126.53E	135	5.1	020/30	113/04	070/21	332/17	211/60	Strike-slip	0.85	20	BMG
281.	BMG	01 02 82	11 45 04.5	00.27N	122.22E	202	5.3	193/40	074/30	226/06	128/54	320/34	Reverse	0.96	47	BMG
282.	BMG	06 02 82	03 29 34.1	06.04S	105.37E	85	5.0	210/10	120/00	236/07	164/07	030/80	Strike-slip	0.92	13	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
283.	BMG	10 02 82	22 34 18.3	02.27N	128.21E	174	5.1	340/30	250/00	291/20	028/20	160/60	Strike-slip	1.00	14	BMG
284.	BMG	13 02 82	19 56 12.7	05.68N	094.79E	71	5.3	292/30	192/16	334/09	238/34	078/55	Strike-slip	0.87	45	BMG
285.	BMG	14 02 82	05 06 39.4	01.51N	128.46E	87	5.2	230/78	050/12	230/33	050/57	140/00	Reverse	0.90	20	BMG
286.	BMG	22 02 82	12 37 48.6	01.84N	128.18E	147	5.5	045/62	225/28	045/17	225/73	135/00	Reverse	0.90	39	BMG
287.	BMG	18 03 82	11 13 00.9	04.52S	129.36E	162	5.1	106/65	286/25	106/20	286/70	016/00	Reverse	1.00	21	BMG
288.	BMG	22 03 82	07 12 51.4	06.15N	125.93E	141	5.0	200/40	080/30	232/06	133/54	326/34	Reverse	1.00	16	BMG
289.	BMG	26 03 82	04 56 32.5	06.84S	129.39E	181	5.6	110/40	238/36	082/03	177/60	351/29	Reverse	0.88	48	BMG
290.	BMG	29 03 82	21 33 55.4	00.09N	123.33E	187	6.0	176/20	035/64	007/23	146/66	272/14	Reverse	0.86	95	BMG
291.	BMG	12 04 82	11 31 37.6	02.40N	128.51E	240	5.3	067/07	190/32	134/56	037/07	305/33	Normal	0.93	42	BMG
292.	BMG	07 05 82	05 36 19.6	00.62S	123.29E	92	5.9	132/40	294/48	304/04	190/78	034/10	Reverse	0.84	57	BMG
293.	BMG	08 05 82	17 19 02.0	08.78S	124.15E	135	5.2	065/14	325/38	282/14	022/38	172/48	Strike-slip	0.92	24	BMG
294.	BMG	13 05 82	14 05 23.8	06.72S	129.70E	191	5.1	065/20	170/38	211/10	109/42	311/44	Reverse	0.91	34	BMG
295.	BMG	27 05 82	21 04 04.2	00.94S	127.11E	66	5.0	225/22	000/60	029/18	257/62	129/19	Reverse	0.85	27	BMG
296.	BMG	03 06 82	03 36 47.3	09.39N	126.32E	66	5.1	276/00	186/34	237/24	135/25	006/56	Strike-slip	0.94	17	BMG
297.	BMG	04 06 82	15 21 33.1	04.09N	124.52E	328	5.7	340/12	243/30	199/11	296/35	088/57	Strike-slip	0.90	90	BMG
298.	BMG	14 06 82	03 50 44.0	10.09S	123.32E	178	5.0	110/72	290/18	110/27	290/63	088/57	Reverse	0.94	17	BMG
299.	BMG	22 06 82	04 18 40.4	07.34S	126.04E	450	6.3	321/20	066/37	077/41	107/10	200/00	Normal	0.84	99	BMG
300.	BMG	23 06 82	23 23 34.4	04.07N	124.53E	344	5.6	217/54	078/28	188/65	242/13	209/46	Normal	0.91	97	BMG
301.	BMG	09 07 82	10 43 11.5	02.09N	126.66E	72	5.1	121/52	301/38	121/07	301/83	337/20	Reverse	0.92	25	BMG
302.	BMG	20 07 82	15 56 35.0	06.81S	129.42E	146	5.6	306/42	170/38	329/03	234/66	031/00	Reverse	0.87	55	BMG
303.	BMG	16 08 82	01 27 00.1	06.16S	129.45E	213	5.2	145/50	325/40	145/05	325/85	060/25	Reverse	0.84	31	BMG
304.	BMG	21 08 82	09 46 33.5	02.65N	128.23E	76	5.3	190/32	306/36	245/52	339/04	055/00	Normal	0.94	17	BMG
305.	BMG	23 08 82	12 47 42.0	05.82S	128.72E	322	5.3	070/60	250/30	250/75	070/15	070/36	Normal	0.94	18	BMG
306.	BMG	23 08 82	20 34 38.0	06.87S	130.41E	114	5.3	070/40	250/50	250/85	070/85	160/00	Reverse	0.86	28	BMG
307.	BMG	15 09 82	00 59 24.3	06.58S	130.01E	146	5.1	242/22	340/20	291/30	201/02	108/60	Strike-slip	0.87	23	BMG
308.	BMG	16 09 82	12 27 38.6	07.30S	127.06E	307	5.0	147/47	250/12	211/42	099/21	350/40	Normal	0.93	14	BMG
309.	BMG	18 09 82	15 00 40.6	07.63S	127.44E	158	5.3	247/18	045/70	061/26	257/63	155/06	Reverse	0.86	62	BMG
310.	BMG	25 09 82	18 08 09.7	07.07S	129.73E	119	5.5	234/20	112/54	075/18	195/55	334/28	Reverse	0.83	65	BMG
311.	BMG	26 09 82	08 32 31.5	06.61N	126.76E	190	5.4	230/30	099/48	071/10	182/62	335/26	Reverse	0.87	78	BMG
312.	BMG	03 10 82	01 12 57.8	05.64S	129.88E	220	5.0	065/82	245/08	245/53	065/37	335/26	Normal	0.92	25	BMG
313.	BMG	13 10 82	17 25 01.8	07.05S	129.31E	164	5.2	000/30	103/20	320/07	055/37	222/52	Strike-slip	0.85	27	BMG
314.	BMG	22 10 82	01 08 30.1	06.32S	130.46E	120	5.3	252/51	072/84	252/51	072/39	162/52	Normal	0.93	39	BMG
315.	BMG	26 10 82	12 44 21.9	07.40S	108.74E	153	5.6	103/34	318/50	298/07	051/70	206/17	Reverse	0.86	86	BMG
316.	BMG	28 10 82	15 30 14.7	07.99S	109.09E	96	5.2	245/14	340/20	292/25	023/03	121/65	Strike-slip	1.00	10	BMG
317.	BMG	29 10 82	03 47 23.2	06.05S	130.45E	166	5.6	050/20	144/10	005/06	099/22	259/68	Strike-slip	0.85	46	BMG
318.	BMG	05 11 82	04 52 02.3	03.63S	128.64E	113	5.3	290/70	110/20	110/65	290/25	020/00	Normal	0.81	42	BMG
319.	BMG	05 11 82	18 29 39.0	07.16S	129.62E	139	5.0	126/38	250/34	097/02	194/58	005/33	Reverse	0.89	19	BMG
320.	BMG	08 11 82	18 35 34.7	04.63N	127.86E	160	5.4	020/30	130/30	075/45	345/00	255/45	Normal	0.86	55	BMG
321.	BMG	27 11 82	11 13 51.6	05.30N	125.76E	147	5.1	025/64	205/26	025/19	205/71	115/00	Reverse	0.91	34	BMG
322.	BMG	29 11 82	13 32 25.6	07.55S	127.68E	115	5.0	270/28	007/14	227/08	321/30	121/58	Strike-slip	0.92	13	BMG
323.	BMG	01 12 82	01 12 05.7	07.62S	116.91E	322	5.5	037/42	237/46	227/02	340/79	130/14	Reverse	1.00	11	BMG
324.	BMG	08 12 82	16 30 50.7	00.66N	119.93E	84	5.0	110/10	202/13	155/18	246/02	341/73	Strike-slip	0.88	26	BMG
325.	BMG	02 01 83	23 58 14.0	06.75N	126.93E	75	5.1	195/38	096/10	138/33	242/18	353/50	Strike-slip	0.90	20	BMG
326.	BMG	03 01 83	07 27 35.5	03.91S	102.89E	121	5.0	138/30	240/20	097/07	192/37	358/53	Strike-slip	1.00	13	BMG
327.	BMG	05 01 83	01 44 15.5	06.84N	126.89E	99	5.0	270/40	017/18	229/13	331/43	125/45	Reverse	1.00	12	BMG

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
328.	BMG	16 01 83	02 27 48.6	07.09S	129.46E	75	5.2	101/22	066/10	051/24	145/06	250/65	Strike-slip	0.81	32	BMG
329.	BMG	28 01 83	03 15 09.3	02.60N	124.07E	354	5.6	215/40	313/08	167/20	273/34	052/48	Strike-slip	0.87	77	BMG
330.	BMG	30 01 83	01 26 05.9	05.45N	094.94E	83	5.2	134/44	040/04	077/32	187/26	305/46	Strike-slip	0.90	44	BMG
331.	BMG	31 01 83	05 32 20.6	07.34S	128.72E	175	5.2	265/18	010/40	310/42	052/12	157/45	Normal	0.85	34	BMG
332.	BMG	03 02 83	06 31 15.8	01.49N	127.79E	144	5.5	174/10	282/60	206/48	332/28	078/28	Normal	0.87	62	BMG
333.	BMG	28 02 83	22 17 58.9	04.76S	142.38E	106	5.3	354/22	251/30	305/39	211/05	115/51	Strike-slip	0.91	21	BMG
334.	BMG	08 03 83	23 27 57.8	07.07S	129.25E	186	5.4	143/42	022/30	175/06	074/53	270/32	Reverse	0.86	27	BMG
335.	BMG	21 03 83	07 57 19.3	07.28S	128.91E	151	5.6	060/20	328/06	012/18	106/09	223/69	Strike-slip	0.81	38	BMG
336.	BMG	25 03 83	07 43 58.4	06.52S	129.96E	133	5.5	047/26	157/34	194/05	098/46	288/44	Reverse	0.82	62	BMG
337.	BMG	04 04 83	02 51 34.4	05.72N	094.72E	78	6.6	075/38	315/32	107/04	010/55	200/34	Reverse	0.90	221	BMG
338.	BMG	04 04 83	04 06 00.0	05.63N	094.68E	80	5.1	090/38	330/33	120/02	007/54	213/34	Reverse	0.80	51	BMG
339.	BMG	04 04 83	15 21 37.2	09.39S	113.48E	81	5.0	076/40	300/40	098/00	008/66	189/22	Reverse	0.93	15	BMG
340.	BMG	10 04 83	00 44 11.9	07.44S	107.03E	87	5.0	325/40	070/16	027/44	283/14	177/45	Normal	1.00	11	BMG
341.	BMG	10 04 83	12 19 31.9	02.27N	126.68E	83	5.0	145/30	235/00	095/20	195/20	325/60	Strike-slip	0.95	20	BMG
342.	BMG	16 04 83	16 17 30.5	04.85N	127.69E	95	5.1	205/40	322/28	171/05	270/52	076/36	Reverse	0.87	32	BMG
343.	BMG	18 04 83	13 52 12.9	08.27S	119.58E	190	5.0	005/22	171/68	179/23	019/66	272/09	Reverse	0.95	38	BMG
344.	BMG	20 04 83	11 01 40.0	05.52S	129.39E	290	5.2	132/36	044/00	185/25	081/25	312/54	Strike-slip	0.83	42	BMG
345.	BMG	25 04 83	08 43 53.3	08.94S	118.44E	105	5.1	160/25	257/14	119/04	212/32	012/61	Strike-slip	0.87	30	BMG
346.	BMG	02 05 83	01 22 17.7	05.88S	129.02E	305	5.0	200/30	322/42	253/57	347/14	088/32	Normal	0.86	43	BMG
347.	BMG	03 05 83	21 02 15.9	03.88S	126.37E	70	5.0	295/40	055/30	264/05	001/54	170/35	Reverse	0.94	17	BMG
348.	BMG	03 06 83	22 53 13.6	07.08S	129.15E	202	5.2	342/30	208/52	182/11	297/65	088/25	Reverse	0.86	21	BMG
349.	BMG	05 06 83	00 43 13.7	07.57S	127.59E	179	5.2	279/09	173/60	121/30	250/47	014/28	Reverse	0.84	32	BMG
350.	BMG	09 06 83	04 51 01.1	03.87S	129.01E	118	5.1	013/02	105/42	158/28	049/29	281/46	Strike-slip	0.85	20	BMG
351.	BMG	12 06 83	10 12 42.8	01.53N	127.32E	120	5.7	280/30	038/40	072/05	333/54	164/34	Reverse	0.87	62	BMG
352.	BMG	24 06 83	04 41 46.4	09.11S	120.20E	188	5.4	072/49	187/20	145/40	031/14	291/33	Strike-slip	0.91	22	BMG

EARTHQUAKE FOCAL MECHANISM SOLUTIONS

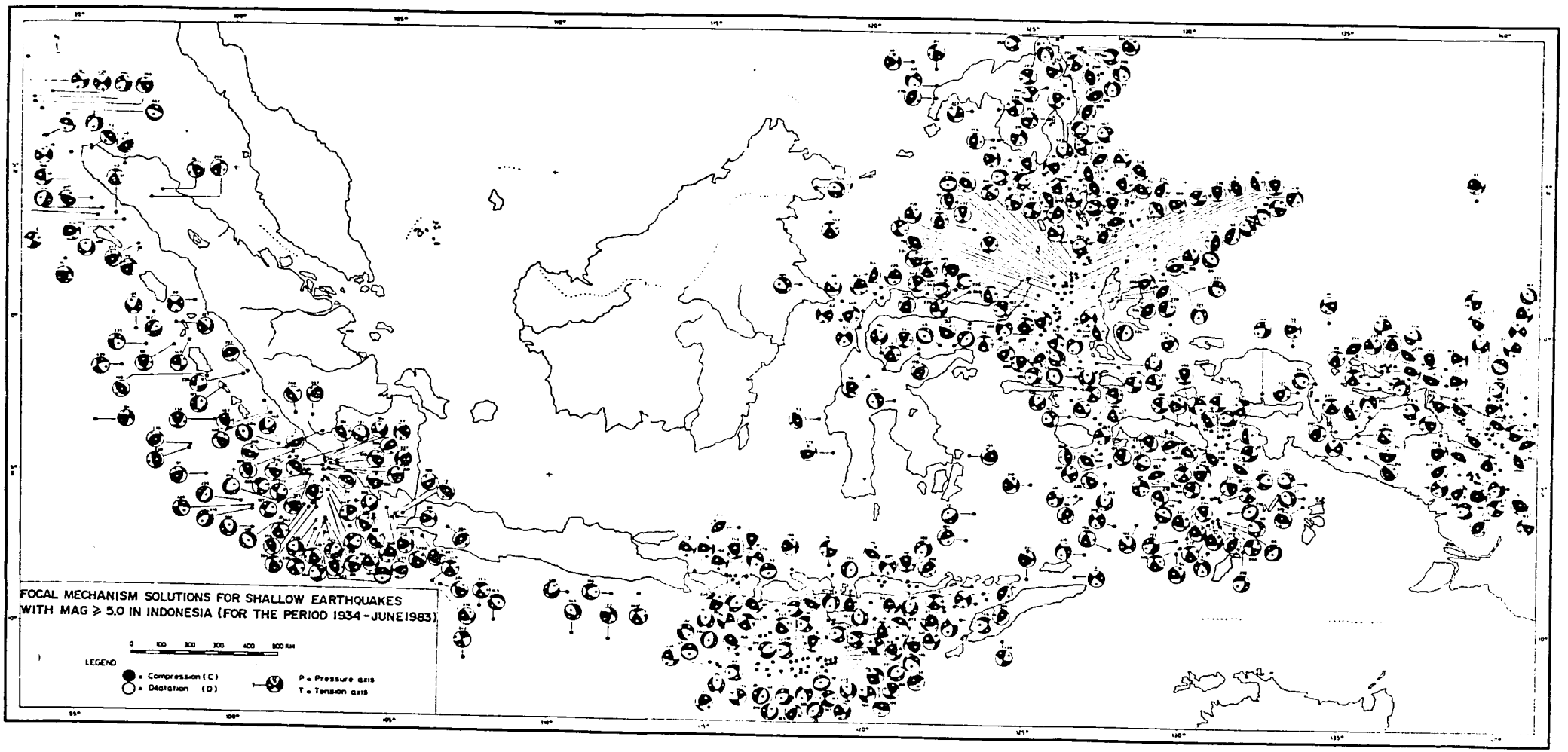
Classification	NOE	Solution	N	R	SS	Data Sources						
						Before SEASEE Project					On SEASEE Project	
						Others				Solution by BMG	Others	Solution by BMG
						WDC	R/56	RCBI	JOKO/79		BMG	BMG 84
Deep EQ.	71	76	43	19	14	19	8	2		38	9	1

No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
21.	ROBI/78	04 08 69	17 19 19.6	05.71S	125.42E	531	6.2	332/60	077/08	280/31	047/45	172/29	Strike-slip	-	-	Richard Cardwell
22.	RCBI/78	14 06 73	11 02 46.9	05.34S	120.32E	639	5.8	332/30	128/58	002/72	143/14	237/11	Normal	-	-	Richard Cardwell
23.	BMG	23 07 76	05 45 30.5	07.46S	119.89E	615	6.2	335/50	155/40	155/85	335/05	065/[illegible]	Normal	0.88	131	BMG
24.	BMG	19 04 77	21 46 33.7	05.54S	125.37E	526	5.1	266/20	070/74	082/25	273/63	070/75	Reverse	0.91	78	
25.	BMG	08 06 77	21 18 03.2	05.88S	113.07E	636	5.1	309/12	054/56	103/27	343/47	212/37	Reverse	0.93	29	
26.	BMG	08 06 77	21 58 37.3	05.88S	113.12E	643	5.1	034/41	276/29	068/06	328/53	164/36	Reverse	0.87	31	
27.	BMG	21 11 77	11 39 40.1	06.83N	123.58E	601	5.5	090/66	292/23	106/21	303/67	199/08	Reverse	0.90	41	
28.	BMG	13 01 78	01 29 08.3	05.39N	123.31E	577	5.0	150/66	330/24	150/20	330/70	060/00	Reverse	1.00	14	
29.	BMG	18 02 78	03 69 05.6	03.38N	122.91E	522	5.1	231/30	338/26	195/03	286/43	100/48	Reverse	0.86	48	
30.	BMG	21 02 78	07 14 05.3	04.95S	125.25E	535	5.9	081/30	3[illegible]/11	028/30	127/12	230/57	Strike-slip	0.85	86	
31.	BMG	21 02 78	07 14 54.4	04.84S	125.41E	510	6.3	270/22	147/54	111/18	230/58	013/28	Reverse	0.81	36	
32.	BMG	21 02 78	07 47 21.7	04.99S	125.23E	531	5.6	086/14	352/12	039/20	131/02	217/64	Strike-slip	0.88	75	
33.	BMG	22 03 78	17 22 28.8	07.08S	123.25E	556	5.0	063/10	172/60	220/30	094/46	328/28	Reverse	0.86	14	
34.	BMG	27 03 78	18 33 38.9	06.71N	123.56E	602	5.2	296/39	196/10	238/37	343/19	096/39	Strike-slip	0.98	50	
35.	BMG	21 05 78	07 24 06.6	06.1[illegible]N	123.62E	572	5.3	356/24	176/66	176/22	256/68	268/00	Reverse	0.86	57	
36.	BMG	10 06 78	17 38 19.9	06.09S	114.24E	520	5.5	002/23	254/35	311/44	216/08	117/44	Normal	0.93	72	
37.	BMG	31 10 78	11 21 01.1	06.81N	123.86E	554	5.4	308/50	066/21	025/52	272/15	171/32	Normal	0.92	65	
38.	BMG	11 12 78	03 33 52.8	07.07S	117.98E	563	5.9	134/50	349/34	047/69	152/07	247/16	Normal	0.81	96	
39.	BMG	18 01 79	13 50 39.7	07.29S	123.15E	578	5.3	218/19	038/71	218/64	038/26	128/00	Normal	0.86	59	
40.	BMG	09 04 79	06 31 52.3	03.63N	122.07E	614	5.1	150/40	330/50	150/86	330/04	060/00	Normal	0.96	45	
41.	BMG	15 04 79	22 14 52.5	05.68N	123.62E	549	5.9	290/20	270/70	090/65	270/25	000/00	Normal	0.90	159	
42.	BMG	03 05 79	16 42 15.2	06.85N	125.24E	529	5.0	154/64	270/17	247/54	112/27	008/31	Normal	0.94	16	
43.	BMG	17 08 79	00 01 11.8	06.14S	124.89E	615	5.2	200/09	020/81	020/34	200/36	290/00	Reverse	0.88	26	
44.	BMG	19 09 79	08 24 30.7	05.41N	124.01E	497	4.9	246/39	147/10	189/36	291/17	046/48	Normal	0.90	20	
45.	BMG	05 12 79	23 04 56.0	06.29N	126.25E	509	5.2	106/06	286/84	106/51	286/39	016/00	Normal	0.80	15	
46.	BMG	20 12 79	14 23 22.3	03.06N	122.64E	551	5.0	100/20	358/30	052/37	317/05	219/52	Normal	0.88	16	
47.	BMG	30 01 80	00 38 06.9	03.73N	122.54E	605	5.1	106/04	203/52	138/39	258/30	012/38	Normal	0.95	22	
48.	BMG	21 02 80	03 29 29.5	06.13S	112.83E	601	5.2	170/60	350/30	350/75	170/15	080/00	Normal	0.93	40	
49.	BMG	03 05 80	16 51 37.0	07.37S	120.41E	600	5.8	160/08	340/82	340/37	160/53	070/00	Reverse	0.92	25	
50.	BMG	11 06 80	08 10 07.5	06.89S	125.38E	532	5.8	255/40	147/20	193/46	294/11	037/43	Normal	0.94	78	
51.	BMG	04 08 80	08 14 40.7	07.10S	124.97E	558	5.0	222/20	042/70	222/65	042/25	312/00	Normal	0.89	21	
52.	BMG	12 08 80	10 18 24.2	05.04N	122.74E	631	5.1	114/10	019/30	072/29	333/12	222/58	Strike-slip	0.84	24	
53.	BMG	25 10 80	20 36 20.9	06.80S	116.77E	612	5.2	342/47	212/28	266/60	010/10	106/25	Normal	0.92	48	
54.	BMG	30 01 81	10 29 09.8	05.61S	110.21E	562	5.7	280/10	100/10	100/35	280/55	010/00	Reverse	0.81	37	
55.	BMG	30 03 81	00 37 05.9	07.07S	117.20E	609	5.2	302/12	122/78	122/32	302/58	032/00	Reverse	0.87	37	
56.	BMG	10 04 81	15 10 05.7	04.45N	122.83E	593	5.1	133/66	313/24	133/20	312/70	043/00	Reverse	0.89	27	
57.	BMG	20 05 81	05 42 44.9	03.53N	122.67E	554	5.1	114/20	294/70	114/65	294/25	024/00	Normal	0.93	27	
58.	BMG	01 10 81	17 48 45.0	05.21N	123.13E	595	5.3	123/60	303/30	123/15	303/75	033/00	Reverse	0.86	36	
59.	BMG	14 10 81	15 10 59.7	07.05S	125.22E	529	5.1	238/10	330/10	194/01	284/14	105/76	Strike-slip	1.00	11	
60.	BMG	17 10 81	20 04 15.4	04.60N	122.66E	625	5.8	198/56	291/02	139/33	261/37	022/34	Strike-slip	0.89	93	
61.	BMG	08 11 81	13 41 20.0	06.17S	112.15E	633	5.8	211/32	065/54	186/73	051/12	318/10	Normal	0.91	110	
62.	BMG	06 01 82	12 38 38.0	05.00N	126.86E	473	5.1	217/14	312/20	356/04	264/25	092/65	Reverse	0.84	37	
63.	BMG	25 01 82	21 44 22.2	06.84S	125.45E	537	5.1	090/20	320/60	059/59	287/21	189/21	Normal	0.88	33	

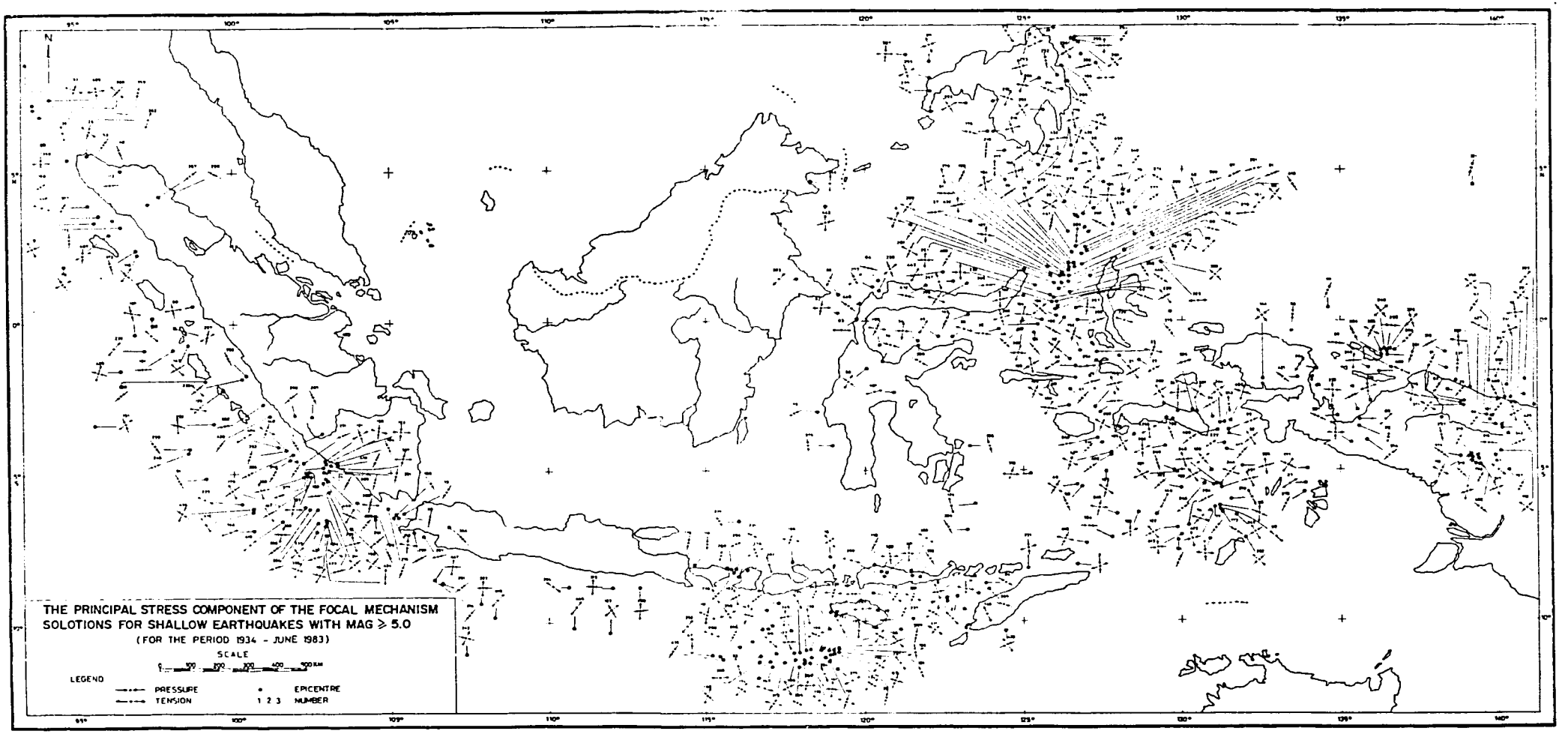
EARTHQUAKE FOCAL MECHANISM SOLUTIONS

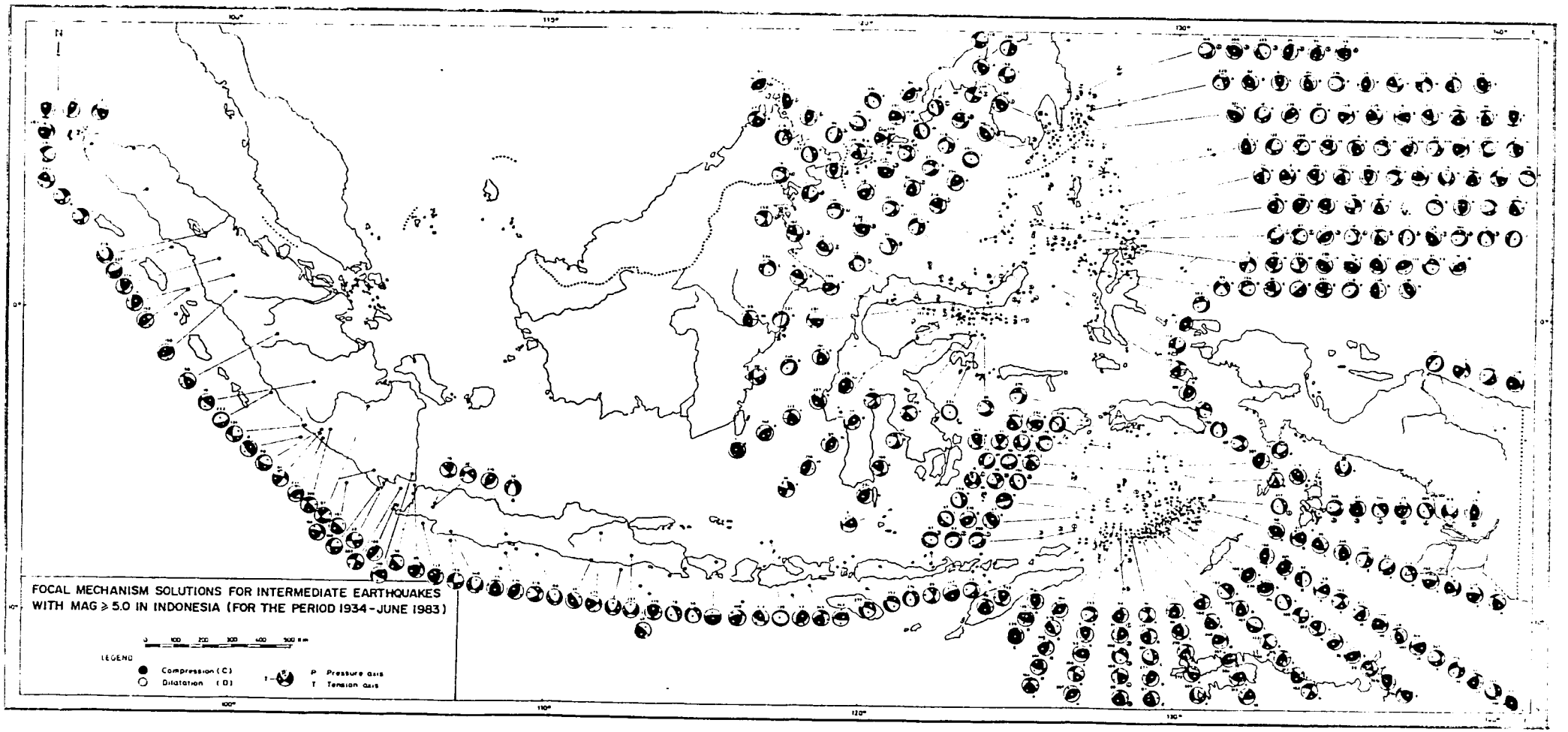
No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB	Magnitude ML	Magnitude MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7			8	9	10	11	12	13	14	15	16
1.	R/56	29 06 34	08 25 17.0	06.75S	123.75E	770				002/06	098/45	039/34	148/26	265/54	Normal	-	-	Ritsema
2.	R/56	08 05 36	09 11 34.0	05.75S	112.75E	573				002/43	162/45	077/80	173/01	262/17	Normal	-	-	Ritsema
3.	R/56	11 08 37	00 55 52.0	06.50S	116.50E	573				001/68	191/22	191/67	011/23	101/00	Normal	-	-	Ritsema
4.	R/56	18 06 40	13 52 33.0	05.40N	123.00E	510				315/43	135/47	315/88	135/02	046/00	Normal	-	-	Ritsema
5.	R/56	22 09 40	22 51 58.0	07.50N	123.50E	637				055/17	302/52	017/50	261/21	157/57	Normal	-	-	Ritsema
6.	R/56	11 02 52	07 01 05.0	05.50S	109.80E	637				198/26	094/26	146/39	056/00	325/60	Strike-slip	-	-	Ritsema
7.	R/56	01 01 54	13 04 19.0	09.00S	123.50E	637				236/26	327/01	188/17	285/19	059/69	Strike-slip	-	-	Ritsema
8.	R/56	20 02 54	18 35 07.0	06.90S	124.50E	573				340/62	089/10	061/47	291/31	184/34	Normal	-	-	Ritsema
9.	FM/70	15 12 63	19 34 46.0	04.86S	106.09E	654	5.7		7.1	035/33	250/51	347/70	230/09	137/18	Normal	-	-	World Data Centre
10.	FM/70	18 10 64	12 32 24.9	07.17S	123.86E	585	5.8			142/45	354/40	059/74	158/03	250/16	Normal	-	-	World Data Centre
	DS/73	18 10 64	12 32 24.9	07.17S	123.86E	585	5.8			339/51	159/39	159/84	339/06	069/00	Normal	0.70	69	World Data Centre
	F/72	18 10 64	12 32 24.9	07.17S	123.86E	585			6.9	000/37	139/45	060/67	160/05	252/22	Normal	-	-	World Data Centre
11.	DS/73	25 11 64	09 24 08.9	04.34S	122.14E	607	5.8			270/60	039/20	007/59	236/22	137/21	Normal	0.90	29	World Data Centre
	O/71	25 11 64	09 24 08.9	04.34S	122.14E	607	5.8			119/20	021/20	160/00	070/28	250/62	Normal	-	-	World Data Centre
12.	DS/73	06 01 65	00 55 27.7	07.13S	122.84E	554	5.3			340/20	246/10	292/21	024/07	131/67	Strike-slip	0.85	26	World Data Centre
	O/71	06 01 65	00 55 27.7	07.13S	122.84E	554	5.3			065/00	345/00	290/00	020/00	000/90	Strike-slip	-	-	World Data Centre
13.	O/71	23 01 65	23 24 30.1	07.43N	123.86E	628	5.2			276/10	016/44	316/38	064/22	177/44	Strike-slip	-	-	World Data Centre
14.	DS/73	29 04 65	15 48 58.9	05.65S	110.24E	524	5.7			310/20	218/10	254/07	262/21	101/67	Strike-slip	0.80	33	World Data Centre
15.	O/71	09 08 65	02 34 24.3	06.99S	123.32E	605	4.8			324/43	055/01	018/30	270/28	146/47	Strike-slip	-	-	World Data Centre
16.	FM/70	22 06 66	20 29 05.3	07.21S	124.69E	537	6.1			089/27	218/51	133/61	243/13	345/26	Normal	-	-	World Data Centre
	D/71	22 06 66	20 29 05.3	07.21S	124.59E	507	6.1			238/52	129/51	129/75	253/09	347/13	Normal	-	-	World Data Centre
17.	O3/71	03 02 67	12 30 53.0	05.62S	110.48E	569	4.8			010/44	228/40	292/69	089/03	120/20	Normal	-	-	World Data Centre
18.	FM/70	03 02 67	12 48 38.2	05.58S	440.53E	560	5.5			010/44	224/41	292/72	028/02	118/19	Normal	-	-	World Data Centre
19.	FM/70	24 03 67	09 00 20.0	06.01S	112.33E	600	5.9			019/66	199/24	199/69	019/21	108/00	Normal	-	-	World Data Centre
20.	FM/70	09 11 67	02 18 47.3	07.18S	123.72E	560	5.6			144/45	324/45	324/90	144/00	054/00	Normal	-	-	World Data Centre

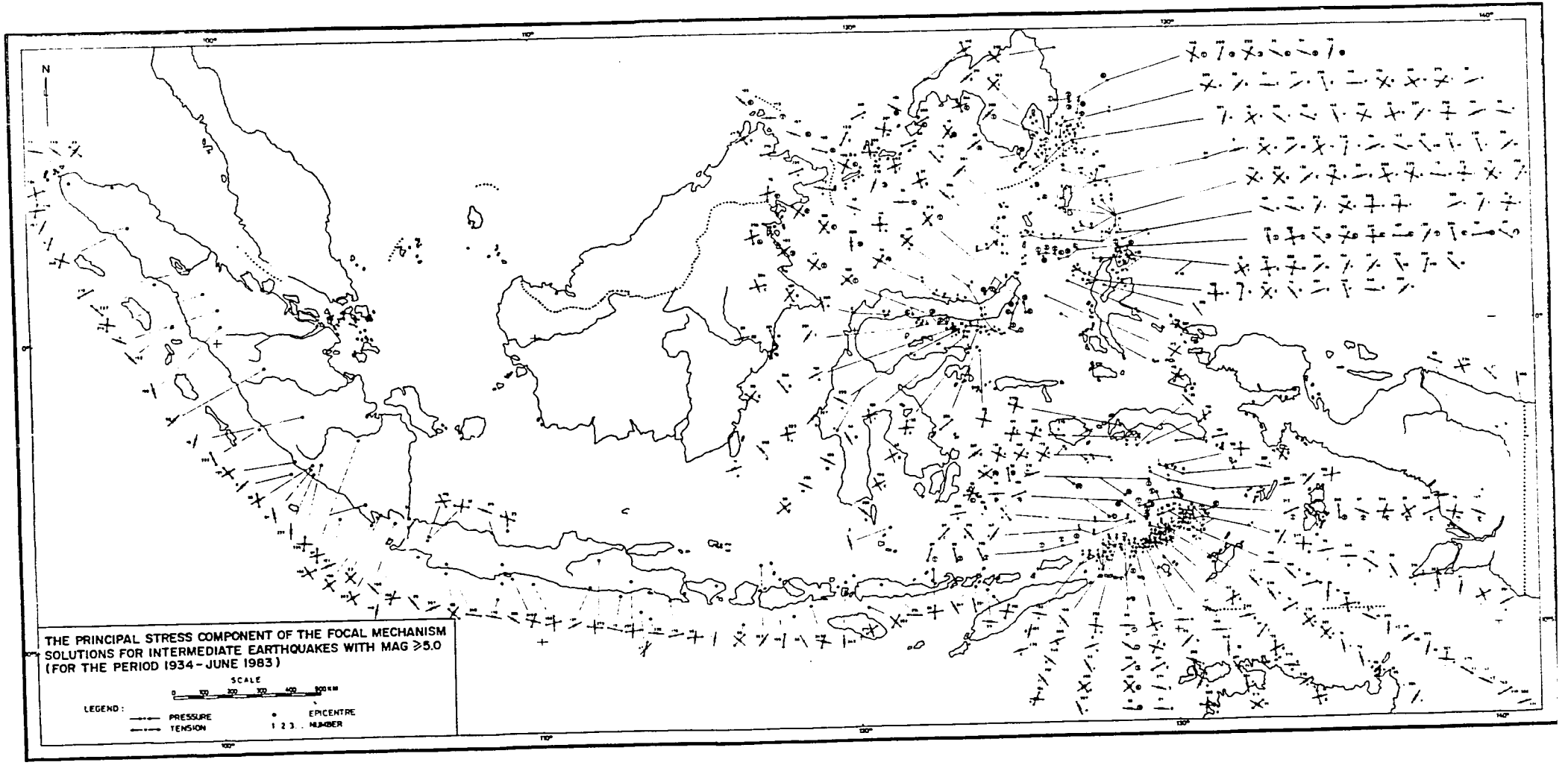
No. of EQ.	Data Source	Data DY MN YR	Time HR MN SEC	Epicentre Lat	Epicentre Long	Depth km	Magnitude MB ML MS	Pole of 1st Nodal Plane Trend/ Plunge	Pole of 2nd Nodal Plane Trend/ Plunge	Axis of Compresion P Trend/ Plunge	Axis of Tension T Trend/ Plunge	Null Axis B Trend/ Plunge	Fault Type	Score	Number of Data	Remark
1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	16
64.	BMG	27 01 82	21 46 24.1	06.09S	111.67E	627	5.6	140/30	246/24	101/24	169/41	006/50	Reverse	0.88	43	
65.	BMG	02 03 82	06 39 28.7	07.29S	120.31E	572	5.5	282/20	112/70	104/25	279/65	014/03	Reverse	0.83	36	
66.	BMG	29 08 82	13 18 14.5	06.02S	112.76E	597	5.8	058/62	195/20	167/58	027/22	292/17	Normal	0.92	94	
67.	BMG	24 01 83	08 42 03.3	04.21N	126.64E	607	5.5	267/70	100/20	107/65	276/25	008/05	Normal	0.91	54	
68.	BMG	19 02 83	20 14 22.9	08.73N	124.04E	568	5.8	074/22	278/66	058/66	261/22	168/08	Normal	0.92	124	
69.	BMG	10 05 83	10 27 32.5	07.27S	123.29E	600	5.1	053/36	308/20	353/41	093/10	196/47	Normal	0.87	61	
70.	BMG	11 06 83	04 54 00.7	04.28S	122.52E	640	5.2	170/70	350/20	170/25	350/65	196/47	Reverse	0.86	37	
71.	BMG	15 06 83	19 41 43.0	09.05N	124.02E	543	5.1	041/64	221/26	221/71	041/19	131/00	Normal	0.95	37	

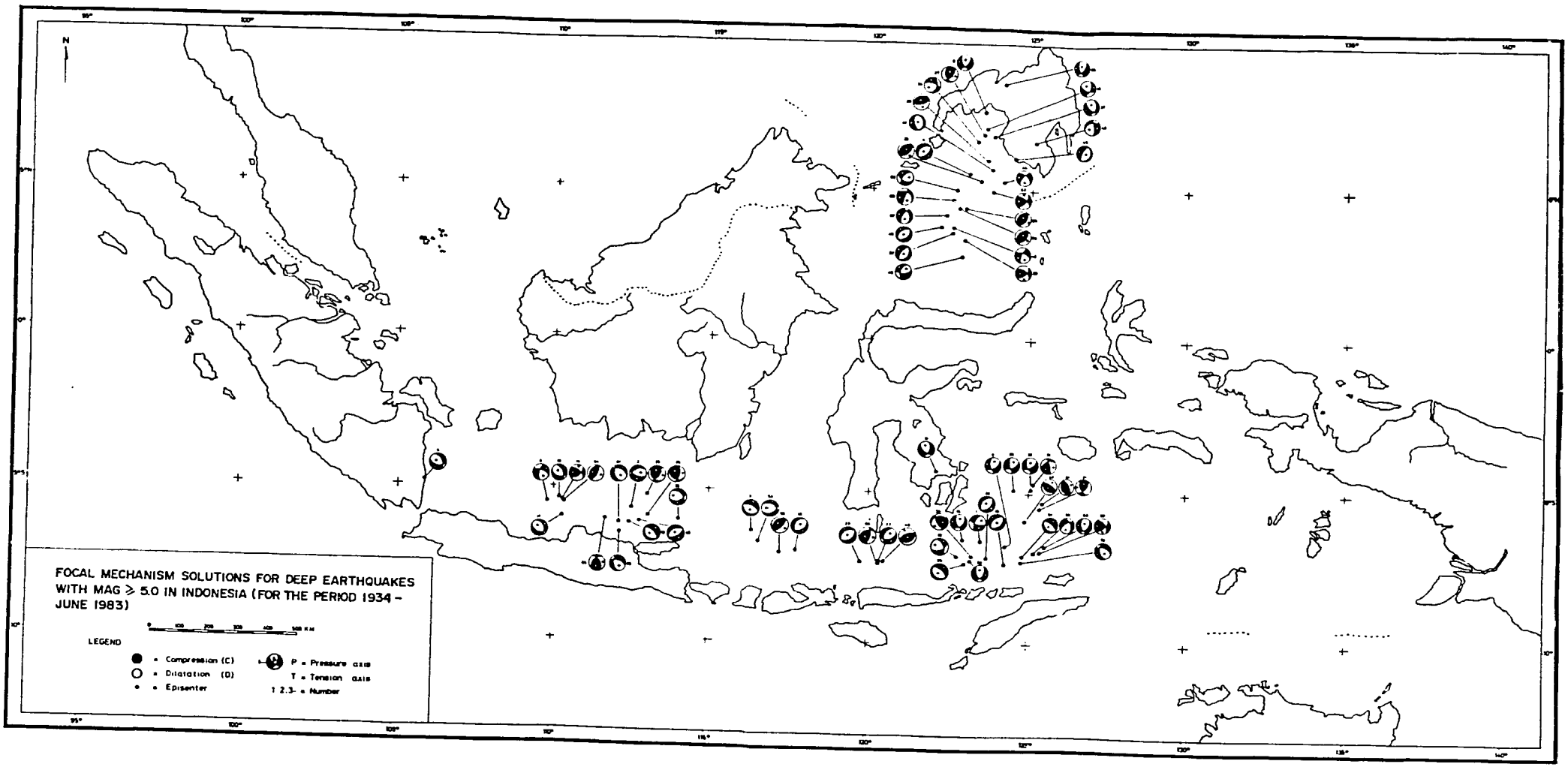


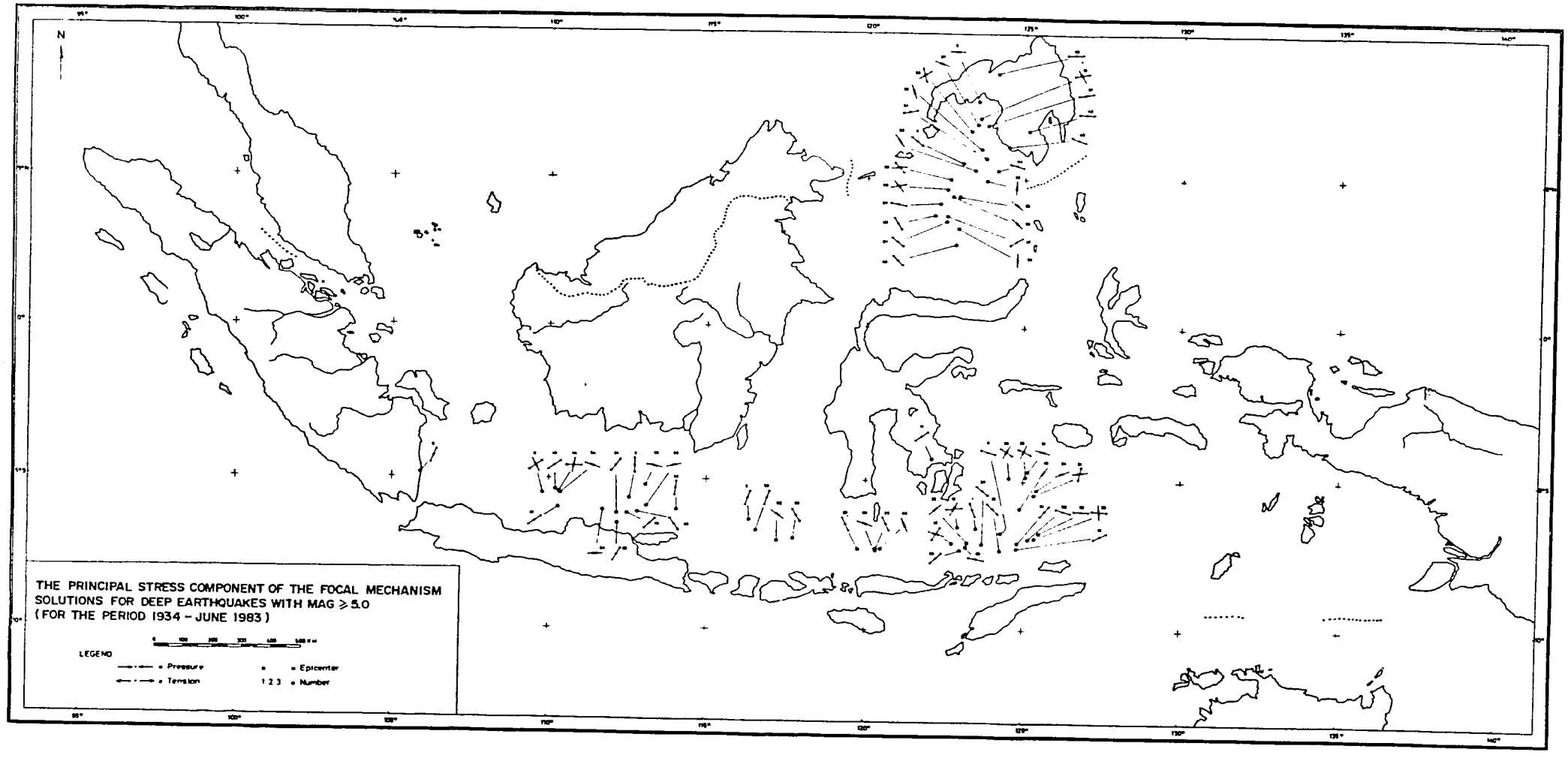
Previous Page Blank


THE PRINCIPAL STRESS COMPONENT OF THE FOCAL MECHANISM
SOLOTIONS FOR SHALLOW EARTHQUAKES WITH MAG ≥ 5.0
(FOR THE PERIOD 1934 - JUNE 1983)
SCALE
LEGEND
PRESSURE
TENSION
EPICENTRE
1 2 3 NUMBER


FOCAL MECHANISM SOLUTIONS FOR INTERMEDIATE EARTHQUAKES
WITH MAG ≥ 5.0 IN INDONESIA (FOR THE PERIOD 1934 - JUNE 1983)
LEGEND
Compression (C)
Dilatation (D)
P Pressure axis
T Tension axis


THE PRINCIPAL STRESS COMPONENT OF THE FOCAL MECHANISM
SOLUTIONS FOR INTERMEDIATE EARTHQUAKES WITH MAG ≥5.0
(FOR THE PERIOD 1934 - JUNE 1983)
SCALE
LEGEND :
PRESSURE
TENSION
EPICENTRE
1 2 3 . NUMBER
N


N
FOCAL MECHANISM SOLUTIONS FOR DEEP EARTHQUAKES WITH MAG ≥ 5.0 IN INDONESIA (FOR THE PERIOD 1934 - JUNE 1983)
LEGEND
= Compression (C)
= Dilatation (D)
= Epicenter
P = Pressure axis
T = Tension axis
1 2.3- = Number


N
THE PRINCIPAL STRESS COMPONENT OF THE FOCAL MECHANISM
SOLUTIONS FOR DEEP EARTHQUAKES WITH MAG ≥ 5.0
(FOR THE PERIOD 1934 – JUNE 1983)
LEGEND
= Pressure
= Tension
= Epicenter
1 2 3 = Number

PART C

SEISMIC SOURCE ZONES IN INDONESIA

1061

PART C SEISMIC SOURCE ZONES IN INDONESIA

Introduction

An attempt has been made to construct seismic source zones in Indonesia based primarily on seismicity. Distribution of earthquake epicentres has been thoroughly discussed by Koning (1952) and by Ritsema (1953, 1954a). Seismotectonic data have also been taken into account ('Tectonics of the Indonesian region', by Warren Hamilton). The seismicity data alone may be insufficient for a rigorous and detailed analysis, and so the seismic source zones based on these data are liable to future modification.

An Outline of the Seismic Source Zones in Indonesia

1. Divided into areas according to the maximum magnitude of the earthquakes, based on a compilation by Becca Carter Hollings, such as typical maximum earthquakes (New Zealand). Furthermore the b-Value based on the formula $\log N = a - bM$.

   The divided areas are shown in Fig. 1.

2. Divided into areas of deformation, based on the compilation of Becca Carter Hollings, as shown in Fig. 2.

3. Divided into areas according to maximum acceleration for a return period 20 years, published by Becca Carter Hollings, as shown in Fig. 3.

4. Plate tectonics system in Indonesia, as shown in Fig. 1

5. Distribution of shallow earthquake epicentres of magnitude above 6.0 for the period 1897-1984, as shown in Fig. 4.

6. Expression of earthquakes frequency square during a certain time interval, as shown in Fig. 5.

Seismic Activity

Indonesia can best be regarded as the place of interaction of three crustal plates, namely: a. Indonesian-Australian plate, b. Eurasian plate, c. Pacific plate.

Most earthquakes in Indonesia can be assigned to one of three vigorous assymmetrical systems that mark the contacts between the Eurasian, Indonesian and Pacific plates.

The first, the most significant of these systems, is the Sunda-arc, which expresses the subduction of the Indonesian plate beneath the Sunda shelf, a stable southern prolongation of the Eurasian plate.

This plate is bounded to the east by the second main system, the Philippine arc, a similar expression of the subduction of the Pacific plate.

The third system forms an active margin of the Australian continent and continues the line of the Sunda arc to the east. This third system marks the subduction of the Pacific plate beneath the Indonesian one.

The three systems meet in the North Maluku region which in consequence is an area of high seismicity. So the northernmost region of Indonesia (Maluku Sea and surroundings) is probably one of the world's most vigorous areas of seismic activity. The intermediae earthquake activity in this area is very pronounced, skirting Minahassa and extending to the north via the Maluku Sea to the Philippines.

Earthquakes associated with the trenches of the island arc are, according to Isacks, closely related to the underthrusting of the sea block beneath the landward block.

On land, shallow, earthquakes occur along fault zones and folded zones. It could further be adduced that the remarkable shape of N. Sulawesi and Halmahera and, in addition, the loop shape of the Banda arc are due to the combined results of the northward drift of the Indonesian-Australian plate (Australian continent) and the westward drift of the Pacific plate. It is a well known fact that earthquake epicentres may be associated with deep submarine troughs, which run parallel to the coast of the continent wherever the coast is lined by mountains.

Island arcs and active continental margins are typical of such subduction zones. These systems are also characterized by deep-focus earthquakes.

Many earthquakes, including the great ones for which the magnitude exceeds 7 or 8, occur in association with such a subduction of the oceanic plate. The down-going palte seems to reach a depth of 645 km. Many deep-focus earthquakes are located within the dipping plate.

Epicentres are sometimes distributed along a nearly straight line in highly seismic areas. Such lineations seem to lie closely correlated with active faults. Small stable units exist within the complex of active systems in East-Indonesia.

The Sunda arc is composed of the Sumatera segment, Java segment and Timor segment.

The Sumatera segment is characterized by the presence of an outer island arc and the absence of deep quakes east of it. Java displays typical features, such as the occurrence of deep foci north of the island.

The interdeep area between the volcanic arc and the non-

volcanic arc is generally subjected to a state of compression. The crust comes to a rupture probably between the continental and oceanic plates, when the compression exceeds a certain limit. The main quake is generally associated with a tsunami, causing serious loss to life and property in coastal villages. Numerous earthquakes occur in the interdeep area, just at the place where, opposing a long deep ocean trough, there are great mountain ranges at a long distance back from the shore.

On land, shallow earthquakes occur along fault zones and folded zones, e.g. folded areas in Sunda arc, West Irian and Sulawesi.

Further fault zones can be mentioned as follows: Great Barisan fault, extending from Aceh to Lampung, runs parallel to the west coast of Sumatera; many small faultings in the other islands of the Sunda arc; Palu fault in Central Sulawesi and Gorontalo fault in the Minahassa: the Sorong fault runs along the north coast of West Irian; further, the submarine faultings from Teluk Tomini running to the Philippines via the Maluku Sea.

The Sorong Fault in northern West Irian is associated with the westward motion of the Pacific plate and marks the subduction of the Pacific plate beneath the Indonesian one. Back to the south is the folded area which runs from east to west approximately in between the north and south coasts of the island. The seismic activity diminishes gradually southward.

Except for the small northern part, South Sulawesi has minor seismic activity. The subduction below Minahassa and the faulting in and around Minahassa and, further, the Palu fault in Central Sulawesi are responsible for the active seismicity of North and Central Sulawesi. This activity runs northward along the Sangihe ridge.

Kalimantan has been spared the experience of major earthquakes. However, this area has not been seismically inactive.

Seismic Source Zones

Indonesia is bounded by latitude 10°N-15°S and longitude 90°E-140°S and is divided into 6 seismic source zones.

The seismic source zones are summarized below.

1. **Highly active areas**
   Shocks of magnitude 8 are known.
   Shocks of magnitude 7 or more are frequent.
   e.g. Philippine trench, Halmahera arc, northern coastal region of West Irian.

2. **Active areas**
   Shocks of magnitude 8 could occur.

Shocks of magnitude 7 or more are frequent.
e.g.Interdeep area off the west coast of Sumatera and off the south coast of Java; further, the small Sunda Islands east of Java, Timor segment, East Banda Sea, Buru and Ceram arc, folded zones of West Irian and the Minahassa Peninsula.

3. **Folded and fractured zones**
Shocks of magnitude 7 and less are frequent.
e.g. Western coastal regions of Sumatera, southern coastal regions of Java, the lesser Sunda Islands east of Java, Buru, northern part of central Sulawesi and central West Irian.

4. **Folded zones with or without fracture zones**
Shocks of magnitude 7 or less have occurred.
e.g. Sumatera, northern part of Java, eastern and northern Kalimantan, Sula, south Sulawesi and central West Irian.

5. **Areas where infrequent small earthquakes have been reported**
e.g. Eastern coastal region of Sumatera, central Kalimantan, western Banda Sea, southern margin of the Sunda shelf, southern part of West Irian.

6. **Stable areas with no record of earthquakes**
e.g. Southernmost region of West Irian, Arafura Sea (Sahul shelf) Sunda shelf, except Kalimantan.

Characteristics of Seismic Source Zones

Source Zone I

This zone comprises the northern part of West Irian and the northern portion of Maluku, except the island of Halmahera. This zone forms an area of frequent earth deformation during the last 20,000 years and has experienced numerous shallow earthquakes.

The maximum magnitude in this area is of the order of 8.5 and its b-Value is 1.09. The earthquakes are concentrated west of the island of Halmahera and their frequency is 20.1 events per square degree for the period 1976-1983; the frequency of the earthquakes in the area surrounding Jayapura is 16.0 events per square degree, while in Sarmi and surroundings it is 12.0 per square degree. The expected maximum acceleration in this zone is more than 0.69 g or, as intensity, more than X MMI.

Destructive Earthquakes in Zone 1 during 1821-1984

Event	Felt	I max
Origin Time 1845 Feb 08	Menado: North Sulawesi - a strong earthquake was felt in north Sulawesi and caused the collapse of brick buildings and houses at Menado, Tikala, Tomohon, Tonsarongsong, Tondano and Tanawanko.	MMI VIII-IX
Origin Time 1855 Jul 14	Ternate: Maluku - a strong earthquake occurred. Severe damage to buildings; one house collapse and 34 people were killed.	MMI VIII-IX
Origin Time 1858 Feb 27	Ternate: Maluku - a rather hard shock was felt and caused damage to walls.	MMI VI
Origin Time 1858 Jun 04	Ternate: Maluku - a rather strong earthquake was felt, causing damage to some buildings and houses.	MMI VI
Origin Time 1858 Dec 13	Tondano: North Sulawesi - a moderate earthquake caused 15 sheds to fall. On Ternate, Tidore, Halmahera, Sangihe, Talaud and Banggai islands a tsunami was observed.	MMI VII
Origin Time 1859 Oct 08	Halmahera Island: Maluku - at Halmahere a great number of cottages tumbled down.	MMI VI
Origin Time 1864 May 23	Arfak: Irian Jaya - the destructive earthquake caused houses on Mount Arfak to be set ablaze and some houses were buried. 250 people killed.	MMI VI-VII
Origin Time 1867 Nov 03	Ternate: Maluku - a moderate shock caused fissures in the walls of numerous houses.	MMI VI
Origin Time 1914 May 26	Japen Island: Irian Jaya - all brick buildings collapsed on Japen Island. Ansus and Pom were affected by a tsunami. A few people lost their lives.	MMI IX

Event	Felt	I max
Origin Time 1919 Nov 21	North Irian Jaya: Some damage was caused by a strong quake in the eastern part of North Irian Jaya. A few houses collapsed. Earth fissures developed in the ground and walls were disturbed.	MMI VIII
Origin Time 1921 Oct 10	Sentani: Irian Jaya - a major earthquake was felt as far as Dobo, but was destructive around Lake Sentani in southeast Irian Jaya. Ground-slides, boulders and a large mass of limestone dammed up a branch of the river temporarily in the village of Doormantop.	MMI VII
Origin Time 1932 May 14 Epicentre 0.5°N-126.0°E	Tondano: North Sulawesi - the strong earthquake was felt as far north as Mindanao. The major destruction took place at Kakas, south of Lake Tondano; 592 houses collapsed, 115 people sustained injuries and the death of six people was reported. Damage was also done at Langowan, Poso, Tondano, Waluyama, Rembohan, Koya and Lekupang. Ternate in north Maluku suffered minor damage. On the coast between Amurang and Tompoan vertical gaping cracks developed in the beach sands and the sea side of the cracks sagged.	MMI VII
Origin Time 1936 Apr 01 Epicentre 3.6°N-126.7°E	Sangir: North Sulawesi - the quake seemed to be followed by numerous aftershocks. Destructive in the Sangir-Talaud Islands. Approximately 127 houses collapsed. Cracks in walls at Lerung.	MMI VIII-IX
Origin Time 1971 Jan 10 07h 14m 3.7s UTC Epicentre 0?.1°S-140.1°E Magnitude: 7.3 Depth: normal	Sentani: Irian Jaya - the quake was felt in most places in northern Irian Jaya and rocked Jayapura and Sentani. In Jayapura cracks developed in walls of brick buildings and ten wooden buildings on pillars	

Event	Felt	I max
	floating on water collapsed completely. In Sentani, 40 km away from Jayapura, a church was cracked and at 10 km further inland about 14 wooden houses on pillars toppled. In Genyem, about 40 km away from Sentani, earth-slumps and fissures which erupted and the sand were observed. A sound was heard like gun fire. This area is sparsely inhabited and the sketehy information is due to difficult communications.	MMI VI-VII
Origin Time 1974 Feb 27 00h 21m 57.7s UTC Epicentre 2.7°N-125.4°E Magnitude: 5.2 Depth: normal	Siau Island: North Sulawesi - the quake was followed by an aftershock on March 02. A roaring sound was heard, indicating that the quake was shallow. On March 13, 1974 occurred a shallow earthquake again off the west coast of Siau Island. The shock caused people to panic; and due to the continuous strong shocks and the loose formation of the soil in that area, it caused ground-slides, ground cracks and damage to buildings.	MMI V
Origin Time 1976 Jun 25 19h 18m 29.0s UTC Epicentre 3.2°S-142.8°E Magnitude 6.8 Depth: -	Jayapura: The shock felt by many people but no damage was reported. According to the newspaper report the earthquake caused a landslide and ground cracks in the hinterland of Irian Jaya.	MMI IV
Origin Time 1979 Jul 23 05h 52m 53.0s UTC Epicentre 2.5°S-140.4°E Magnitude: 5.7 Depth: normal	Sentani, Jayuapura: Irian Jaya - the shocks caused damage to buildings and houses in Sentani.	MMI VII

Event	Felt	I max
Origin Time 1979 Sept 12 05h 17m 52.4s UTC Epicentre 1.8°S-136.1°E Magnitude: 6.4 Depth: 50 km	Japen-Serui: Irian Jaya - this earthquake killed 2 people and injured 5 people slightly in Japen and Jobi villages. Many houses, buildings, school buildings and clinics collapsed or were seriously damaged.	
	The villages that experienced damage are Ansus, Papuma, Serui, Ariepie, Aromarea, Sarawandori, Serui Laut, Kabuaena, Borai, Menawi, Kointunai, Dawai, Randawaya and Warironi. All the above-mentioned are located in the Japen District.	MMI VIII
Origin Time 1980 Feb 22 03h 51m 46.0s UTC Epicentre 1.5°N-124.65°E Magnitude: 5.5 Depth: normal	Manado: North Sulawesi - in Manado cracks developed in some buildings and houses. No one reported killed or injured.	MMI VI
Origin Time 1983 Oct 22 21h 48m 44.4s UTC Epicentre 4.0°N-126.6°E Magnitude: 4.9 Depth: 118 km	Sangihe-Talaud: Noth Salawesi - in the Sangihe-Talaud Islands cracks developed in the walls of buildings. No loss of life was reported.	MMI V

Source Zone 2

This zone comprises 1, the coastal region of west Sumatera and south Java including the interdeep area; 2, the islands in the Timor segment (Nusa-Tenggara Timur) and 3, Maluku, Minahassa and surroundings and Fak-Fak and surroundings.

1. **The Coastal region of West Sumatera and South Java**
   This area includes a small part of the west coast of Sumatera and the islands west of it, a small part of southern West Java and those parts of the sea south of Central Java and West Java.

2. **Nusa Tenggara Timur** includes Sumba, the southern portion of Timor and the small islands in the surrounding area.

3. **Maluku** includes Yamdena, Ceram, Buru, the eastern portion of

Sula, Obi, Halmahera, the southern portion of Minahassa (N. Sulawesi) and the islands in the Gulf of Tomini and finally Fak-Fak in West Irian and the areas east of it, extending from east to west. The seismicity of the zone can be summarized as below.

In the interdeep area numerous earthquakes have occurred from the trenches up to the coast. The frequency of the events in some places in the interdeep area is described below.

a. In the sea areas south of Bengkulu as many as 10.4 events per square degree during 1976-1983.

b. Off the south coast of Bantam as many as 6.4 events per square degree.

c. In the surroundings of Siberut as many as 4.9 events per square degree.

d. In the sea areas south of Jogyakarta as many as 4.7 events per square degree.

e. In areas southwest of Banda Aceh as many as 4.5 events per square degree.

The entire seismic source zone 2 is located in an area of frequent earth deformation during the last 20,000 years. The maximum acceleration, as from the area south of Aceh to the west as far as the area south of Sukabumi to the east in seismic source zone 2, does not exceed 0.69 g or, as intensity, IX MMI, while its expected maximum magnitude is 8.5. In the areas south of Preangan and south of Central Java the maximum acceleration does not exceed 0.33 g or, as intensity, IX MMI, while its expected maximum magnitude is of the order of 8.0.

In the Timor segment and Maluku areas the highest frequency (values of N) of felt earthquakes is to be found in Jamdena Island and surroundings, as many as 55.0 events per square degree during 1976-1983.

Further, the frequency in the area west of this island and that east of Wetar is as high as 33.0 events per square degree. The frequency in the lesser Sunda Islands, comprising Bali, Lombok, Sumbawa, Sumba and Flores, is as high as 8.2 events per square degree, while in Timor and surroundings it is 2.0 events per square degree only. All the islands mentioned above are located in an area of frequent earth deformation during the last 20,000 years.

The expected maximum magnitude is of the order of 8.0 for Nusa Tenggara Barat while Java and Nusa Tenggara Timur have experienced earthquakes of 8.5 maximum magnitude. The expected maximum acceleration in Nusa Tenggara Timur does not exceed 0.69 g or, as intensity, X MMI.

Maluku, comprising Seram and the surrounding sea area and also the western portion of Halmahera, is located in an area of frequent earth deformation during the last 20,000 years. The expected maximum magnitude in Central Maluku is of the order of 8.0. The highest b-Value is to be found in Central Maluku where it is 1.14 and for areas in the Gulf of Tomini 0.90, while for Nusa Tenggara Timur it is 0.98.

The maximum acceleration in Central Maluku (Zone 2) does not exceed 0.69 g or, as intensity, X MMI. This figure can be used in West Irian as from Fak-Fak, Nabire and further eastward (see seismic zone map). The frequency of the felt earthquakes in Fak-Fak, Nabire and further eastward cannot be compared with that in zone 1. Nonetheless this region is located in an area of frequent earth deformation during the last 20,000 years.

The Java trench running to the south of zone 2 from west to east bends as from the south of Jamdena Island northward and comes to an end just at a point north of Ceram.

Due to the subduction of the Indonesian-Australian plate beneath the Eurasian one, the earthquakes originate more deeply further to the north.

Earthquakes at a depth of 100 km are therefore observed along the west coast of Sumatera and the south coast of Java, while along the north coast of Java a depth of 300 km is observed and further in the Java Sea a depth of more than 300 km is detected.

Most of the damage in Sumatera, Java and Nusa Tenggara is caused by local shallow earthquakes and not by earthquakes originating along the trenchs or in the interdeep over. More significant are the N-S trending fractures in Nusa Tenggara Timur, as there the Indonesian plate (oceanic plate) seems to be heavier than that east of it, e.g. the Australian plate. It is thought that the Indonesian plate is descending more rapidly than the Australian plate.

Destructive Earthquakes in Zone 2 during 1821-1984

Event	Felt	I max
Origin Time 1830 Mar 28 01h 00m 00s UTC	Ambon: Maluku - earthquake occurred and caused damage to buildings.	MMI VII-VIII
Origin Time 1835 Nov 01	Ambon: Maluku - a large earthquake occurred and caused some buildings to collapse; 60 people injured; landslides in the	

Event	Felt	I max
	hills were observed.	MMI VII-IX
Origin Time 1837 Jan 21	Maluku: Earthquake felt at Saparua, Haruku and on Nusalaut Island. Damage to buildings and houses.	MMI VII-VIII
Origin Time 1841 Dec 16	Ambon: a moderate earthquake occurred at Ambon. The earthquake was accompanied by a tsunami at Galaga Bay and Buru Island. The tsunami caused damage to some boats.	MMI VII-VIII
Origin Time 1843 Jan 05	Gunung Sitoli and Baras: Nias Island - a strong earthquake struck Gunungsitoli and Baras. The shock was followed by a tsunami, causing damage to some boats. Ground-slump was observed too.	MMI VII-VIII
Origin Time 1858 Nov 09	Ambon: Some buildings suffered damage by an earthquake.	MMI VI
Origin Time 1871 Aug 18	Bengkulu: Sumatera - the quakes caused some houses to tumble down in Bengkulu and Tebingtinggi.	MMI VI-VII
Origin Time 1876 May 28	Kajeli: Ceram - a few houses suffered damage and a mosque tumbled down at Kajeli-Ceram Island - Maluku.	MMI VII
Origin Time 1896 Apr 18	Timor Island: The quake was also felt at Alor Island; 250 people killed and most of the settlement damaged.	MMI VII-VIII
Origin Time 1898 Jan 17	Ambon: Maluku - many houses were destroyed by this quake.	MMI VII
Origin Time 1902 Jun 27	Lais: Bengkulu - fall of plaster and cracks developed in walls.	MMI VI
Origin Time 1903 Feb 27	Banten: West Java - this quake felt over Banten; small cracks developed in walls.	MMI VI
Origin Time 1908 Mar 24	Atapupu: Timor Island - the quake strongly felt at Atapupu in	

Event	Felt	I max
	North-east Timor. Cracks developed in the wall of a fortress; a part of the wall fell. Damage to buildings was also done in the Chinese blocks. Cracks developed in the beach sands about 25 m long.	MMI VII
Origin Time 1920 May 10	Ambon: Maluku - cracks in walls reported at Ambon, Saumlaki and Banda. The quake itself had its origin about 1120 km south of Banda and Irian Jaya.	MMI VI
Origin Time 1923 May 12 Epicentre 7.3°S-105.8°	Banten: West Java - the shock was felt over West Java and South Sumatera as far as Krue. Damage was done at several places; at Pelabuhanratu a water tower was thrown down.	MMI VII
Origin Time 1925 Jul 24	Bacan Island: Maluku - exact origin unknown. Strongly felt at Labuban (Bacan Island), accompanied by a roaring sound; cupboard overturned, a pendulum clock fell.	MMI VII
Origin Time 1931 Sept 25	South Sumatera: Felt over South Sumatera and west Java and as far west as Padang. Foundations of most buildings subsided. Difficult to walk as a result of the earthquake. In Kalimantan a rumbling sound was heard.	MMI VII-VII
Origin Time 1932 Sept 09 Epicentre 3.5°S-128.3°E	Seram: Molluce - the origin seemed to be in Tolehu Bay. A few old buildings collapsed at Wae and Tolehu. Ground-slumps and ground-slides were also reported.	MMI VII
Origin Time 1936 Aug 23 Epicentre 6.1°N-94.7°E	Banda Aceh: The quake was strongly felt at Banda Aceh, Lhok Sukon, Lhoksemawe and was followed by a number of aftershocks. Caused damage to buildings. as a result of the shocks 9 people said to have perished, 20 people were badly injured.	MMI VII-VIII

Event	Felt	I max
Origin Time 1938 May 20 Epicentre 0.7°S-120.3°E	Tomini Gulf: Central Sulawesi - the tremor was felt as far east as Kalimantan and as far north as Kalimantan and as far north as Gorontalo (Minahassa). The shock was associated with a tsunami which swept the sea, causing serious loss of life and property; 942 houses collapsed and a few persons were drowned.	MMI VIII-IX
Origin Time 1938 Aug 18 Epicentre 3.8°S-102.8°E	Bengkulu: Sumatera - the shock was felt over West Sumatera, Palembang, Bengkulu and on the Mentawai Islands. Fall of plaster and cracks in walls were reported at some places in Bengkulu.	MMI VII
Origin Time 1938 Oct 20 Epicentre 9.2°S-123.2°E	Flores: Walls were badly cracked in Flores. Ground-slides at Larantuka. The quake seemed to have aftershocks.	MMI VII
Origin Time 1939 Dec 22 Epicentre 0.0°S-123.0°E	Central Sulawesi: This major earthquake was felt over north and central Sulawesi, East Kalimantan and as far north as the Sulu Islands. Cracks developed in walls at Gorontalo and at Langonan; cupboards overturned and a few people were injured. Houses collapsed at Kalo, Luwuk, Labuba and on the Sula Islands. At Mandar and Meulaboh in Central Sulawesi houses were shaken.	MMI VIII
Origin Time 1941 Oct 11 Epicentre 0.6°N-97.6°E	Tapanuli: North Sumatera - strongly felt over Tapanuli; slight damage was done at Sibolga.	MMI VII
Origin Time 1941 Nov 09 Epicentre 1.4°S-121.1°E	Gorontalo: North Sulawesi - brick/stone buildings collapsed at Gorontalo, Paleleh and Cibawa. Ground-slumps and land-slides in the hills were reported.	MMI VIII
Origin Time 1960 Apr 29 09h 16m 20s UTC	Una-Una: Central Sulawesi - felt over North and Central Sulawesi. Destructive on the Una-Una	

Event	Felt	I max
Epicentre 0.5°S-121.5°E	Islands. No lives were lost.	MMI VII-VIII
Origin Time 1961 Mar 16 18h 21m 04s UTC Epicentre 8.1°S-122.3°E	Flores: East Nusatenggara - damage in most villages in Central Flores; one person killed.	MMI VII-VIII
Origin Time 1964 Apr 02 01h 11m 55s UTC Epicentre 5.9°N-95.7°E Magnitude: 5.2 Depth: 132 km	Banda Aceh: The earthquake was the strongest shock ever recorded in this region since that of August 23, 1936 which caused considerable damage to buildings. The quake was most strongly felt at Banda Aceh where the intensity was high (VII MMI). About 30-40% of the brick buildings sustained damage. The village worst hit was Krueng Raya.	MMI VII
Origin Time 1967 Apr 12 04h 51m 50.2s UTC Epicentre 5.3°N-97.3°E Magnitude: 6.1 Depth: 55 km	Aceh: North Sumatera - the earthquake was felt mainly over the eastern coastal areas of Aceh, being located on alluvial deposits and to the south as far as Kisaran. Farther inland the shock was felt in Takengeun, situated in the mountainous region. No report was received from places on the west coast of Aceh. The maximum intensity, about midway between Lhoseumawe and Sigli, probably did not exceed VIII MMI. The places worst hit were Jeunieb, Pendada and Jeumpa Bireun. Damage was done to 5 mosques, 59 brick and wooden houses which were used for religious purposes, 11 school buildings, 5 bridges and about 2000 brick and wooden dwelling houses.	

Event	Felt	I max
	Furthermore, earth-slumps rock-slides, cracks and fissures were observed over a wide area; mud and sand erupted from fissures in soft, water-saturated deposits at some places. In Sigli the quake was followed by an enormous tsunami, Eastern Aceh is a region of only moderate earthquake activity as compared, for example, with the west coast of Sumatera.	MMI VII
Origin Time 1973 Nov 26 08h 51m 12.8s UTC Epicentre 6.8°S-106.6°E Magnitude: 4.9 Depth: 62 km	Pelabuhanratu: West Java - in Pelabuhanratu the quake was felt as Intensity III-IV MMI. At Citarik and Cidadap villages, where the intensity was highest, the only known structural damage was slight cracks produced in the walls of old brick buildings and falling of plaster. Ground cracks and ground-slides were observed.	MMI V
Origin Time 1976 Jun 20 20h 56m 31.7s UTC Epicentre 3.2°N-96.3°E Magnitude: 6.1 Depth: 33 km	Kotacane: Aceh - cracks occurred in the walls of the local government office building. Sibolga: Cracks in walls of the power house building at Pinangsore Airport. The earthquake was also felt by many people in Banda Aceh and Medan, but no damage was reported.	MMI VII
Origin Time 1977 Aug 19 19h 06m 08s UTC Epicentre 11.1°S-118.5°E Magnitude: 7.0 Depth: 33 km	Sumbawa: East Nusatenggara - the quake was an under-sea quake and its epicentre was far from the land but, due to the tsunami which accompanied it, most of the southern part of the sea coast of Bali, Lombok, Sumbawa and Sumba was damaged. In Kuta-Bali one person killed and 5 houses collapsed, 26 boats damaged or missing. In Lombok 20 persons killed, 115 houses damaged, 132 boats missing or damaged.	

Event	Felt	I max
	In Sumbawa 81 people killed, 53 people missing; more than 1000 people lost their property; 63 houses, one school building, one mosque collapsd and the others were cracked. The quake also caused damage to some office buildings and school buildings and a mosque and market in Sumbawa and Bima.	
	In the whole of Nusatenggara Island the quake resulted in 107 people killed, 54 people missing, 440 houses damaged/collapsed, 467 boats missing or damaged, 5 school buildings collapsed and 3 teachers' houses damaged.	MMI VIII
Origin Time 1979 Dec 15 00h 02m 37s UTC Epicentre 3.5°S-102.4°E Magnitude: 6.6 Depth: 25 km	Bengkulu: Sumatera - the quake caused damage in Kepahiang and Curup. No-one killed or injured by this quake, but many houses and building seriously damaged.	
	In Kepahiang, more than 550 houses seriously damaged and in the Rejang Lebong area around 630 houses also seriously damaged; many others cracked on walls. Ground-slides and cracks were observed. Near Bengkulu, many houses were shifted from their foundations and water pipes were broken.	MMI VII-VIII
Origin Time 1980 Aug 17 09h 01m 58.0s UTC Epicentre 3.7°S-128.5°E Magnitude: 5.4 Depth: normal	Ambon: Maluku - cracks in walls developed in some houses in the city of Ambon. No more damage was observed.	MMI V
Origin Time 1982 Aug 06 20h 40m 52.5s UTC Epicentre 8.35°S-120.35°E Magnitude: 5.6 Depth: 18 km	Ruteng: Flores Island - in Ruteng the quake was strong enough to make people panic and run out from their houses. No building or house collapsed, but one hospital, one school building and one government office building	

Event	Felt	I max
	and some houses were seriously damaged, and a microwave station building was slightly damaged. In Pagal, north of Ruteng, two school buildings, one church and 2 clinics were slightly damaged, cracks developed in walls and plaster fell. Cracks in the ground were observed.	MMI VI-VII
Origin Time 1982 Aug 23 16h 46m 34.7s UTC Epicentre 0.06°N-121.23°E Magnitude: 4.7 Depth: 5 km	Una-Una: Central Sulawesi - a small island in Central Sulawesi province was hit by a moderate earthquake. The walls of several houses fell. Cracks developed in walls and plaster fell. No deaths or injuries were reported.	MMI VII
Origin Time 1982 Dec 25 12h 28m 2.7s UTC Epicentre 8.4°S-123.04°E Magnitude: 5.1 Depth: normal	Larantuka: Flores Island - the quake caused serious damage in Larantuka, Solor and on Adonara Island in east Nusatenggara Province. Hundreds of houses collapsed and thousands were slightly damaged, 13 people were killed, 17 injured and more than 400 slightly injured.	MMI VII-VIII
Origin Time 1983 Mar 12 00h 53m 36.0s UTC Epicentre 4.4°S-128.05°E Magnitude: 5.8 Depth: 25 km	Ambon: Maluku - the shock caused slight damage on Ambon. The quake was accompanied by a tsunami along the coast of Ambon.	MMI VI
Origin Time 1983 Apr 04 02h 51m 13.9s UTC Epicentre 5.8°-93.27°E Magnitude: 6.6 Depth: 51 km	Banda Aceh: North Sumatera - the quake caused both serious and slight damage at Banda Aceh. The walls of school buildings collapsed and window panes were broken. Some of the government buildings, for example the treasury buildings, TV station building, one room of the university building and the telephone office building, were damaged.	

Event	Felt	I max
	In Meulaboh on the west coast of Aceh one building was slanted.	MMI VI
Origin Time 1983 Oct 31 03h 37m 54.5s UTC Epicentre 9.55°S-119.09°E Magnitude: 6.5 Depth: 179 km	Waingapu: Sumba - Nusatenggara - some bouses around Mauhau Airport in Waingapu had cracks in their walls. The quake was felt in Ujungpandang and Denpasar (Bali).	MMI V

Source Zone 3

This zone comprises the western coastal region of Sumatera, the southern part of Java, Bali, Lombok, Sumbawa, the northern portion of Flores; furthermore from the Banda Sea up to the west coast of Central Sulawesi, the major portion of Minahassa (N. Sulawesi) and the eastern part of the Sulawesi Sea area. The above-mentioned area is located in a region of frequent deformation during the last 20,000 years, except for the Maluku area and Central Sulawesi, the area east of Poso and the Sulawesi Sea area.

The expected maximum acceleration in zone 3 does not exceed 0.33 g or, as intensity, IX MMI and that in the southern part of Central Sulawesi does not exceed 0.25 g or, as intensity, VII MMI.

The maximum acceleration in the sea area south of Ceram does not exceed 0.69 g and is similar to that in Zone 2. The expected maximum magnitude in Sumatera is of the order of 8.5, while the b-Value in that area is 0.95; Java has a maximum magnitude of 8.0 and b-Value of 1.09; Nusa Tenggara and Maluku have a maximum magnitude of 8.5 and b-Value of 1.14; Central Sulawesi has a maximum magnitude of 7.5 and has an expected maximum magnitude of 5.5.

In the east Sulawesi Sea more earthquakes have been experienced than in the west Sulawesi Sea, as the east Sulawesi Sea is closer to the area of deformation, being located west of Halmahera where numerous earthquakes have been detected. The east boundaries of earth deformation and that of zone 3 in Sumatera coincide and it is the same for the boundaries north of zone 3 for Java and Nusa Tenggara, comprising the islands east of Java.

As the zone 4 is not located in an area of earth deformation during the last 20,000 years, the seismic activity in Sumatera, Java and Nusa Tenggara seems relatively higher than in zone 4.

The frequency in Zone 3 is similar to that in Zone 2, except

in Lampung which has a frequency of 1.5 events per square degree during 1976-1983. Zone 3 is also to be found in West Irian extending along the folded zones including Jayawijaya, which is situated in an area of earth deformation. The expected maximum magnitude is of the order of 8.5. The frequency for the area around Mt. Mandala is 16.0 events per square degree for the period 1976-1983.

The frequency of shallow earthquakes in Zone 3 is relatively lower than in Zone 2. The maximum acceleration in Zone 3 of West Irian does not exceed 0.33 g or, as intensity, IX MMI.

Destructive Earthquakes in Zone 3 during 1821-1984

Event	Felt	I max
Origin Time 1828 Dec 29	Bulukumba: In South Sulawesi a destructive earthquake occurred and caused servere damage to buildings; hundreds of people were killed.	MMI VIII-IX
Origin Time 1833 Nov 24	Bengkulu: Sumatera - a severe earthquake occurred and caused some buildings to collapse or be damaged. A tsunami was observed. No further information.	MMI VIII-IX
Origin Time 1834 Oct 10	Bogor and Cianjur: West Java - a violent shock occurred; the earthquake caused severe damage to buildings, some of which collapsed, and cracks in the road between Bogor and Cianjur. No deaths or injuries were reported.	MMI VIII-IX
Origin Time 1835 Aug 26	Padang: West Sumatera - the earthquake struck Padang and caused slight damage to buildings and cracks in walls.	MMI VII-VIII
Origin Time 1837 Nov 28	Bima: Sumbawa - a strong earthquake occurred and caused heavy damage to buildings, some of which collapsed.	MMI VIII-IX
Origin Time 1840 Jan 04	Purworejo: Central Java - a destructive earthquake occurred at Purworejo and caused severe damage to buildings; two buildings collapsed. This earth-	

Event	Felt	I max
	quake was felt at Wonosobo and caused one building to collapse. Also felt at Semarang, Demak, Solotigo and Kendal on the north coast of Central Java.	MMI VIII-IX
Origin Time 1843 May 25	Bogor: West Java - a shock was felt at Bogor and caused damage to buildings and houses.	MMI VII-VIII
Origin Time 1844 Feb 15	Cianjur: West Java - the earthquake hit Cianjur on West Java and caused damage to houses.	MMI VII-VIII
Origin Time 1852 Jan 09	Teluk Betung: South Sumatera - an earthquake tremor was felt in Teluk Betung and caused damage to buildings and houses.	MMI VII-VIII
Origin Time 1852 Oct 15	Kebumen: Central Java - a moderate earthquake was felt at Kebumen. This shock caused cracks in walls at several buildings and houses.	MMI VI-VII
Origin Time 1852 Nov 26	Bandanaira: Maluku - a strong earthquake was felt at Bandanaira - Banda Island and caused some buildings to collapse. The quake was followed by sea waves (tsunamis).	MMI VIII-IX
Origin Time 1852 Dec 20	Bogor: West Java - a strong earthquake caused some buildings to collapse.	MMI VIII-IX
Origin Time 1859 Jul 05	Tulungagung: East Java - an earthquake occurred and some buildings and houses suffered damage.	MMI VI
Origin Time 1861 Feb 16	Tapanuli and Sibolga: Numerous houses tumbled down. Tsunami was observed at Singkil, Nias and Tello.	MMI VIII-IX
Origin Time 1862 Mar 29	Buleleng: Bali - a moderate earthquake occurred, causing cracks in walls, some of which tumbled down.	MMI VII

Event	Felt	I max
Origin Time 1862 Sept 15	Bandanaira: Maluku - an earthquake caused cracks in walls.	MMI VI
Origin Time 1862 Nov 20	Madiun: East Java - Damage to a few buildings caused by a rather severe earthquake.	MMI VI
Origin Time 1863 Aug 13	Banyumas: Central Java - the strong earthquake caused heavy damage to a sugar factory.	MMI VII
Origin Time 1867 Jun 10	Jogyakarta: Central Java - in Jogyakarta and Surakarta 372 houses collapsed or partially collapsed, while only 5 persons lost their lives.	MMI VIII-IX
Origin Time 1871 Mar 27	Banyumas: Central Java - fissures in the walls of government buildings and houses, which were caused by an earthquake.	MMI VI
Origin Time 1873 Feb 05	Ciamis: West Java - the walls of numerous buildings were cracked.	MMI VI
Origin Time 1873 Oct 07	Tapanuli: North Sumatera - this quake caused damage to some houses and bridges.	MMI VI
Origin Time 1877 Feb 21	Kedu: Central Java - a rather strong shock, felt at Kedu and Wonosobo in Central Java, caused damage to several buildings.	MMI VI
Origin Time 1889 Nov 04	Pasuruan: East Java - the quake caused cracks in walls.	MMI VI
Origin Time 1890 Jul 11	Negara: Bali - the earthquake caused three pillars of the Justice Building to split horizontally and walls to tumble down.	MMI VII
Origin Time 1890 Nov 23	Bandanaira: Maluku - damage to most of the houses and buildings.	MMI VII
Origin Time 1896 Jul 01	Lumajang: East Java - the walls of some houses were split.	MMI VI
Origin Time 1896 Aug 15	Wlingi: East Java - at Brangah - Wlingi many public and private	

Event	Felt	I max
	buildings/houses damaged.	MMI VII
Origin Time 1896 Aug 20	Tulungagung: East Java - the shock caused severe damage to several Chinese houses.	MMI VII
Origin Time 1900 Jan 14	Sukabumi: West Java - felt over Priangan, Bogor and Banten. Most damage to stone houses occurred at Sukabumi, but no lives were lost.	MMI VII
Origin Time 1902 Aug 31	Sedayu: East Java - ground-slumps were observed, walls were disturbed. A series of after-shocks felt during the period 26 Sept - 9 Oct, the heaviest one on August 31, accompanied by a roaring sound.	MMI VI
Origin Time 1903 Feb 14	Bandanaira: Maluku - suspended objects swung and movable objects were thrown down.	MMI V
Origin Time 1904 Jul 05	Siri-Siri: West Sumatera - a part of the pier was destroyed and sailing boats on the coast of Siri-Siri sank as a result of the high waves.	MMI VIII
Origin Time 1907 Jul 30	Lemo: Central Sulawesi - destructive at Lemo, where 164 houses and 49 rice-warehouses collapsed; shocks were frequently felt until August 2. Damage to buildings was also done at Colo, Anja, Olu Congko and Paku.	MMI VIII
Origin Time 1910 Dec 18	Rajamandala: Cianjur - cracks developed in walls at Rajamandala - Cianjur - West Java.	MMI VIII
Origin Time 1912 Jan 21	Campaka: Sukabumi - cracks developed in walls at Campaka - Sukabumi - West Java. Movable objects were thrown down.	MMI VI
Origin Time 1914 Jun 26	Kepahyang: Bengkulu - all stone houses suffered severe damage. None of the many wooden houses sustained damage. Twenty persons	

Event	Felt	I max
	were killed and 20 injured. Roads and bridges were destroyed. Damage was also done at Lais, Manna and Seluma.	MMI IX
Origin Time 1915 Dec 01	Madiun: East Java - nearly all buildings in the Sudono sugar estate were cracked. The chimney of the sugar factory toppled down. A certain amount of damage was also done at Maospati and Magetan.	MMI VIII
Origin Time 1916 Sept 09	Maos: Central Java - most destructive took place in and around Maos. About 340 brick/stone buildings collapsed completely and many others were damaged at Maos and Kasugian. Cracks developed in walls, ground-slumps were reported.	
	A few mud or sand craters were formed where jets of water spurted through holes or fissures causing people to panic. Four hundred houses collapsed in the Selarang district. Damage to structures and cracks in the ground were also found in various places. School buildings were among those most generally and severely damaged, due in considerable part to unsuitable design for resistance to shaking. The major destruction, however, was in a more thickly settled district, where unfavourable geological conditions and poor structural work increased the damage.	MMI IX
Origin Time 1917 Jan 21	Bali: Ground-slumps and ground-slides were observed at various places. Many houses suffered damage and about 1500 people were killed due to ground-slides.	MMI IX
Origin Time 1921 Apr 01	Tapanuli: North Sumatera - epicentre tract occupied a narrow belt aligned north west-south	

Event	Felt	I max
	east running for some 80 km from Pangurusan to Tarutung. The area worst hit was the region southwest of Lake Toba. Buildings and bridges collapsed at Sipoholon; furthermore ground-slides and ground-slumps were reported. The quake also felt as far as Sabang, Penang and Gunung Sitoli.	MMI IX
Origin Time 1923 May 15 Epicentre 7.7°S-109.2°E	Maos: Central Java - the shock was felt intensively over western Central Java. Destructive effects were particularly pronounced in and around Maos.	MMI IX
Origin Time 1924 Nov 12 Epicentre 7.3°S-109.8°E	Central Java: The centre was located in a mountainous region. Damage was generally caused by ground-slides.	MMI VIII-IX
Origin Time 1924 Dec 02 Epicentre 7.3°S-109.9°E	Wonosobo: Central Java - the quake seemed to be preceded by foreshocks. Destructive at Wonosobo and damage was also done to stone buildings outside Wonosobo. Approximately 2250 houses collapsed and in some villages most damage was caused by ground-slides. Altogether about 727 people were killed. The quake loss was estimated by the local authorities at about 61,000 guilders.	MMI IX
Origin Time 1926 Jun 28 Epicentre 0.7°S-100.6°E	Singkarak: West Sumatera - destructive around Lake Singkarak; Sijungjung, Muarabungo and Alahan Panjang suffered damage. The quake was followed by a train of aftershocks. These tremors were generally felt intensively over West Sumatera and in particular at Padangpanjang. A part of Lake Singkarak subsided and many people were injured.	MMI IX

Event	Felt	I max
Origin Time 1926 Dec 13	Prupuk: Central Java - destructive at Prupuk and Margasari; minor damage at Dubuktengah, Kaligayan, Wonosari, Danurejo, Jembayat, Pakulaut and Kalisosok. A few people were injured.	MMI VIII-IX
Origin Time 1930 Apr 27	Bali: Exact origin was unknown. Damage was done in south Bali by a moderate tremor. Walls were cracked at Denpasar and Tabanan, earth fissures in the ground occurred at Benoa. The shock was also felt over East Java.	MMI V
Origin Time 1931 Jan 21 Epicentre 7.3°S-108.9°E	Bumiayu: Central Java - in general, damage was confined mostly to older structures or buildings of poor materials and poor construction.	MMI VIII
Origin Time 1933 Jun 25 Epicentre 5.0°S-104.2°E	South Sumatera: The quake seemed to have been followed by a number of aftershocks. Damage to structures over the western part of south Sumatera. Gaping fissures and subsidences in the ground were observed along an imaginary line connecting Kotaagung with Makaka, crossing the Barisan mountain range (Bukit Barisan).	MMI VIII-IX
Origin Time 1934 Sept 21 Epicentre 1.0°N-99.0°E	South Tapanuli: Sumatera - generally felt violently. Pendulum clock stopped; doors and windows rattled. Cracks developed in walls, roofs of some houses ruined.	MMI VII
Origin Time 1935 Dec 28 Epicentre 0.3°S-97.9°E	Batu Island: North Sumatera - damage on Batu Island. Two mud islets, Bola and Sigata, were thrown up by the shock. At Padang cracks developed in walls. Trees and telephone poles swayed. A few buildings collapsed at Sibolga.	MMI VII-VIII
Origin Time 1936 Mar 01	East Java: Exact origin unknown. Damage was generally done in Central and East Java. The shock	

Event	Felt	I max
	was also felt over Bali and southeast Kalimantan.	MMI VII
Origin Time 1936 Sept 09 Epicentre 3.5°N-97.5°E	Tapanuli: North Sumatera - the quake caused minor damage at Medan and it was felt as far east as Malaysia. The most destructive effects of the quake were confined to the Karo region; 17 people were killed due to land-slides in the hills. Numerous cracks appeared in the ground between Kutacane and kabanjahe. A certain amount of damage at Parapat, Brastagi, and Tanjung Putri. Cracks developed in walls at langkat.	MMI VIII
Origin Time 1936 Oct 27 Epicentre 0.2°S-98.8°E	Tapanuli: North Sumatera - the quake was felt over Tapanuli, West Sumatera and also locally in East Sumatera. At various places slight damage to structures and ground-slumps were reported.	MMI VII
Origin Time 1937 Sept 27 Epicentre 8.7°S-110.8°E	Jogyakarta: Central Java - felt as far east as eastern Lombok. In general, south Central Java was badly damaged and slight cracks in walls were fround in East Java. The region of greatest destruction in Jogyakarta Province. At Klumpit one house was torn apart, one person reported killed. At Prambanan 326 brick/stone houses collapsed. At Klaten 2200 houses sustained damage; at various places underground pipelines were broken.	MMI VIII-IX
Origin Time 1938 Feb 02 5.0°S-134.5°E	Banda: Maluku - the shock was felt in the Banda and Kei islands. At Tual glassware was broken, a pendulum clock stopped. On Banda Island and also on Kei Island	

Event	Felt	I max
	great damage was caused by tsumanis.	MMI VII
Origin Time 1938 Oct 30 Epicentre 8.9°-115.8°E	Bali: As a result of the shock, cracks appeared in walls and the principal mosque was badly damaged at Sakara.	MMI VII
Origin Time 1943 Jul 23 Epicentre 8.6°S-109.9°E	Jogyakarta: Central Java - the disturbance was most intense along the south coast of Central Java, between Garut and Surakarta, a distance of about 250 km. The deaths of 213 people have been reported and about 2096 persons were seriously injured; approximately 2800 houses were damaged.	MMI VIII
Origin Time 1954 Nov 02 08h 24m 54s UTC Epicentre 8.0°S-119.0°E Magnitude: 6.75	Bima: Sumabawa - felt over South Sulawesi, Lombok and Flores. Ground-slumps and rock-slides were caused by the earthquake in northeast Sumbawa. Bima and Raba suffered most damage. Nearly all brick/stone houses were cracked and some collapsed completely. Two buildings made of reinforced concrete did not sustain any damage. The pier of Bima harbour was bent outward. A small Customs house seemed to be displaced over a distance of about 0.5 m. No lives were lost.	MMI VII-VIII
Origin Time 1958 Oct 20 01h 12m 30s UTC Epicentre 9.5°S-112.5°E Magnitude: 6.7 Depth: 100 km	Malang: East Java - seriously damaged houses in the Malang area. Earth fissures at various places and land slides in the mountainous regions. Eight persons lost their lives.	MMI VII-VIII
Origin Time 1960 Oct 10 21h 44m 40s UTC Epicentre 8.0°S-112.5°E	Tulungagung: East Java - the quake was strongly felt at Tulungagung, where people were awakened by creaking of buildings and where plaster cracked and fell. The shock was felt as far west as Baturetno in Surakarta and as far east as Tanggul in	

Event	Felt	I max
	Besuki. This earthquake was widely felt in southern East Java over an area of about 15,000 square km.	MMI VI-VII
Origin Time 1961 May 07 04h 32m 05s UTC Epicentre 8.5°S-122.0°E	Campur darat: East Java - damage to brick buildings at Campur darat and Kebonagung Tulung agung. Reports indicated that the macroseismic area extended as far west as Banyumas, Central Java and as far east as Besuki in East Java. Evidence indicated that the tremor had a maximum intensity of VII in the immediate vicinity of the centre. The shock also felt at Jatisrana - Surakarta, Klaten, Maos, Malang and Klakah. To the north the macroseismic area was limited by the mountain range Kendeng; however some places like Demak and Watubelah to the north of the mountain range felt this tremor as Intensity II. The great macroseismic extent suggested that the quake was deep-seated. In the vicinity of the centre slight damage was caused to old structures made of bricks bonded with lime mortar.	MMI VI-VII
Origin Time 1962 Dec 21 00h 44m 19.7s UTC Epicentre 9.0°S-112.2°E Magnitude: Depth: 64 km	Wlingi: East Java - cracks in walls in southern East Java. The shock was felt as far east as the Island of Bali. A moderate tremor was felt in Wlingi and neighbouring places in Kediri and also felt in most places in the Madiun area. A large number of people in buildings in madiun and Kediri felt the quake and its intensity was high enough to cause some panic in public places, such as schools and markets. Macroseismic and instrumental data indicated that the tremor was of tectonic nature and deep-focused.	MMI VI

Event	Felt	I max
Origin Time 1963 Jun 27 11h 46m 58s UTC Epicentre 08.3°S-112.2°E Magnitude: Depth: 180 km	Ponorogo: East Java - the earthquake caused slight damage in Ponorogo. The shock was felt in central and eastern Java. The westernmost place was Jogyakarta and to the cast, Besuki, which detected the tremor; both places reported Intensity II.	MMI IV-V
Origin Time 1963 Dec 16 02h 45m 35s UTC Epicentre 06.2°S-105.4°E Magnitude: 5.0 Depth: 55 km	Labuan: West Java - the earthquake caused slight damage in Labuan where cracks developed in walls. A large number of people felt the quake and its intensity was high enough to cause some panic among the people in Jakarta; however no damage was reported by this shock. The seismograph of the Meteorological Service was out of order. The shock was felt as far east as Tasikmalaya as Intensity II and as far west as Kotabumi in South Sumatera as Intensity II. The shock was also felt in most places in Priangan as Intensity II-III.	MMI V
Origin Time 1965 Jan 25 12h 02m 51.4s UTC 2.6°S-126.1°E Magnitude: 6.3 Depth: 33 km	North Maluku: A rumbling sound was heard at Sanana Coastal villages destroyed and 5 persons reported killed, due to a tsunami.	MMI VII
Origin Time 1967 Feb 19 22h 14m 55s UTC Epicentre 8.5°S-113.5°E Magnitude: 6.2 Depth: 80 km	Malang: East Java - the place worst hit was Dampit, a district situated just to the south of Malang; according to questionnaire reports, 1539 buildings were wrecked, 14 people were killed, 72 people were injured. Next to Dampit was Gondang where, according to a report, 9 people were killed, 49 people were injured, 119 buildings collapsed completely	

Event	Felt	I max
	and another 402 buildings were cracked. 5 mosques were ruined. Attention should also be drawn to Trenggalek where 33 wooden houses were reported cracked and some houses have been moved slightly. In Besuki, the easternmost district of East Java, the intensity was of the order of III to VI MMI; in Tanggul buildings sustained slight damage only. The shock was felt to the west as far as Banyumas (Cilacap); to the north a chain of hills in western East Java form a sort of barrier to the propagation of seismic waves. No report was received about a tsunami.	MMI VIII-IX
Origin Time 1967 Apr 11 05h 09m 11s UTC Epicentre 03.7°S-119.3°E Magnitude: 4.9 Depth: 51 km	Tinambung: South Sulawesi - the tremor was felt over a wide area. The area worst hit covered the coastal lowlands extending from Campalagian to Tinambung. A high tsunami was generated during the main shock causing serious loss of life and property in coastal villages; 58 people were reported killed by the collapse of brick buildings, about 100 people were injured, 13 people were drowned in the sea or missing. Fissures were local in nature and might have been due to the loose formation of the soil in that area.	MMI VII-VIII
Origin Time 1968 Aug 14 22h 14m 15s UTC Epicentre 0.7°N-119.8°E Magnitude: 6.0 Depth: 23 km	Tambu: Central Sulawesi - generally along the west coast of the northern part of central Sulawesi an increase of high waves was noticed shortly after the main shock, in particular in Tambu Bay; the wave height in Tambu was about 8 to 10 metres and might have reached some coconut-tree tops; the waves swept further inland, to about	

Event	Felt	I max
	100-300 metres from the coast. Most of the beach of the inner part of Tambu Bay is under sea water; slumps, with surface trace of faulting and hot springs in several places were observed. Loss of life and considerable damage were chiefly caused by the tsunami along the coast of Mapaga (200 people killed and missing, 790 wooden houses wrecked). In Tambu 7 wooden houses on pillars have been moved in a northwesterly direction. In Sabang a roaring sound was reported. Small island of Tuguan is uninhabited and is still intact. The main shock seemed to be followed by aftershocks and one of those was shallow (11 km). A report from Central Sulawesi about a sound that was also heard in Tambu on October 19, 1968 would strengthen the report of the presence of the shallow earthquake which was detected at 0.1°N-119.8°E in Mapaga Bay.	MMI VII-VIII
Origin Time 1969 Feb 23 00h 36m 55.6s UTC Epicentre 03.1°S-118.5°E Magnitude: 6.1 Depth: 13 km	Majene: South Sulawesi - this quake killed 64 people, 97 others were injured and about 1287 man-made structures were wrecked including mosques which completely collapsed due to poor construction. The place worst hit was Majene. Eighty percent of the brick buildings sustained serious damage; some of them completely collapsed. The pier of the harbour was cracked in several places possibly due to a subsidence of	

Event	Felt	I max
	the submarine surface just outside the harbour; gaping cracks, about 50 m long, caused three brick buildings serious damage; the centre market completely collapsed resulting in several deaths and severe property damage. Campalagian and Wonomulyo, located on alluvium and respectively about 30 km and 50 km east of Majene, also sustained structural damage. General wooden houses were able to resist the shaking and much of the damage there was caused by the collapse of unreinforced concrete walls. A tsunami generated by the quake struck the coastal villages north of Majene. The wave height reached about 4 m at Paletoang and 1.5 m at Parasanga and Pilili. The construction in the villages was principally wood frame and, due to their location at the end of a bay, the wooden houses were swept away the tsunami. In these coastal places banana trees were almost totally destroyed. Damage to the mosque was probably due to the fact that the old structures were made of brick without reinforcing iron rods. Several bridges were damaged in this narrow lowland plain. Between Somba and Parasanga great blocks of Neogene marls and tuffs tumbled down and in some places the road was buries by these blocks. Also from the edge of the raised coral reefs greater and smaller parts were loosened and tumbled down onto the beach.	

Event	Felt	I max
	Fissures were also observed at several places. People interviewed said a roaring sound was heard coming from the sea. The shock was felt as far south as Ujungpandang.	MMI VIII
Origin Time 1969 Nov 02 18h 53m 6.6s UTC 6.5°S-107.1°E Magnitude: 5.4 Depth: 57 km	Sukabumi: West Java - a relatively strong earthquake was felt in southern West Java. In the Bogor area suspended objects swung as a result of the shocks; in Campaka, where the intensity was highest, the only known structural damage was cracks produced in the walls of some badly constructed buildings. The shock was also slightly felt in Jakarta. In the south Bogor area an aftershock seemed to be felt one hour later. In Sukabumi a poorly-constructed brick building was reported collapsed as a result of this earthquake.	MMI V
Origin Time 1971 Feb 04 15h 33m 22s GMT Epicentre 0.6°N-98.8°E Magnitude: 6.3 Depth: normal	Sibolga: North Sumatera - damage to brick buildings developed in Pasaman, Natal, Pinangsore, Sibolga and Pasir Ulu estate. Fissures were observed in Sibolga and hot springs developed in Tarutung. The shock was generally felt in various places in the eastern part of north Sumatera and as far east as Singapore. No loss of life was reported from this earthquake.	MMI V-VI
Origin Time 1972 Sept 06 08h 00m 25.3s UTC Epicentre 2.5°S-119.1°E Magnitude: 5.8 Depth: 36 km	Mamuju: South Sulawesi - the quake rocked the Mamuju area in the northwestern part of south Sulawesi. Only slight damage to brick buildings resulted from the tremor. The quake was preceded by a roaring sound similar to that of a bomb. The shock was felt as far south as Majene.	MMI IV

Event	Felt	I max
Origin Time 1972 Nov 04 21h 36m 54.0s Epicentre 8.4°S-112.2°E Magnitude: 6.0 Depth: 126 km	East Java: Southern Blitar - Trenggalek area experienced an earthquake at 04h 36m L.T. in the morning. Gandusari reported a fairly strong shock as Intensity V-VI MMI. The tremor caused cracks in the walls of brick buildings and a great number of people were awakened from sleep. The shock was felt as far as the Jogyakarta - Surakarta border and this far-extended felt area strengthened the view that the shock was deeper than normal.	MMI V-VI
Origin Time 1972 Dec 19 14h 47m 00.0s UTC Epicentre 06.9°S-107.8°E Magnitude: 4.5 Depth: very shallow	Sumedang: West Java - at 21h 47m L.T. on December 19th, 1972 the Sumedang area experienced a tremor of moderate strength which was slightly shallower than normal, as indicated by the small area affected. The quake caused slight damage to old brick buildings and panic among the people. In Cibunar, Rancakaleng and Pasaribu villages the intensity was IV MMI. In Sindang village the same quake was felt as V MMI; ground-slides and ground fissures were observed.	MMI V
Origin Time 1974 Nov 09 19h 10m 55.2s UTC Epicentre 6.5°S-105.3°E Magnitude: 6.1 Depth: 51 km	Banten: West Java - this quake caused people to awaken. In Leuwiliang, southern Banten, one stone building collapsed and cracks developed in the walls of some houses. The shock was felt as far as Lampung and Pringsewu in South Sumatera and also in Jakarta by some people.	MMI VI
Origin Time 1975 Jan 15 09h 42m 24s UTC Epicentre	Banda Island: Maluku - heavy damage at Bandanaira, 81 houses seriously damaged, 4 houses moderately damaged and 2 houses	

Event	Felt	I max
5.0°S-130.0°E Magnitude: 5.9 Depth: normal	slightly damaged. The earthquake was followed by a tsunami.	MMI VII
Origin Time 1975 Mar 05 00h 22m 23s UTC Epicentre 02.4°S-126.1°E Magnitude: 6.5 Depth: normal	The shock felt by many people in Sanana - Sulu Island at 01.30 UTC for 8 seconds and at 02.24 UTC for 1.5 seconds. Cracks in walls and plaster falling. The earthquake was followed by a tsunami. The height of sea water was about 1.20 m; it reached the road in Sanana, and caused people to panic. No persons killed.	MMI VI
Origin Time 1975 Jul 30 09h 17m 11.6s UTC Epicentre 9.9°S-123.9°E Magnitude: 6.1 Depth: 30-50 km	Kupang: Timor Island - the walls of many houses fell, cracks in walls, plaster fell. No damage to buildings or houses of good construction. The earthquake was followed by a sound like thunder from the ground.	MMI VII
Origin Time 1976 Feb 14 20h 31m 49s UTC Epicentre 7.2°S-109.3°E Magnitude: 6.1 Depth: 30-50 km	Purwokerto: Almost everyone was awakened from sleep due to the earthquake and the sounds from the buildings/houses. The shock was also felt at Ajibarang Kedungbanteng, Tegal, Brebes, Pekalongan, Magelang and Semarang. No damage reported.	MMI IV
Origin Time 1976 Jun 25 19h 18m 55.5s UTC Epicentre 4.6°S-139.8°E Magnitude: 7.0 Depth: 33 km	Bime, Eipomek, Nalca and Okbad in Irian Jaya: Severe damage occurred in Langda, Ambon, Japil, Oksibil. Due to the lack of transport and communications no complete report available.	MMI VIII
Origin Time 1976 Jul 14 07h 13m 22s UTC Epicentre 8.2°S-114.9°E Magnitude: 6.2 Depth: normal	Seririt and Busungbiru: 90% brick buildings and houses collapsed. In Tabanan and Jembrana more than 75% buildings and houses severely damaged. 559 people killed, 850 people seriously injured and more than 3200 injured.	MMI VIII
Origin Time 1976 Oct 29 02h 51m 01s UTC	Nalca: Bime - 62 people killed. Langda: 46 people killed.	

Event	Felt	I max
Epicentre 4.7°S-140.2°E Magnitude: 6.0 Depth: 30-50 km	The wooden houses of native people which were built on the slope, collapsed and were buried by a landslide, but the wooden houses which were built on the flat ground suffered no damage.	MMI VIII
Origin Time 1977 Jan 26 13h 11m 29.5s UTC Epicentre 8.25°S-115.3°E Magnitude: 5.0 Depth: normal	Bangli: Bali - this relatively strong quake was felt in Bangli and surroundings. In Kayubihi village cracks were produced in the walls of one semi-permanent school buildings; a monument and temple collapsed. About 90% of houses damaged. In Banjar Antugan Jehem village more than 80% of buildings and houses cracked. Ground-slides and cracks in the ground were observed in the Melangit River, about 500 m eastward of Kayubihi and Antugan. No killed or injured reported.	MMI VI
Origin Time 1977 Mar 08 23h 17m 29s UTC Epicentre 0.4°N-99.7°E Magnitude: 6.0 Depth: normal	Pasaman: West Sumatera - in Sinurut the quake caused serious damage to 737 houses, one market, 7 school buildings, 8 mosques also damaged. Almost all wooden houses in that area were slanted and shifted from their foundations. Cracks in the ground 5-75 cm wide were observed. The quake was felt at Padang and Padangpanjang with intensity of III MMI. No killed or injured reported.	MMI VIII
Origin Time 1979 Apr 28 03h 29m 55.5s UTC Epicentre 0.7°-99.5°E Magnitude: 5.7 Depth: normal	Marapi: West Sumatera - the quake caused cracks in some houses in Pinangsore - Sibolga. The shock also felt in Padang, Padangpanjang, Bukittinggi, Batusangkar and caused people to panic. Two days after, at midnight on April 30, the Marapi disaster occurred, because materials such as stones and soil crashed down from the top and	

Event	Felt	I max
	slopes of the mountain. The materials from Marapi washed away everything and resulted in 64 people killed, 9 people missing, 193 houses collapsed, 42 bridges damaged, 138 dam and irrigation schemes destroyed, 34 cattle killed. The disaster might have been caused not only by the quake but also by the heavy rain in Marapi and the surrounding district.	MMI V
Origin Time 1979 May 30 09h 38m 53s UTC Epicentre 8.21°S-115.95°E Magnitude: 6.1 Depth: 25 km	Lombok: Nusatenggara - in Tanjung many houses and buildings collapsed, especially the poorly designed structures and old houses/buildings. Some people killed and injured. Other affected areas were Buyan, Gangga, Kediri, Cakranegara Narmada, where many buildings and houses were also seriously damaged and some even collapsed. Two mosques in Narmada and Cakranegara suffered moderate damage, cracks developed in their walls. The tower of the mosque in Kediri cracked. In Ampenan and Mataram the quake caused only slight damage to houses/buildings. In fact the damage to houses/buildings was due to old or poor construction.	MMI VIII-IX
Origin Time 1979 Oct 20 01h 41m 09s UTC Epicentre 8.25°S-116.0°E Magnitude: 5.8 Depth: normal	Karangasem: Bali - the quake caused moderate damage to buildings and houses in Karangasem, Ampenen, and Mataram on Lombok Island, eastward of Bali.	MMI VI
Origin Time 1979 Nov 02 15h 53m 2.6s UTC Epicentre 8.6°S-107.8°E	Tasikmalaya: West Java - in Tasikmalaya and surroundings the quake caused 163 houses and buildings to collapse; 1430 houses were seriously damaged;	

Event	Felt	I max
Magnitude: 6.4 Depth: 64 km	one meeting hall and 24 school buildings were damaged, 3 mosques collapsed and 29 were seriously damaged; 159 news-stand were severely damaged. In Garut most old and poorly constructed stone houses collapsed; many permanent houses had cracks in walls. 10 people killed, 12 seriously injured. Cracks in the ground in an east-west direction were observed. The quake was accompanied by a roaring sound from under the ground. Abnormal sea tides were observed 2 days before the quake occurred in Pameungpeuk.	MMI VII
Origin Time 1979 Dec 17 19h 58m 26s UTC Epicentre 8.4°S-115.8°E Magnitude: 5.0 Depth: 28 km	Karangasem: Bali - in Karangasem this earthquake killed 5 persons, seriously injured 34 and slightly injured 250. Some houses collapsed, some were seriously damaged, many slightly damaged. In Abang, 17 people killed, 9 seriously injured, 300 slightly injured. Some houses collapsed, others seriously or slightly damaged. In Culik many houses collapsed. In Kubu, one person killed, 2 persons seriously injured and 18 slightly injured. Most buildings seriously or slightly damaged, but no building collapsed. In Bebandem, one person killed, 2 seriously injured and 4 slightly injured. Buildings and houses seriously or slightly damaged. Cracks in the road and land were observed along 0.5 km.	MMI VI-VIII
Origin Time 1980 Apr 16 1.h 18m 19s UTC Epicentre	Tasikmalaya: West Java - in Singaparna many houses had cracks in walls but in Tasikmalaya itself only some houses were	

Event	Felt	I max
8.25°S-108.8°E Magnitude: 6.4 Depth: normal	cracked. In Garut and surroundings the poorly constructed houses had cracks in walls, also in the district of Sukawening, Pasanggrahan, Jamberea, Caringin etc. many cracks developed in walls. In the Singajaya district 10 elementary school buildings slanted. The quake also caused cracks in houses in Cilacap, Central Java. The shocks were felt in Bandung at Intensity III.	MMI V-VI
Origin Time 1981 Jan 01 02h 09m 52s UTC Epicentre 7.7°S-111.0°E Magnitude: 6.0 Depth: shallow	Karanganyar: Central Java - the quake shook Karanganyar and surroundings and caused slight damage to some houses.	MMI VI
Origin Time 1981 Mar 13 23h 22m 35s UTC Epicentre 8.95°S-110.4°E Magnitude: 6.0 Depth: normal	Jogyakarta: Central Java - the shock was felt in Jogyakarta and caused small cracks in the walls of the Ambarukmo Hotel. No other buildings or houses damaged.	MMI VII
Origin Time 1982 Feb 10 09h 17m 50.2s UTC Epicentre 7.0°S-106.9°E Magnitude: 5.3 Depth: 25 km	Sukabumi: West Java - the quake was felt in some places in the Sukabumi and Bogor areas. The shock caused serious or slight damage to many houses and buildings and 4 people were injured. No loss of life.	MMI VII
Origin Time 1983 Oct 16 05h 32m 24.8s UTC Epicentre 1.48°N-121.01°E Magnitude: 5.9 Depth: 46 km	Toli-Toli: Central Sulawesi - according to the news in the Kompas newspaper, on October 21, 1983 the quake caused 20 houses in Toli-Toli to collapse and 15 aboringine's houses were seriously damaged.	MMI VI

Event	Felt	I max
Origin Time 1983 Oct 25 00h 36m 19.4s UTC Epicentre 1.6°N-120.8°E Magnitude: 6.0 Depth: 50 km	Central Sulawesi: The quake was strong enough to cause 2 people killed, 4 injured and 24 houses to be seriously damaged, of which 20 collapsed. The shock was also felt in Palu, the capital of Central Sulawesi Province.	MMI VII
Origin Time 1984 Jan 08 15h 24m 14.4s UTC Epicentre 2.94°S-118.73°E Magnitude: 5.9 Depth: 95 km	Mamuju: Central Sulawesi - this quake killed 2 persons, seriously injured 5, slightly injured 84. In the affected area 15 government office buildings, 23 government houses, 31 school buildings, one clinic, one news-stand seriously damaged and about 16 government office buildings, 12 government houses, 14 school buildings and two clinics slightly damaged. Besides this above-mentioned damage, 213 local people's houses, 4 shops, 18 mosques and one church were seriously damaged and 321 people's houses, 4 shops, 13 mosques and 1 church were slightly damaged. Ground-slumps were observed in Tapalang. The shock was also accompanied by a tsunami.	MMI VII
Origin Time 1984 Aug 27 06h 41m 25.5s UTC Epicentre 1.5°N-98.94°E Magnitude: 4.8 Depth: 53 km	Pahae Jae - Tapanuli: North Sumatera - in Sarula, three elementary school buildings and one junior high school building collapsed, one senior high school building was seriously damaged and the school caretaker's house shifted 30 cm from its foundations. Cracks developed in the walls of the local authority office, post office building, clinic. In Perdamaian and Selangkitang villages two Elementary School buildings partly collapsed.	

Event	Felt	I max
	Ground-slides were observed. On the road between Tarutung and Padangsidempuan cracks in the ground developed and sulphurous gas was emitted. In Pinangsori-Sibolga small cracks developed in the walls of houses. The quake was felt as far as Gunung Siloli on Nias Island, Rantau Prapat and Balige (Toba Lake). According to the news, the shock was also felt along the west coast of Malaysia.	MMI VIII

Source Zone 4

This zone comprises the middle of Sumatera from N to S, the northern portion of Java, including the southern part of the Java Sea area, the Flores Sea as far east as the south of Sulawesi, a small portion of the Banda Sea, South Sulawesi, the Makassar Strait, the eastern coastal region of Kalimantan and the northern part of the Sulawesi Sea.

Zone 4 is also to be found in southern West Irian forming a narrow belt that is bounded to the north by foldings (Jayawijaya Mountain).

The expected maximum acceleration in Zone 4 does not exceed 0.25 g or, as intensity, VIII MMI. In general Zone 4 is located outside an area of earth deformation during the last 20,000 years except for S. Sulawesi and the northern part of the Makasar Strait.

The frequency in Zone 4 is similar to that in Zone 3 except in Lampong and north Bantam which have a frequency as high as 1.5 events per square degree for the period 1976-1983. The frequency in the area north of East Java and Nusa Tenggara Barat reaches 2.9 events per square degree.

Destructive Earthquakes in Zone 4 during 1821-1984

Event	Felt	I max
Origin Time 1821 Dec 25	Jepara: Central Java - the earthquake was felt at Jepara and reported as VI-VII on the MMI scale.	MMI VII
Origin Time 1833 Jan 28 05h 00m 00s	Batavia/Jakarta: Shocks caused damage to buildings and cracked walls.No deaths or injuries were reported.	MMI VII-VIII
Origin Time 1836 Mar 22	Mojokerto: East Java - at Mojokerto, about 60 km west of Surabaya, a shock occurred and caused damage and loss of property.	MMI VI1-VIII
Origin Time 1853 Nov 30	Cirebon: West Java - a moderate earthquake was felt and caused cracks in walls. No further information.	MMI VII-VIII
Origin Time 1856 Jan 19	Semarang: Central Java - an earthquake was felt at Semarang and caused cracks in walls.	MMI VII-VIII
Origin Time 1862 May 24	Karawang: West Java - a rather severe shock was felt at Karawang, West Java, where walls of some houses were fissured.	MMI VI
Origin Time 1865 Jul 17	Banyubiru: Central Java - some buildings and houses suffered considered damage caused by an earthquake.	MMI VII
Origin Time 1866 Apr 22	Ambarawa: Central Java - because of an earthquake, walls of some houses and barracks were fissured.	MMI VI
Origin Time 1872 Oct 10	Salatiga: Central Java - a rather strong shock felt at Salatiga caused fissures in walls.	MMI VI
Origin Time 1873 Aug 19	Mandailing: North Sumatera - many houses were damaged, due to the earthquake.	MMI VI

Event	Felt	I max
Origin Time 1875 Oct 25	Kuningan: West Java - the quake was felt at Kuningan, Sumedang and Manonjaya. 628 houses damaged and seven people killed.	MMI VII-VIII
Origin Time 1890 Dec 12	Pati: Central Java - this quake also felt at Juwana; caused many houses to fall. Several people killed and injured.	MMI VIII
Origin Time 1892 May 17	Prapat: North Sumatera - the shock caused severe damage to three buildings.	MMI VI
Origin Time 1921 May 14	Sangkulirang: East Kalimantan - damage at Sangkulirang and more intense on the islands of Rending, Kariorang and Sekuran. Houses collapsed and gaping fissures were observed. The shock was associated with a tsunami which swept the sea, causing considerable damage at Sekuran.	MMI VIII
Origin Time 1923 Apr 19	Tarakan: East Kalimantan - the earthquake was recorded by sensitive seismographs all over the world. The shock was strongly felt at Tarakan about 140 km north of the centre and was followed by a number of aftershocks. Brick buildings collapsed, cracks developed in the ground, and streams were affected. The kitchen of a house seemed to be displaced over a distance of about 1 m toward the west. Structures on solid ground suffered little damage.	MMI VIII
Origin Time 1924 Apr 13 Epicentre 0.3°N-118.2°E	East Kalimantan: the tremor was generally felt at several places in East Kalimantan and as far north as the island of Tarakan, it was followed by aftershocks. As a result of the main shock, seven houses collapsed.	MMI VII
Origin Time 1925 Feb 14	Tarakan: East Kalimantan - the exact origin was unknown, but the shock was strongly felt at	

Event	Felt	I max
	Tarakan and Lungkas and it was preceded by a rumbling sound.	MMI VII
Origin Time 1927 Dec 01 Epicentre 0.5°S-119.5°E	Donggala: Central Sulawesi - a major earthquake caused damage to buildings at Donggala, Borowaru and neighbouring places. Earth fissures and subsidences in the ground were reported. The damage was mainly confined the Palu Bay area. A tsunami was observed that caused serious loss of life and property in coastal villages. About 50 people sustained injuried and 50 died.	MMI VII
Origin Time 1936 Oct 19 Epicentre 2.0°S-126.0°E	Sanana: Molluca - aftershocks were also felt on Sula Island. Movable objects were overthrown and a rumbling sound was heard.	
	At Sanana, 24 houses collapsed, great fissures appeared in the ground close to the market.	
	At Wai Ipa, 14 houses were damaged and at Wai Iau 2 buildings sustained considerable damage.	MMI VIII
Origin Time 1939 Jun 27 Epicentre 6.9°S-108.5°E	Central Java: Fall of plaster and small cracks in walls in the Cirebou Residency. More damage was done at Sodomantra, Japara and Manis Kidul.	MMI VII
Origin Time 1939 Aug 11 Epicentre 6.5°S-112.4°E	East Java: Kembang and Surabaya were rocked; suspended objects swung. A brick building collapsed at Brondong.	MMI VII
Origin Time 1950 Jun 19 12h 36m 54s UTC Epicentre 6.2°S-112.5°E	East Java: Destructive in and around Gresik. Felt slightly in South Kalimantan and as far west as West Java.	MMI VII
Origin Time 1965 Jul 25 03h 40m 40.4s GMT Epicentre	Tapanuli: North Sumatera - at Sarula and Onang Hasang in Tapanuli the intensity reached VII MMI; damage to brick	

Event	Felt	I max
2.0°N-99.3°E Magnitude: 5.3 Depth: 98 km	buildings and ground-slumps were observed.	MMI VII
Origin Time 1971 Jun 16 14h 44m 22.5s Epicentre 7.2°S-109.1°E Magnitude: 5.2 Depth: 35 km	Bantar Kawung: Central Java - the shock was generally felt in western Central Java. The place worst hit was Buaran, about 6 km west of Bumiayu; further, in Bantar Kawung and Jipang, respectively some 12 and 17 km west of Bumiayu, most brick buildings suffered considerable damage.	
	In the affected area 1377 buildings sustained damage; wooden houses generally resisted shaking but some poorly constructed buildings slanted toward east or west and some collapsed completely. Despite this only one person was reported killed and 6 injured. The damage might have been due to old structures made of brick which are not well cemented and are without reinforcing iron rods. The unconsolidated river deposits may largely be responsible.	MMI VII-VIII

Scurce Zone 5

This zone comprises the eastern coastal region of Sumatera including the sea area east of it, a part of the Java Sea extending from west to east and central Kalimantan extending from south to north.

Zone 5 is also to be found in a sea area east of S.E. Sulawesi and in S.W. Irian, extending from east to west just to the north of Merauke.

The expected maximum acceleration in Zone 5 does not exceed 0.20 g or, as intensity, VII MMI. The expected maximum magnitude in Zone 5 has occurred in Sumatera, namely magnitude 8.5, in the Java Sea magnitude 8.0, while in central Kalimantan, S. Sulawesi and S.E. Sulawesi it is magnitude 7.5; further, in the sea area east of S.E. Sulawesi it is magnitude 5.5 and in West Irian 8.5.

Zone 5 is situated outside an area of earth deformation during the last 20,000 years and in this area earthquakes have occurred sparsely.

Source Zone 6

This zone is more or less stable, although this area has always experienced small events sparsely. Zone 6 comprises the sea area east of Sumatera (S. China Sea) or the Sunda shelf, west Kalimantan and the Sahul shelf (Arafuru Sea) including the southernmost portion of West Irian. This zone is located outside an area of earth deformation during the last 20,000 years and has never experienced shallow earthquakes of magnitude greater than 6.0 during 1897-1984.

This means that this area has never suffered significant damage caused by earthquakes.

The expected maximum acceleration in Zone 6 does not exceed 0.13 g or, as intensity, VI MMI.

Conclusions

This report deals with the study of earthquake source zones in Indonesia bounded by latitudes 10°N to 15°S and longitudes 90°E to 145°E.

This region is divided into 6 seismic source zones ranging from zone 1, which is the most seismically active up to zone 6 which can be described as a stable one. The above-mentioned zones include also a part of Malaysia and Brunei Darusalam, plus a portion of the Philippines and Papua New Guinea.

The boundaries of the above-mentioned zones are nearly similar to those of the seismic zones for building contruction. However, due to the results revealed by recent seismic and tectonic data, some modification is necessary.

Modification has been taking place in the interdeep area south of Java, in the sea area west of Sumba, in the sea area south of Ceram, in the northern part of south Sulawesi and in the northernmost of Sulawesi.

Two figures have therefore been made available for the areas mentioned above and one figure only for the remaining part.

Correlation of the damaging earthquakes for the period 1821-1984, shows that no disasters (damage by earthquakes) have occurred in zone 5 or zone 6 but only in zones 1 to 4.

REFERENCES

B. Gutenberg and C.F. Richter, Seismicity of the Earth.

Becca Carter Hollings & Ferner Ltd., Seismic Zones for Building Construction in Indonesia.

J.A. Katilli and R. Soetardijo, 1970, Neotectonics and Seismic Zones of Indonesia

Meteorological and Geophysical Agency, Felt Earthquakes in the Indonesian Region during 1921-1959.

R. Soetadi, Seismic Zones in Indonesia.

R. Soetadi and R. Soetardijo, Field Observations on the Effects of the Tinambung Earthquake of April 11, 1967.

R. Soetadi and Soekarman, Preliminary notes on the Atjeh Earthquake of April 2, 1964.

Sukarman, Destructive Earthquakes in Indonesia.

Sulaeman Ismail, Energy Release and Frequency of Earthquakes in Indonesia during 1900-1978.

Sulaeman Ismail, Maximum Acceleration and Frequency of Earthquakes in Indonesia.

Warren Hamilton, Tectonics of the Indonesian Region.

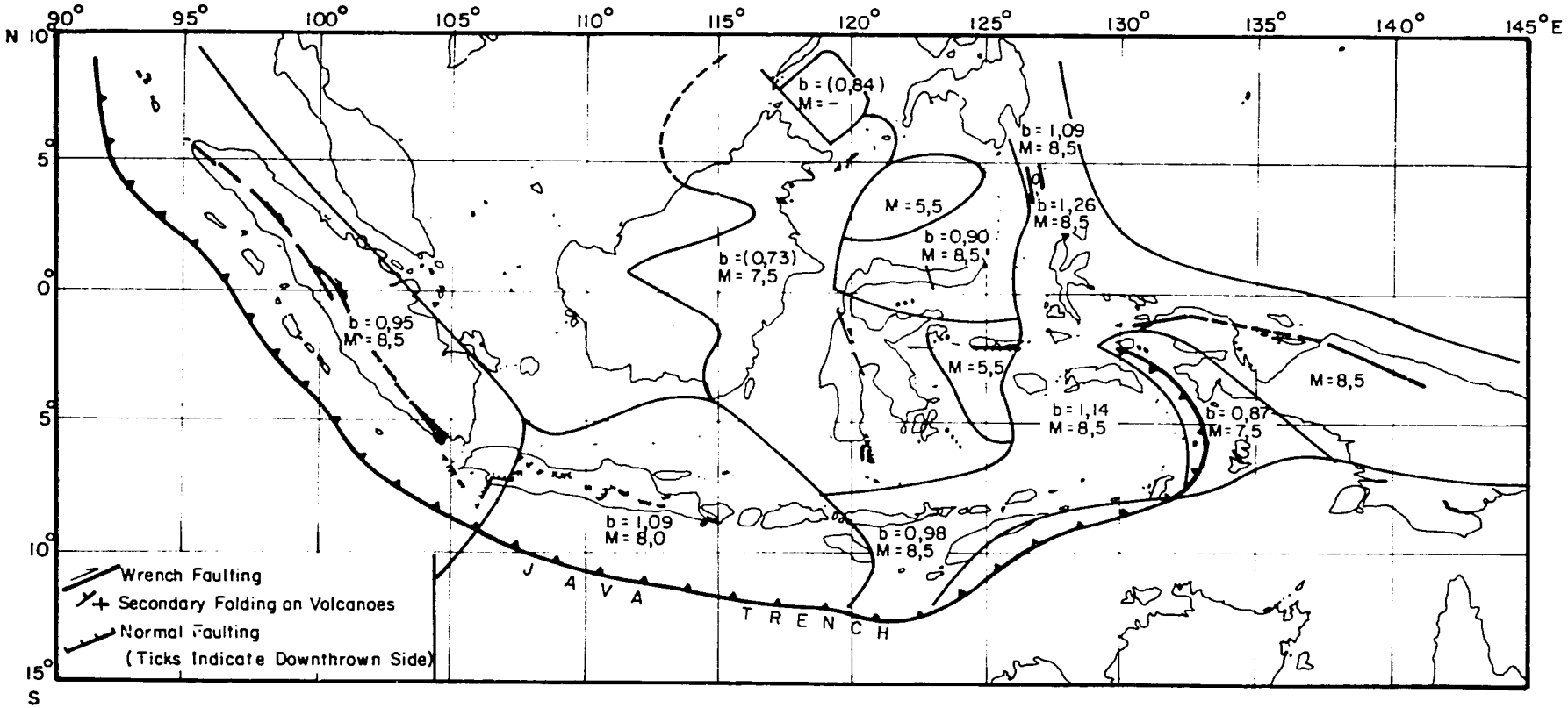


Fig. I Principal Seismotectonic Units of Indonesia Illustrating the Magnitude of Typical Maximum Earthquakes and b-Values

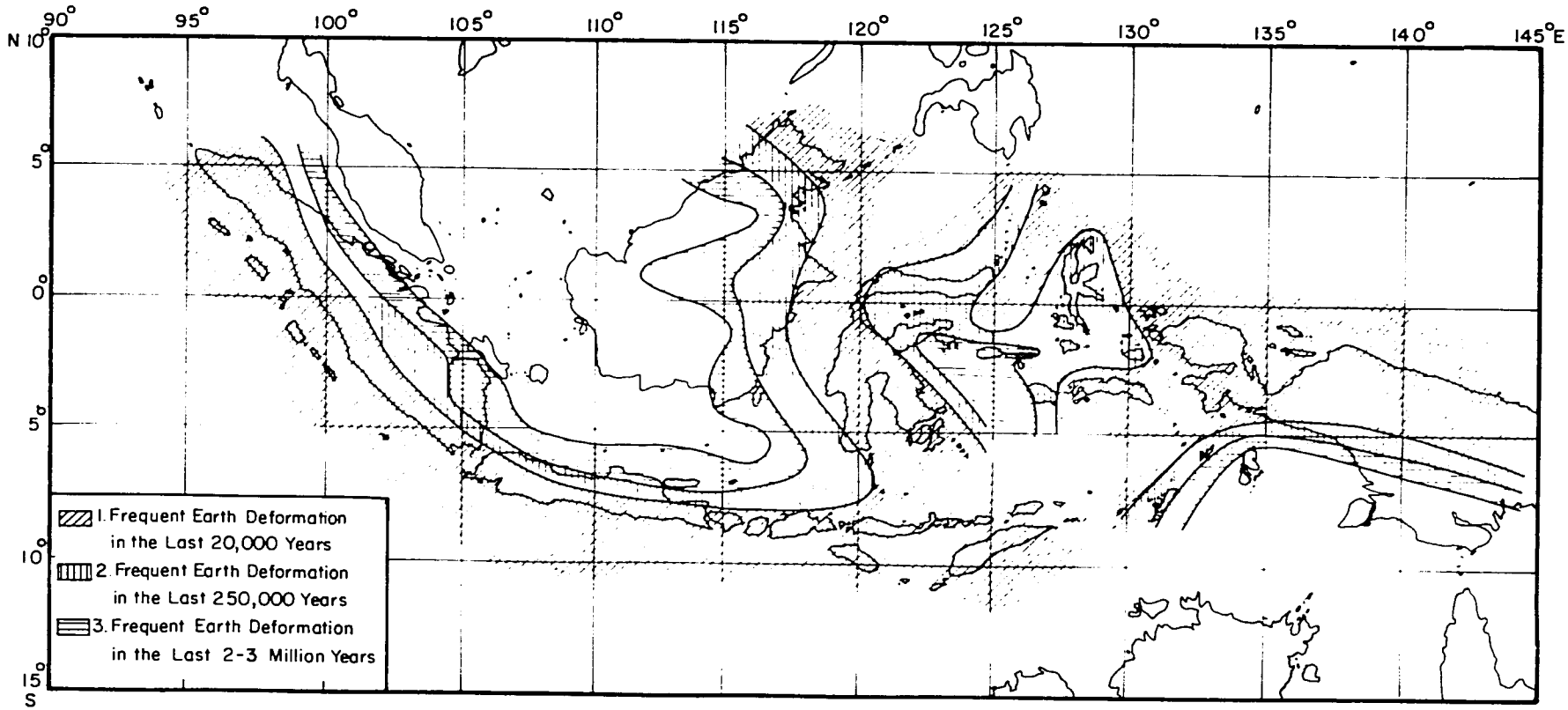


Fig. 2 Quaternary Tectonic Zones in Indonesia

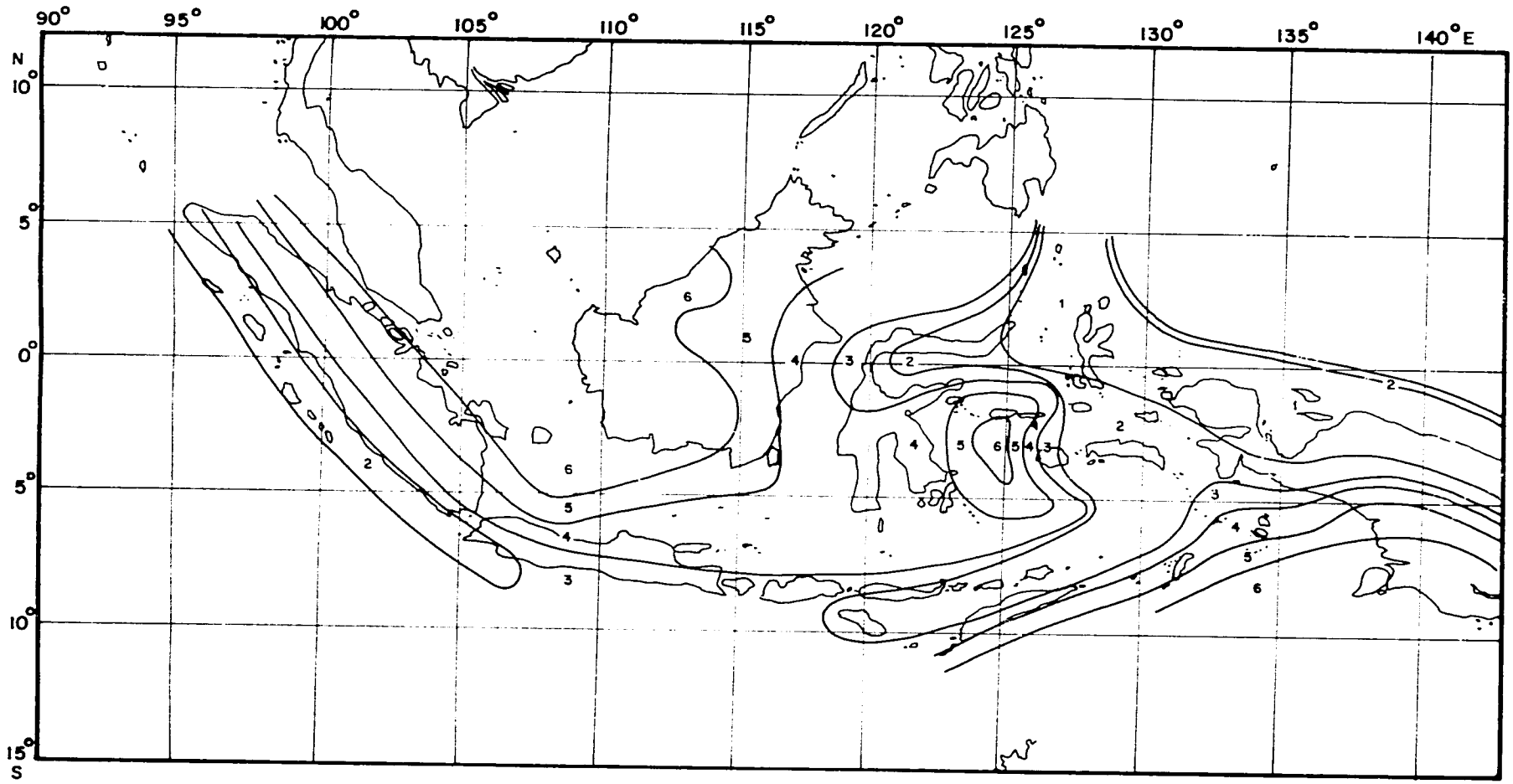


Fig. 3 Seismic Zones for Building Construction

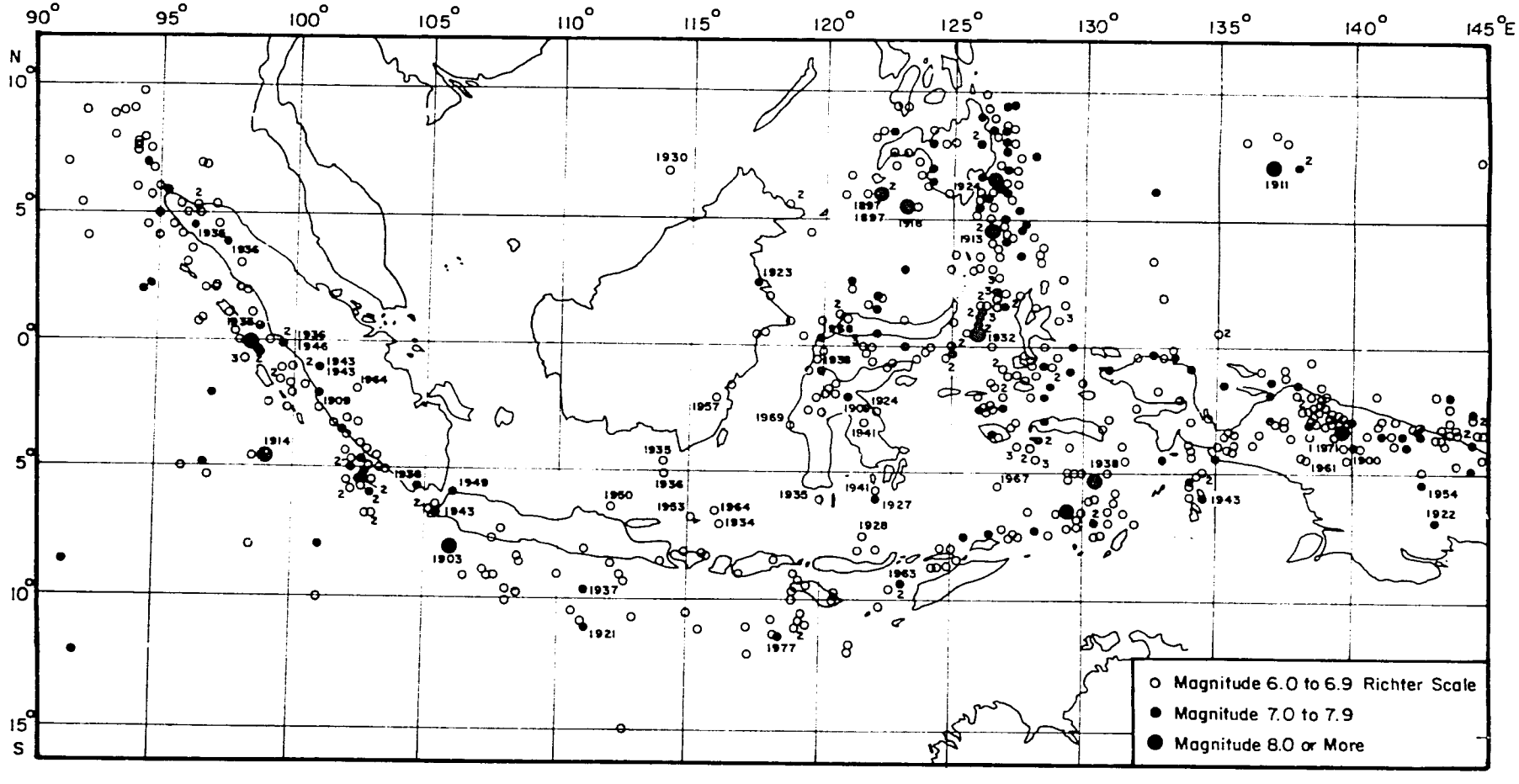


Fig. 4 Major Shallow Earthquakes in Indonesia 1897-1984 (h = 0-65 km)

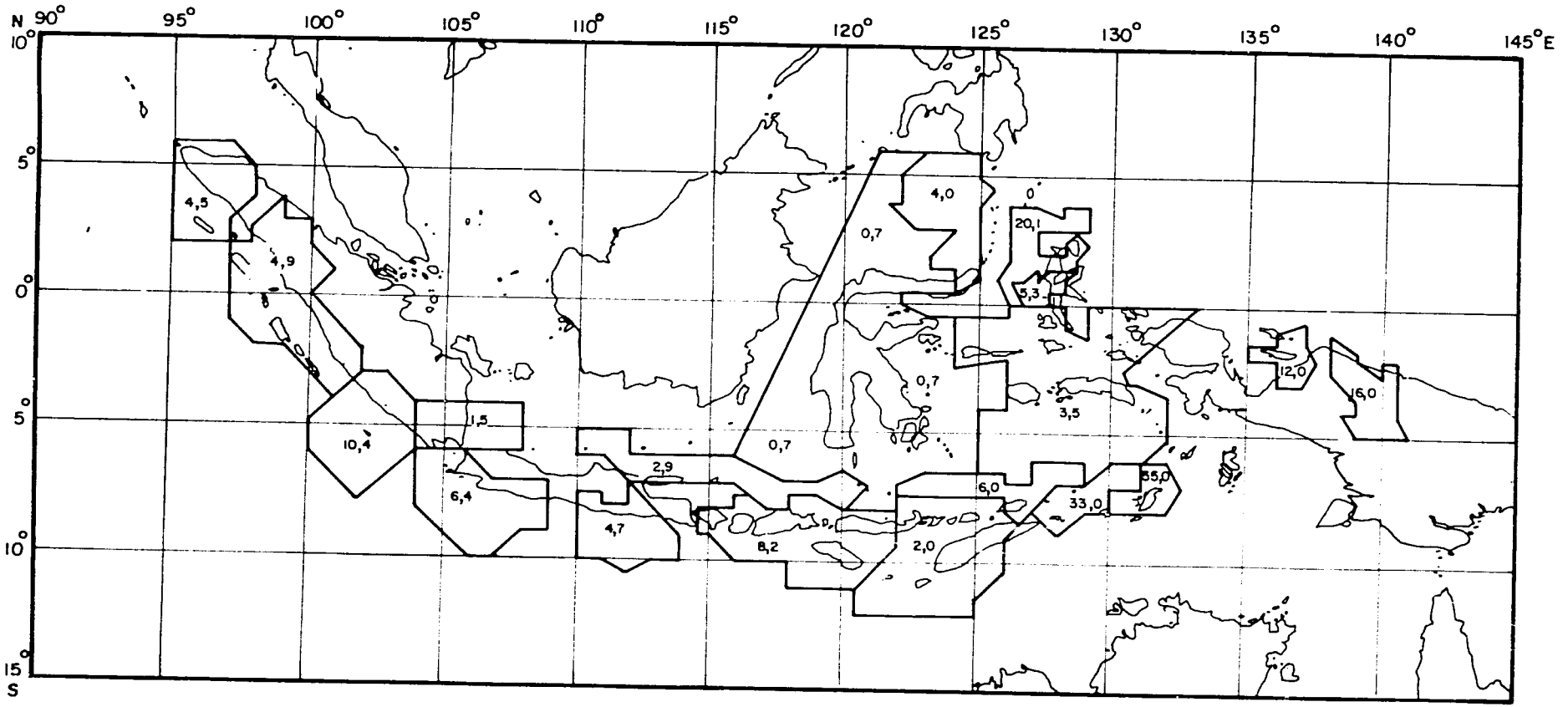


Fig. 5 Frequency of Felt Earthquakes per Square Degree during 1976-1983

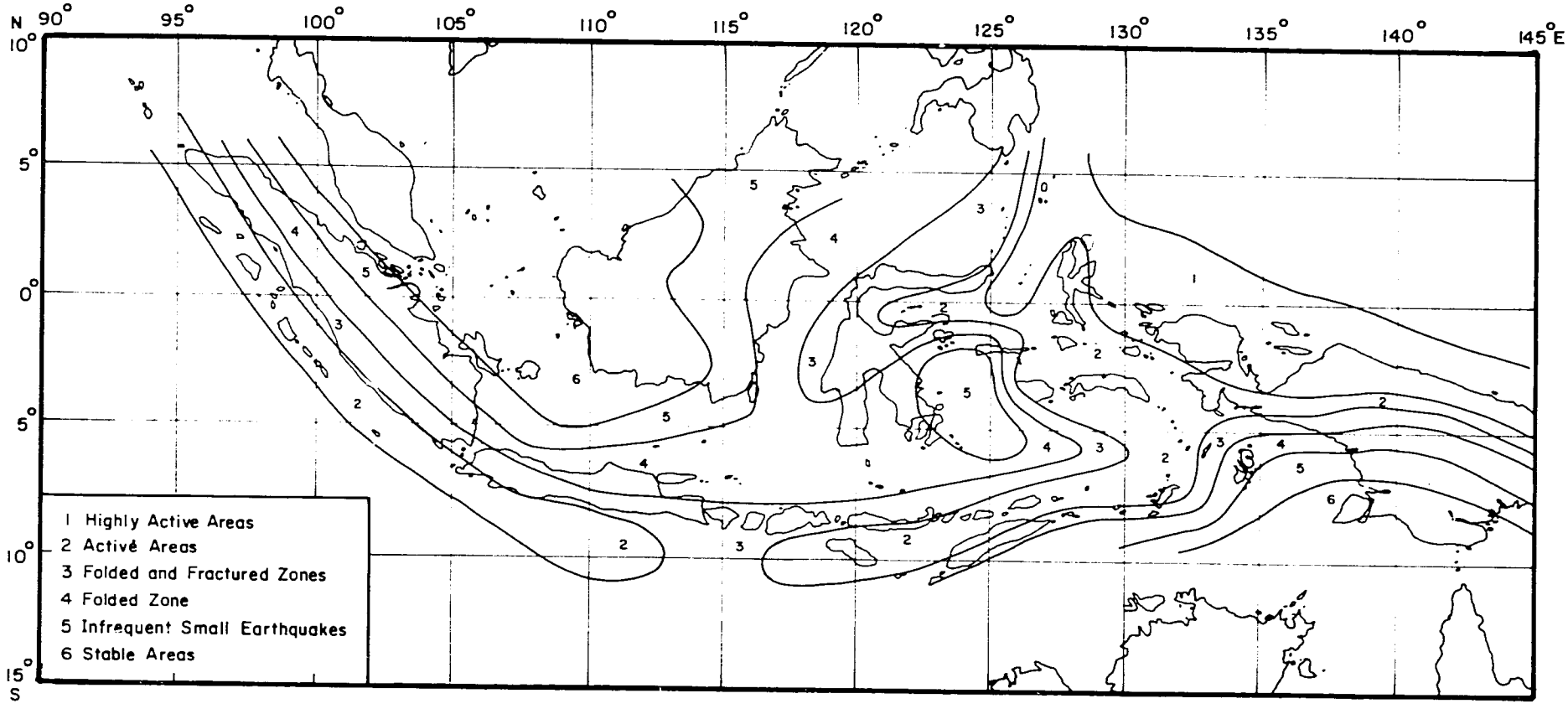


Fig. 6 Seismic Source Zones in Indonesia

PART D

SEISMOTECTONICS OF THE INDONESIAN REGION

PART D SEISMOTECTONICS OF THE INDONESIAN REGION

Introduction

The Indonesian region is one of the most seismically active zones of the earth; at the same time it has a leading position from the point of view of active and potentially active volcanoes. It is a typical island-arc structure with its characteristic physiographic features, such as a deep oceanic trench, a geanticline belt, a volcanic inner arc and a marginal basin.

In most subduction zones, motion of the subducted plate is nearly perpendicular to the trench axis. In some cases, for example Sumatera, where the motion is oblique to the axis, a strike-slip fault zone is seen, and is lying parallel to the volcanic chain.

In the subduction zone southwest of Sumatera, the Sunda trench axis strikes approximately N 37°W. The Indian Ocean crust is moving in an azimuth of approximately N 23°E relative to Southeast Asia, giving an angle of obliquity of 60°. Eastern Indonesia, forming the southeastern extremity of the Southeast Asian lithospheric plate, crushed between the northward-moving Indo-Australian and the westward-moving Pacific plates, is certainly the most complex active tectonic zone on earth. The rate of subduction is some centimetres per year; for example, it is 6.0 cm per year in the West Java Trench at 0°S 97°E (azimuth; 23); 4.9 cm per year in the East Java Trench at 12°S 120°E (azimuth; 19°); and 10.7 cm per year in New Guinea at 3°S 142°E (azimuth; 75°).

Frequent volcanic eruptions and frequent earthquake shocks testify to the active tectonic processes which are currently in progress in response to the continued movement of these major plates. The distribution of small ocean basins, continental fragments, remnants of ancient magmatic arcs and numerous subduction complexes which make up the Indonesian region indicate that the past history of the region was equally tectonically active.

The purpose of this work is to make a new contribution to the knowledge of the seismotectonics of Indonesia and to identify those aspects of the seismology and geotectonics which should be the subject of future research.

Sumatera

Seismotectonic Significance of the Sumatera Islands

Katili (1981) suggested that the oldest rocks known are of Permo-Carboniferous age. During this time the area was occupied by an elongated sea-basin, in which a thick sequence of bathyal

and neritic sediments was deposited, and at the same time volcanic activity started in the area. The extrusion of andesitic lavas continued until late Permian.

At the beginning of Triassic time, volcanic activity became very weak and during the late Triassic came to a complete standstill. Sedimentation continued undisturbed into the Triassic.

An introductory phase to the later orogenic movement may have started immediately after Triassic time (possibly in the Jurassic), with the intrusion which can now be found in sills and dykes in the Triassic deposits.

The main phase of folding took place in the Middle Cretaceous when the complete sequence of pre-Tertiary pelitic rocks was thrown into mainly isoclinal folds. This folding was accompanied by emplacement of granitic and granodiorite rocks, changing the pelitic rocks and volcanic tuffs adjacent to the contacts into gneisses.

After an uplift in late Cretaceous time the area was strongly attacked by erosion and a considerable thickness of sediments disappeared. Few Jurassic or Cretaceous deposits survive in Sumatera. It is quite possible that a part of the area had already risen above sea level shortly after the deposition of the Triassic rocks.

The Eocene was a period of denudation of the Barisan mountain system, which, as has been stated earlier, was folded during late Cretaceous time (Proto-Barisan). Due to tensional forces acting on top of the Proto-Barisan geanticlinal system, a longitudinal graben (Sumatera fault zone) came into being along the entire length of Sumatera. During the Oligocene, the Proto-Barisan range disappeared slowly below sea-level. In several places, but particularly in the south of the Proto-Barisan range, volcanic activity started.

In Middle Miocene time the Barisan geanticline was uplifted for the second time. In the fore-deep, which was situated in the present non-volcanic outer arc, folding and thrusting took place simultaneously, affecting the Early to Middle Tertiary sediments. It is remarkable that the sediments in the subsiding trough of eastern Sumatera (East Sumateran Basin) on the other side of the Barisan Ridge were hardly affected by this intra-Miocene orogenesis. In the East Sumateran Basin, sedimentation continued from Oligo-Miocene to Quaternary times.

The Miocene was followed by a period of quiet development, especially in the northern part of the Sunda region.

The Pleistocene period in Indonesia was characterized by powerful mountain-building. In some areas the orogenic movements started in Pliocene time and in many parts continued into Holocene and recent times. In Lower Pleistocene time or probably

earlier, horizontal movements of a dextral character commenced along the entire length of Sumatera, affecting the combined Mesozoic and Miocene fold systems and the existing graben structures. The same tectonic conditions which produced the wrench-faults was also responsible for the moderate folding of the East Sumateran Basin.

Seismicity

Shallow seismicity prevails within the axis of the trench and the volcanic belt; shallow, plus intermediate, seismicity touches the line of volcanoes. Disregarding these two particular cases as well as the Krakatau region, the volcanic chain in general is almost perfectly aseismic, which corresponds well to the explanation given in the previous section. No deep seismicity is present in Sumatera. This suggests that the penetration of the oceanic lithosphere in the area west of the Sunda Strait, that is, on the island of Sumatera by no means exceeds 300 km measured vertically from the surface.

The seismic pattern here (Bengkulu area and adjacent area) is again very simple. A large shock of M = 8.1 is known near the plate boundary, but a little oceanward of it, that created an active centre with a maximum value of $23,610^{10}$ $erg^{0,5}$ (Hedervari and Papp, 1980).

The Krakatau area appears to be one of the most important regions within the middle Indonesian arc. Hedervari and papp (1980) suggested that no fewer than four very powerful earthquakes took place on the two opposite sides of the Sunda Strait, very near Krakatau (M = 7.0 and M = 7.5 for which h, the focal depth, was less than 70 km; one shock with M = 7.0, h = 80 km and another one with M = 7.2, h = 75 km). In addition to these, southeast of Krakatau there occurred a shock with a Richter magnitude of 8.1 and focal depth less than 70 km, and from northeast of Krakatau Hedervari & Papp (1980) know of two very deep shocks (M = 7.5, h = 600 km and M = 7.1, h = 600 km). They suggest the concentration of so many strong earthquakes, and particularly the four on the two opposite sides of the Sunda Strait, very near the extraordinarily active volcano of Krakatau (Anak Krakatau) indicates that the Sunda Strait is undergoing great tectonic stresses which are related to the clockwise rotation of Sumatera, and which are reflected both in the present-day seismicity and the very vigorous volcanism.

Huchon and Le Pichon (19??) propose that the northwestward motion of the southwest Sumatera block along the Sumatera fault zone, away from the northeast Sumatera and West Java blocks, has resulted in the formation of the Sunda Strait by extension.

Java

Seismotectonic Significance of Java Island

The modern structural belts of onshore and offshore Sumatera trend southeastward and inflect abrupty to eastward between Sumatera and Java. The major morphostructural units can be recognized along the margin of Java. However, the outer arc ridge, interpreted as the summit of the accretionary prism, is developed off Java. The westernmost part of Java Island, called the Banten block, belongs, geologically speaking, to Sumatera. Based on a reconnaissance survey made by Huchon (198?) on the west coast of West Java, it seems that little deformation occurred in this area, except uplift.

Java presents many contrasts with Sumatera. The accretionary prism is less developed off Java than off Sumatera, where the sedimentary influx coming from the Bengal deep-sea fan, (Curray and Moore, 1974) is greater. The young volcanic rocks are markedly more mafic in average composition than are those of Sumatera. The basement formation within the Java area consists of various igneous and metamorphic rocks. The basement complex has been rigidified since the end of the Cretaceous. This orogenesis has furthermore accentuated metamorphism, folding and faulting.

At the beginning of the Tertiary, block faulting with differential subsidence took place which thus gave its topographical appearance to the pre-Tertiary basement. These movements continued until the mid-Miocene which was then dying out. In Plio-Pleistocene time the main folding phase took place which mainly affected the younger Tertiary formations.

The basement rocks of Java that are exposed consist of a melange of Late Cretaceous or very Early Tertiary age. No indication of old continental crust exists.

Melange that involves Upper Cretaceous and Palaeocene sediments is exposed in three small areas south of the mid-line of Java, namely; the Lok Ulo area, the Jivo Hills, central Java, and Ciletuh in the southwest corner Java (West Java). The Lok Ulo melange complex is exposed beneath a folded cover of shallow water and continental sediments, dated roughly within the Eocene.

A large mass of polymict melange is thrust over coherently deformed sedimentary rocks. The quartz porphyry, anomalous here in a melange terrain, may owe its presence to melting caused by subduction beneath the wedge of the very young hot Indian Ocean (Marshak and Karig, 1977).

The Jivo Hills melange consists of varied green schist, amphibolite, phyllite, slate, quarzite, limestone, radiolarian limestone, radiolarian chert, and serpentine, all contorted and highly sheared. Overlying strata are middle and upper Eocene marls and limestone.

The Ciletuh melange consists schist, phyllite, peridotite, gabbro and basalt, all variously altered and sheared. Deformed upper Eocene and younger clastic rocks overlie these crystalline rocks.

Palaeogene sedimentary rocks are exposed in small areas on top of these melange terrains and elsewhere near the south edge of the modern volcanic belt, in southwestern and southcentral Java. An arc of Eocene and Oligocene volcanic islands is widely assumed to have been present in medial or southern Java. The volcanic rocks or submarine volcanic rocks assigned to the Palaeogene by the early mappers are the "Old Andesites".

The belt of active calc-alkalic volcanoes is supperimposed upon older volcanic and volcaniclastic rocks, which are intercalated with Oligocene and Neogene sediments and are intruded by small plutonic masses of similar composition. The main magmatic belt lay in about its present position during most of Miocene and Pliocene time, but during the late Oligocene and Early Miocene it lay closer to what is now the south coast.

Kalimantan

Seismotectonic Significance of Kalimantan

The pre-Late Triassic sedimentary rocks in Kalimantan were deposited in a fore-arc environment and a volcanic facies has been recognized in west Kalimantan consisting of intensely altered basic effusives, associated with, cherts. This association suggests the existence of an arc facing north during the Carboniferous-Permain.

In Palawan in the southern Philippines, basement rocks consist of highly deformed Permian sediments and volcanics intruded by Cretaceous granitic rocks. Presumably these basement rocks were derived from Indo-China or from South China and, as a volcanic arc existed in Permo-Carnoniferous time in Kalimantan, these basement rocks of Palawan are not related to the rocks of similar age in Kalimantan.

Hartono (1984) suggested that Kalimantan is assumed to lie on the eastward extension of the Bentong Raub suture from Peninsular Malaysia through Biliton. As in Peninsular Malaysia, the collision in Kalimantan is not as prominent as in Thailand; moreover in South Kalimantan the collision zone is buried beneath a tectonic superstructure.

Hamilton (1978) interpreted the widely distributed ophiolites and associated rocks in east Kalimantan as melange resulting from subduction of oceanic crust from the east. This melange is associated with silicic volcanic and granitic rocks in southwest Kalimantan which probably formed an island arc. The granitic intrusions assisted the cratonization process in Kalimantan.

Haile and others (1977), from palaeomagnetic and radiometric data, concluded that west Kalimantan and the Malay Peninsula have behaved as a craton since Cretaceous time. Kalimantan has rotated 50° anti-clockwise, so that at its inception the arc was less curved than it is now.

Extensional tectonics off Indo-China and South China moved the oceanic crust southward to be subducted under Kalimantan. This process started in the Early Tertiary and ceased before the Pliocene in Kalimantan, but continues at present in the Manila Trench. It is manifested in Kalimantan by Eocene melange and accompanying fore-arc sediments. During the Neogene, fore-arc sediments were deposited in Serawak and also intermediate and basic volcanic rocks were erupted in the interior of Kalimantan.

Almost the whole of Kalimantan is aseismic - this is a cratonic area - except the northeast coast of the island where a sole shallow shock of M = 7.0 took place and therefore a small active centre came into being.

Sulawesi

Tectonic Significance of Sulawesi

Sulawesi and its surroundings consist of three main tectonic units, namely the eastern arc or province, which is characterized by thrust tectonics associated with the emplacement of an ophiolite-metamorphic suite, the western arc or province, which displays normal folding in a sequence of Mesozoic to Tertiary metamorphics, sediments and volcanics intruded by plutonic rocks of acid and intermediate composition, and the Banggai-Sula Province which is characterized by a basement complex of Carboniferous metamorphic and Permo-Triassic plutonic rocks, overlain by a Mesozoic continental-derived sedimentary sucession containing ammonites, belemnites and pelecypods. Southwest Sulawesi is located at the southern end of the latter arc. It can be divided into two north-trending mountain chains, called the Western Divide Mountains and Bone Mountains. These converge in the southern tip of the peninsula and form there a mountain landscape, dominated by the inactive Lompobatang Volcano. The area between both mountain chains is occupied by the Valley of the Welanae River, a graben-like structure that is known as the Walanae or Central Depression. This structure forms part of a major N to NW trending fault zone. In the north a marked depression filled with Quaternary sediments extends from the mouth of the Sungai (River) Sadang on the west coast, through Danau Tempe and the Neogene Singkang basin to the east coast. This depression appears structurally to separate southwest Sulawesi from the rest of the western arc. In the Sadang River area, the structure lineament is known as the Sadang fault zone.

The relation of the eastern to the western part of Sulawesi has been the subject of speculation, because the geology of the eastern part differs greatly from that of the west.

Palaeomagnetic results from Jurassic to Early Cretaceous radiolarian cherts in the southwest arm indicate that these cherts formed within 3° of the equator, and that SW Sulawesi then lay close to its present position relative to west Kalimantan and the Malay Peninsula, and that these three areas probably formed part of the same plate, which has rotated some 30° to 40° anticlockwise since the Jurassic (Haile, 1978). Similar cherts were sampled from one exposure in the east arm, and the direction of magnetization shows an inclination relative to the bedding plane equivalent to a palaeo-latitude of 42°, consistent with a derivation of the east arm from higher latitudes than the southwest arm derives from. Results from the Late Cretaceous of northwest central Sulawesi (Sasajima, et al., 1978; 1980b) show 14° anticlockwise rotation, with inclinations of 32°, equivalent to a palaeo-latitude 16° of present; Sasajima's sites are east of the Palu Fault, along which east Sulawesi may have moved north, which could explain the discrepancy in inclination between this site and the Jurassic - Early Cretaceous site of Haile.

For sites in Tertiary igneous rock, (two of sills, one of tuff, one of lava) believed to be late Cainozoic, give a mean direction near that of the present field or along this direction but in a reversed sense, indicating that the southwest arm was complete by the time these rocks formed.

Tectonic Development

Late Cretaceous

The tectonic development of the western and eastern Sulawesi Provinces is closely related to the tectonic development of the Banggai-Sula Province. During the late Cretaceous, a thick sequence of flysch-type sediments was deposited in broad areas along the western Sulawesi Province.

These flysch-type sediments are unconformably underlain by the melange complex in the south part and by a metamorphic complex basement in the central and north parts. The sediments are commonly associated with lavas and pyroclastics, indicating that this rock association derived from volcanic island arcs and was deposited in a fore-arc basin area.

At the same time the region of the eastern Sulawesi Province developed as a deep-sea basin, in which pelagic sediments have been deposited since Jurassic time on the ophiolite basement. It is very possible that the Cretaceous deep-sea basin in the eastern Sulawesi Province was separated by a trench from the western Sulawesi Province. The trench was possibly the surface appearance of a westerly-dipping subduction zone, in which the Wasuponda melange accumulated. The subduction initiated magmatism along the western Sulawesi Province. The metamorphic rocks occurring along the western part of the eastern Sulawesi Province are believed to have formed during this Cretaceous subduction.

By contrast, the Banggai-Sula Province was part of a continental shelf from the Early Mesozoic, in which Late Triassic to Cretaceous clastics were deposited.

The core or basement of the continent consists of Carboniferous metamorphic and Permo-Triassic plutonics.

Palaeogene

Development of flysch-type sediments in the western Sulawesi Province terminated in the southern part, while in the northern part it continued until Eocene time. Volcanoes were locally active during the Palaeocene in the south and during the Eocene in the central and north. Deposition of thick carbonate rocks occurred in large areas of the south during the Eocene to Miocene, indicating that this part of the area was a stable shelf.

Since the Palaeocene, the eastern Sulawesi Province would appear to have been shoaling the shallow water carbonates were deposited in this environment. Deposition of carbonate rocks in this area continued up to the Lower Miocene.

In the western part of the Banggai-Sula Province a thick sequence of carbonates intercalating with clastics was deposited widely until the Middle Miocene.

The westerly-dipping subduction zone which commenced from the Cretaceous produced the early volcanics in the western Sulawesi Province and a shoaling process of the sea in the eastern Sulawesi Province as well as in the Banggai-Sula Province.

Neogene

The wide distribution of volcanic products indicates that strong volcanism recurred from the Middle Miocene in the western Sulawesi Province. The volcanic rocks were initially deposited in a submarine environment and then locally became terrestrial in the Pliocene. The volcanism terminated in the Lower Quaternary in the south but continued until recent times in the northern part of the province.

Strong magmatism in the western Sulawesi Province during the Middle Miocene was apparently coincident with the squeezing process of the rocks within the eastern Sulawesi Province, due to the westward movement of the Banggai-Sula microcontinent. This tectonic episode uplifted and thrust most of the material within the eastern Sulawesi Province. The metamorphic rocks were thrust westward into the western Sulwes Province; likewise, the ophiolite rocks were also thrust and imbricated with associated rocks possibly including the melange, but in the opposite direction, namely, eastwards into the Mesozoic and Palaeogene

sediments of the Banggai-Sula Province.

During the uplifting of the whole region of Sulawesi which commenced from the Middle Miocene, block faulting was initiated in various places to form graben-like basins. In Pliocene time the whole region was subjected to block faulting and the major fault, and the subsequent movement, initiated the present morphology of Sulawesi Island. This tectonic event produced a shallow and narrow marine basin in some parts of the region and some isolated basins inland. Coarse clastic rocks were deposited in these basins and formed the so-called Sulawesi molasse.

The Middle Miocene tectonic event also bent the western Sulawesi Province into its present curved form and exposed the metamorphics within the neck of the island.

Seismicity in Sulawesi

Seismicity in the eastern arc and in the Banggai-Sula Province is much less intense than that beneath the Molucca Sea.

Almost half of the earthquakes recorded in these areas occurred in a narrow zone at shallow and intermediate depths beneath the eastern half of the Gorontalo Basin. These earthquakes define a north-dipping zone which apparently shallows towards the east arm of Sulawesi from a maximum depth of about 180 km at the equator (R. McCaffrey et al., 1983). The top of the zone of hypocentres appears to dip away from the east arm at about 25°, becoming vertical at depths greater than 60 km. In general the distribution of earthquakes from the local survey is similar to teleseismic locations (Cardwell et al., 1980), with the significant exception of the appearance of shallowing towards the east arm. The distribution of teleseismically located earthquakes hints only vaguely at shallowing to the south and does not suggest that the seismic zone approaches the surface of the earth near the east arm.

In the light of the ambiguity surrounding the relation between the shallow earthquakes beneath the east arm and the intermediate-depth activity beneath the central Gorontalo Basin, R. McCaffrey et al., (1980) propose two interpretations. The first is that the two zones are unrelated and the appearance of continuity between them is fortuitous. In this case the shallow seismicity to the south may be due to deformation related to the collision of the Banggai Islands with the east arm and the deeper activity occurs within the southern edge of the Mollucca Sea plate thrusting westward beneath the north arm and the Sangihe Island arc.

The second, and perhaps more interesting, interpretation is that the zone of seismicity seen in the local survey data dipping to the north from the east arm occurs within a single slab of lithosphere connecting the Banggai Islands block to the Molucca Sea plate. The projection of the trend defined by the earthquake

foci intersect the surface of the earth in the central part of the Poh Head region of the east arm at the Batui thrust. The Batui thrust has been observed in the east arm and offshore in reflection profiles by Silver (1981) and is interpreted as being the site of the underthrusting of the Banggai Islands block beneath the east arm ophiolite and southern Gorontalo Basin crust.

The obvious inference is then drawn that the possibly continuous slab dipping to the north beneath the Gorontalo Basin was once the leading edge of the Banggai-Sula Islands complex and was subducted beneath the east arm and the Gorontalo Basin prior to the arrival of the Banggai Islands into the trench system.

Talaud

Tectonic Significance of the Talaud Islands

Silver and Moore (1978) have already described the structural contacts between the deformed rocks of the Molucca Sea and the volcanic aprons of the Halmahera and Sangihe arcs. The contacts appear along the troughs adjacent to the volcanic arcs. Most of the seismic reflection profiles across the troughs indicate thrust contacts where deformed rocks are thrust on to the volcanic aprons. The deformed rocks in the east are thrust on to the Halmahera arc whereas in the west they are thrust onto the Sangihe arc. The reflection profiles between thrust contacts in the Molucca Sea show virtually no structural resolution within the Talaud-Tifore ridge. Judging from the exposures on the islands along the Talaud-Tifore ridge and rocks dredged from submarine ridge, it has been interpreted that the acoustically irresolvable terrane probably consists of tectonic melange.

This tectonic melange is composed of highly deformed material of low average density (2.2 - 2.4 gm/cc) and sound velocity (3.5 km/s) and is thrusting over the adjacent arcs along the east Sangihe and Halmahera thrust (Silver, 1981).

An oceanic microplate, which Sukamto (1979) proposes to call the Molucca microplate, has been present in the Molucca Sea since Middle Tertiary time, possibly Oligocene, bounded by approximately northward trending arc - trench systems. This microplate was subducted westward and subsequently produced the Sangihe volcanic arc along the extensional fractures within the upwards bending plate above the subduction zone. The Sangihe is a part of the plutono-volcanic arc of western Sulawesi Province where a strong volcanism is indicated by wide distribution of Miocene-Pliocene volcanics.

Possibly volcanism in the Sangihe arc started in Late Oligocene time. From the east another microplate that Sukamto (1979) calls the Halmahera microplate, was subducted westward underneath the Molucca microplate and produced the Talaud-Tifore volcanics along the extensional fracture above the subduction

zone.

Volcanism in the Talaud-Tifore arc possibly started in the Middle Tertiary as indicated by the andesitic-basaltic volcanics that are startigraphically older than the Middle Miocene to Pliocene sediments. Melange wedges occurred in the troughs east of the Sangihe arc as well as east of the Talaud-Tifore arc.

Volcanism in the Sangihe arc has continued until the present time, but in the Talaud-Tifore arc it has decreased rapidly since the Middle Miocene and become totally dormant in the Late Pliocene. As the Molucca and Halmahera microplates collided and the subduction process terminated, it is assumed that the active Halmahera microplate was bent upwards. The bending and rupturing of the Halmahera microplate affected the volcanic and melange rocks that occurred in the Talaud-Tifore arc trench system. Squeezing within the melanges and thrusting within the volcanics occurred in this stage, possibly during the Middle Miocene. in the next stage imbricated thrusts occurred at the frontal part of the bending plate. In relation to this encroachment process, part of the oceanic materials and the volcanics broke up into slabs and injected into the melange mass. The volcanism in the Talaud-Tifore arc was possibly still active in the northern area during the Late to Middle Pliocene as indicated by the occurrence of volcanics on the Miangas and Keratung islands. In the present stage the slabs of ophiolite and volcanic rocks are exposed, together with the melange mass in the Talaud Islands.

Timor

Seismotectonics of Timor and the Surrounding Area

Fitch & Hamilton (1974) proposed that Timor can be regarded as a chaotic complex of imbricated and mainly allochthonous rocks and melange derived from Australia's continental margin during the collision and formation of an outer arc ridge within the subduction zone and the Timor Trough as a shallow subduction trench. Carter & others (1976) viewed the geology as representing a deformed Australian continental margin, overthrust from the north by several allochthonous units. Crostella (1977) interpreted the Timor rocks without the requirement of a continental collision. The Timor Tertiary orogenies occurred in a geosynclinal trough along the northwest margin of Australia. Chamalaun & Grady (1978) suggested that, prior to a mid-Miocene collision, all the Timor rocks belonged to the Australian continental lithosphere, separated from the previously subducted oceanic lithosphere, giving rise to the Late Pliocene to recent uplift of Timor by isostatic rebound.

Johnstone & Bowin (1981) viewed the Kolbano unit, which is found along the south coast of Timor, as ranging from the Cretaceous to Early Pliocene. It is folded recumbently and contains many thrusts and imbricate faults. Carter & others (1976) interpreted the Kolbano unit as having been scraped from

oceanic crust and imbricated into an acretionary prism prior to the continental collision.

The Late Miocene Bobonaro olistostrome is widespread on Timor, having been emplaced as a huge gravity slide that moved from north to south. It consists of exotics within a clay matrix. The exotics, which range from pre-Permian to Late Miocene, have been derived from all the underlying continental rocks on Timor (Carter & others, 1976).

Audley-Charles (1980) proposed that the clay was derived from submarine weathering of volcanic ash.

The Viqueque group represents the most recent sedimentary sequence on Timor. It overlies the Bobonaro olistostrome and is Late Miocene to recent. The calcilutite sediments which make up the bulk of this formation suggest a deep water depositional environment during the Late Miocene and Early Pliocene.

During the Late Miocene, the Bobonaro olistostrome began to develop, when Timor tilted sharply to the south in response to the onset of rapid subduction along the eastern end of the Indonesian subduction zone. On the southern edge of this subduction zone, sediments were scraped from descending Cretaceous oceanic crust and incorporated into the olistostrome. For the remainder of the Miocene and the Early Pliocene, almost all the Timor rocks formed part of an outer arc ridge or basin associated with an oceanic subduction zone. The Batu Puti limestone and the Noil - Toko formation were deposited in this subduction zone as outer-arc basin, outer-arc ridge, or inner-slope basin sediments.

Prior to the mid-Pliocene, the Kolbano unit developed as an accretionary wedge of oceanic sediments at the leading edge of the subduction zone. The Bobonaro olistostrome contains exotics derived from these deep-water sediments, suggesting that olistostrome deposits continued to develop during the Early Pliocene.

The Bouguer gravity field of Timor and regions to the east, as is generally characteristic of the gradient of gravity anomalies, passes into a belt of negative anomalies, whereas to the north it culminates in a strong positive anomaly over the central part of the Banda Sea. To the west of South Timor the complex gravity field indicates that a north-south discontinuity occurs between Sumba and Timor.

Fitch (1976) summarized the seismic evidence for tectonic behaviour in this region. He reported that there is no evidence from focal mechanisms to support the existence of present-day underthrusting along the eastern end of the Sunda Arc, even though a well-developed inclined seismic zone exists beneath the arc in this region. The dip of the seismic plane for deep-focus earthquakes in eastern Indonesia is steeper than that in western Indonesia.

Immediately to the south of Sumba there is a sharp break in three well-defined submarine linear morphological features (S. Nishimura, 1981). The Java ridge and the Bali trough (4 km deep), separating and Java ridge from the volcanic islands of Bali, Lombok and Sumbawa, do not continue to the east of Sumba. East of Sumba there is no trench south of the Sunda Arc separating them from Australia and West Irian. The outer Banda Arc islands, east of the Sumba Arc, separated the Australian shelf by the Timor Trough and its eastward extensions that descend in that area to a depth of 3 km.

The Sawu Sea separates Timor and Roti in the outer Banda Arc from the volcanic islands of the inner arc.

A pronounced discontinuity in the linear zone of volcanoes is located on an island north of Sumba. This break may be an extension of the strike-slip fault in southwest Sulawesi, plotted by Katili (1970) and Hamilton (1972). The Late Cenozoic origin of these volcanoes suggests that these dextral movements were Quaternary (Audley-Charles, 1975).

The Timor trough is associated with the southern tectonic boundary of the Sunda and southern Banda arc portions, respectively, of the Indonesian subduction zone. The Timor trough is some 3 km shallower than the Java trench and as such has been considered by some to be a relatively minor feature. From the top of Timor to the axist of the Timor trough there is an elevation difference of about 5 km (Johnstone & Bowin, 1981).

The Timor trough is associated with a similar type of structural boundary, except that north of the trough the structural complexity is even more difficult to resolve. However, the data suggest that the northern flank of the Timor trough includes both compressional folds and north-dipping thrust planes (Montecchi, 1976, Beck & Lehner, 1974, Von der Borch, 1979). The usual form for subduction zones is convex towards the plate that is being subducted, as is the case throughout the Sunda arc. However, the Timor trough and the outer arc are concave towards Australia, whereas the inner volcanic arc is convex (Brouwer, 1919).

The global solution for relative plate motions derived by Minster & others (1974) predicted that the relative motion at the eastern end of the Indonesian subduction zone in the vicinity of Timor is approximately 70 km/m.y. In the Timor region the down-dip length of the seismic zone, as mapped by Cardwell & Isacks (1978), is approximately 800 km, suggesting an average relative plate motion during the last 10 m.y. of about 80 km/m.y.

Johnstone & Bowin (1981) proposed that the model suggests that the Australian continental crust first entered the eastern end of the Indonesian subduction zone approximately 3 m.y. ago or during the mid Pliocene. The resulting influx of thick, coherent continental margin sediments into the subduction zone initiated a change in the accretion processes - a deformation or tectonic

front, separating deformed from undeformed continental margin sediments, moved rapidly up the continental slope.

In accordance with the model of Johnstone & Bowin (1981), the Timor trough coincides with a tectonic boundary separating a wedge of deformed, but autochthonous, continental margin sediments from the depressed margin of Australia.

McCaffrey et al., (1982) suggested that the large micro-seismic events that occurred south of Pantar Island, with hypocentres at depths of 70-200 km beneath the eastern Sawu Sea, reveal a trend of deepening to the northwest.

The zone of seismicity dipping to the northwest is at an angle of 45° between 70 and 200 km depth and continuing more sparsely to 300 km. At shallower depths, a few better-located events form a zone that appears to flatten out at about 50 km depth beneath Timor.

The seismic events beneath Timor and beneath the region between Timor and the volcanic arc probably result from a variety of crustal and upper mantle stresses. These stresses include those in, and associated with, the subducted oceanic lithosphere and those resulting from compression of the subduction zone (Johnstone & Bowin, 1981).

Halmahera

Seismotectonics of Halmahera

The metamorphic rocks which form the pre-Tertiary basement in the Bacan, Saleh and Tapas islands (Western halmahera-Obi Province) are considered to be probably the oldest rocks in the region. The ophiolite of the eastern Halmahera-Waigeo Province, overlain by Jurassic-Cretaceous deep-sea sediments is also clearly of this age. No rocks of pre-Tertiary age are known from the Talaud-Tifore Province.

These relations suggest that at the beginning of the Tertiary the western Halmahera-Obi Province constituted a continental block bordered on its eastern side by oceanic crust. It is not known whether this continental fragment was attached to a major continent at that time or not. The presence of ophiolite fragments among the ocean floor sediments on the eastern side of the block may be due to block faulting, with the erosion of ophiolitic material from fault scarps, or it may indicate that convergent tectonics were already operating in this region in pre-Tertiary times with the erosion of imbricated ocean floor material. These problems require further study.

By Palaeogene times the ocean floor had been formed that is now the Talaud-Tifore Province, perhaps as a result of the development of a marginal sea which separated the western Halmahera-Obi Province from the major continent to which it had

previously been attached. On the eastern side of the continental block, extensive flysch deposits were being laid down.

Clasts in the conglomerates within these flysch deposits include ophiolitic fragments, deep-sea red shales, volcanic andesites and basalts, indicating that at this time an imbricate wedge of ophiolitic material and a volcanic arc had been formed as a result of subduction, and ocean-floor and volcanic-arc materials were being eroded to form the flysch deposits. The flysch deposits were presumably laid down in a fore-arc basin or more localized basins within the imbricate wedge.

By Oligo-Miocene time convergent tectonics were well established, with the continuous imbricate of Palaeogene deposits into the imbricate wedge. In eastern Halmahera, imbricate blocks are separated by westward dipping faults, indicating that subduction of the ocean floor was directed towards the west from the Pacific side. The occurrence of extensive andesite and basaltic volcanics in the western Halmahera-Obi Province indicates that subduction was taking place beneath the older continental block with the development of a volcanic arc.

Minor volcanism on Obi, Bacan, Mandioli and Nanusa in Mio-Pliocene time suggests that subduction was less active then. On the other hand, major convergence had commenced further to the west with the westward subduction of the Maluku Sea floor beneath the Sangir arc.

The volcanic chain which extends along the western side of Halmahera indicates that subduction recommenced beneath the island in early Pleistocene time and is still continuing at the present time.

Silver and Moore (1978) suggest that subduction of the western side of the Maluku Sea, commencing in Miocene time beneath the Sangir Arc, was followed in the early Pleistocene by subduction of the eastern side beneath Halmahera.

Subduction contined until nearly 1000 km of the Maluku Sea Ocean floor had been subducted.

At the present time the tectonic situation shows compressional regimes in the Talaud-Tifore and Halmahera-Weigeo Provinces and an extensional regime in the western Halmahera-Waigeo Province which forms the site of present-day volcanic arc (Sukamto et al., 1981).

Seismicity of Halamhera Island and Surrounding Areas

Here an extraordinarily complicated pattern of seismicity occurs. Shallow and shallow-plus-intermediate active centres occur alike. The complexity of this area is emphasized by the fact that we are dealing with two opposite-facing, oblique hypocentre-systems (Benioff zones). "The Sulawesi system displays

a relatively conventional seismic zone dipping west-northwest to a depth of 650 km, whereas the Halmahera system dips more gently east-southest to a depth of about 240 km" (Hatherton and Dickinson, 1969). Another investigation (Suzuki and Kodama, 1969) has revealed, however, that in this area there are altogether three well-separated regions of intermediate and deep earthquakes. The first lies between Sulawesi and Halmahera, in the northern part of the Molucca Pass, the second between Halmahera and Mindanao and the third one can be found between Mindanao and the coast of north Sulawesi. The deepest earthquakes in the first of these three areas come into being around 200-250 km, measured vertically downward from the surface; the maximum depth of hypocentres in the second region is the same; finally, in the third area, the greatest depths of earthquake-foci can reach 600-65 km. Among these three regions of intermediate and deep shocks one can find a triangle-like area in which there are only shallow earthquakes. Here, at $2^{o}26'$N and $127^{o}15'$E, that is at the southeastern vortex of the triangle mentioned, one can find a point which is characterized by abnormally high heat flow, namely 5.21 HFV (Lamont-Doherty Geological Observatory, Heat Flow Data).

Let us consider, furthermore, that in this region, that is in the environs of the triangle-like area, there are two chains of volcanoes-one on and near the northeastern peninsula of Sulawesi and another one, well separated from it, and with an oppositely directed curvature, on northern Halmahera.

These geophysical and physiographic facts, including the two oppositely-directed Benioff zones as mentioned above, strongly suggest that the triangle-like feature which includes the "hot spot" as well may be regarded as a small, local spreading centre which is responsible for the development of the three, well-separated areas of intermediate and deep earthquakes and also for the creation of the two volcanic belts, one in front of the other, but having on opposing curvature (Hedervari, 1976b).

This suspected spreading centre lies at the northern end of a submarine ridge-like feature, the northernmost tip of which carries Talaud Island. This part of the ridge is bounded by the Sangihe trough to the west, by the Talaud trough to the northeast, by the Morotai basin to the east (the hot spot mentioned lies in this basin) and by the Ternate trough to the southeast. It must be mentioned, however, that no trace of the existence of a rift-valley type of feature can be seen on the surface of this ridge and this fact contradicts the suggestion.

In this area there are some minima, where the released tectonic flux is as low as 10.10^{10} $ergs^{0.5}$ or even smaller. The broad minimum, that has the largest areal extent among all the minima, can be found just west of the suspected local spreading centre but no physical correlation can be suggested between them. It is noteworthy that the existence of the minima is characteristic only for this part the Indonesian region.

Tectonics of the Northern Banda Arc

During pre-Triassic times Misool, Buru and Seram were part of the stable continent of the Irian Jaya-Australia continent. During Triassic to Middle Jurassic time presumably break-up and rift-drift occurred between Seram and "Buru-Misool", followed by sedimentation of the continental platform sequence of flysch-type sediments with subordinate limestone. The break-up and rift-drift were perhaps caused by thermal upwarping followed by block faulting. The break-up stage was suceeded probably by sea floor spreading during Middle Jurassic to Early Cretaceous time, as indicated by deep sea sediments, while minor amounts of volcanic rocks occurred in Buru as well as in Seram. On Misool Island the break-up stage is indicated by neritic flysch and limestone with minor volcanics. The break-up stage corresponds to the development of the proto-Banda Sea, part of the Indian Ocean, while Seram was probably located near the triple junction of the rift-drift zone.

Break-up ceased in the Early Cretaceous followed by deep open-sea sedimentation up to Eocene time on Buru and East Seram. The Eocene of Misool is characterized by neritic limestone which presumably was deposited on structural highs.

The trend of the rift-drift zone between Seram and "Misool-Buru" appears to be in the NE-SW direction, similar to the regional Jurassic rifting in the Banda Sea (Bowin et al., 1980).

During Cainozoic time the arc rotated anticlockwise at least 90° to reach its present position (Katili, 1974, 1975; Carter et al., 1976); Seram has rotated anticlockwise 98° since Late Triassic time, of which 74° occurred since the Late Miocene (Haile, 1978, 1981).

Between the Middle Miocene and the present, Seram and Misool-Irian Jaya collided, while oceanic crust subducted underneath Seram. From the Middle Miocene to the Pliocene the subduction was most active and the Benioff zone may reach a depth of over 200 km, at which granitic magma could be generated, forming the uliaser magmatic belt.

Green et al., (1980) suggested that the Banda arc system grew eastward and the Banda Sea opened because a triple plate junction formed in eastern Java early in the Cenozoic and moved eastward across the Banda Sea region to its present position at the junction of the Aru trough with the Torera-Aiduna fault system. The Aru and Seram troughs are offset along a section of the Torera-Aiduna fault system and that section is possibly therefore an arc-arc transform (Cardwell and Isacks, 1978). The fault is in line with a major tectonic boundary in central New Guinea (Irian) between the central orogenic belt and the Australian craton (Plumb, 1979).

Untung, et al., (1981) suggested that the complicated geological structure resulting from the collision of a continent

with an oceanic trench system gives rise to large-amplitude gravity features. The main belt of negative anomalies is arcuate, and terminates in the most western portion of Seram.

The mantle depth of 15 km, modelled in the Banda Sea, shows that mantle depths in excess of 31 km are indicated under Seram, Misool, Salawati and Waigeo. The depth-to-mantle under Seram may relate to subduction zones south of this island.

This is again a very complicated area from the point of view of seismicity, particularly the Banda Sea, under which a remarkable conformation of the down-going lithosphere can be deduced on the basis of the distribution of earthquake hypocentres. The broad belt between Australia and the axis of the oceanic trench is completely asismic, as would be expected from the deduction that this is a cratonic area with great rigidity and without present-day orogenic movements.

According to the Papp (1981) classification, the Banda Sea region falls into Category IV, which is characterized by strong seismic activity and in which, according to his calculation, Mag = 7, 21.

Irian Jaya

Geological and Geotectonic Evolution of Irian Jaya

The mainland of Irian Jaya and Papua New Guinea may be subdivided into three east-trending zones, which differ characteristically in stratigraphic, tectonic and magmatic history. A northern oceanic province of ophiolite and island-arc volcanics is separated from a continental provinces with sediments overlying a relatively stable basement by a transition zone with strongly deformed and regionally metamorphosed rocks. The transition zone forms a belt exposed along the north flank of the central range and is separated from the other provinces by major thrust faults and transcurrent faults.

The distribution and contrasting geology of the provinces is the result of interaction between the Australia-India and Pacific plates which probably dates back to the Early Jurassic. Following the cessation of island-arc volcanism in early Miocene time, a major orogeny resulted from the collision of the Australian continent with an island arc overlying the Pacific plate and from continued convergence after collision. Cardwell and Isacks (1978) suggested that Irian Jaya is being subducted beneath the Banda Sea. They maintained that subduction is not continuous around the arc and that the northeastward-directed subduction in the Aru trough is separated from the southward subduction below Seram by a transform fault in the neighbourhood of the Banda Islands.

This relatively simple zoning on the mainland is not easily applied further west in the Bird's Head and Bird's Neck. This region is an amalgamation of widely diverse terrain with oceanic

as well as continental affinities and distinct geological histories. The terrains are juxtaposed along sutures which are commonly recognized as major faults.

Fault-bounded fragments of ophiolite, Palaeogene island-arc volcanics and post-volcanic sediments were mapped on Waigeo, Batanta, Biak and Yapen islands and in the Losem and Arfak mountains. These allochthonous blocks fall into the oceanic province and probably made part of an original continuous magmatic belt which was disrupted by transcurrent faulting during Late Miocene and Pliocene time.

The central and southern Bird's Head has a basement of folded and regionally metamorphosed Silurian-Devonian turbidites and the western Bird's Neck area is almost certainly also underlain by a basement of continental affinities. However, each of these terrains is characterized by a unique stratigraphy and history of deformation of the sedimentary cover; Misool Island, Onin and Kumawa peninsulas are also categorized with the continental province.

The rocks of the Tamrau Mountains, the Wandamen Peninsula and the Wondiwoi Mountains in the east Bird's Neck and of the Weyland Mountains and northern Central Range are strongly and complexly deformed by folding and faulting and have been subjected to regional metamorphism.

These terrains are lumped together in the transition zone. Lithostratigraphic units confined to the Sorong and Ransiki fault zone, although not metamorphosed, area also grouped in this zone.

In vivid contrast to Halmahera and the north Sulawesi area, the pattern of seismicity of north Irian Jaya is very simple. A great shock, of M = 8.1, occurred near the plate boundary at the northern extremity of this area and created an active centre with maximum value of 29.5 - 10^{10} $ergs^{0,5}$ (Hedervari & Papp, 1981). Two active centres, with relatively high values, are present in the northern part of New Guinea and another shallow one, with only a small maximal value, near the islands of the Aru group. This latter centre is related to the plate boundary. From here towards Australia the area is perfectly aseismic again, corresponding to the evident cratonic character of this part of the region.

Active Faults of the Indonesian Archipelago

The Great Sumateran Fault Zone

The great Sumateran dextral fault zone (synonyms: Semangko or Semangka fault zone) extends for the entire length of Sumatera. The dextral character of the fault zone is indicated by river and valley offsets and by the offset of granitic intrusion. Since the Late Miocene the dextral displacement has covered approximately 25 km. Some Jurassic outcrops suggest that the

total displacement may have reached a distance of 180 km (Tjia, 1977).

The Sumatera fault zone consists of at least eighteen fault segments. The majority of the segments are arranged dextrally en echelon. It is found that the wider depressions, where normal faulting occurred, are located at their echelon junction. Kinematic considerations suggest that such junctions are subject to tension on account of dextral slip along the main fault.

The eighteen fault segments are as follow:

(1) Semangko Bay and the Semangko fault segment
The southernmost part of the Sumatera fault zone begins with Teluk (Bay) Semangko which is a wedge-shaped depression narrowing northwestward from about 40 km to less than 20 km over a distance of 75 km. The bay's western scarp consists of step faults and is parallel to Sumatera's long axis. Microearthquake study in and around Semangko Bay (Kertapati, 1984) suggested that the seismic activity indicated a right-lateral slip-fault. The northernmost part of the Semangko fault segment grades into the Liwa and Lake Ranau depressions. Damage by the Liwa earthquake of 1932 was concentrated in a narrow zone parallel to the long axis of Sumatera. Relative displacements of houses occurred in the NW - SE direction.

(2) Mekakau fault segment and Tanjungsakti graben
This fault segment is arranged dextrally en echelon with respect to the former segment. The Tanjungsakti basin forms the northwest end of the segment. N-S and E-W topographic lineaments form parts of the boundaries of the basin.

(3) Keruh-Musi fault segment and Curup depression
The Keruh-Musi fault segment is arranged sinistrally en echelon. The western fault scarp is well defined; its eastern scarp decreases from 1000 m to less than 500 m towards the northwest. The Curup basin forms the north end of the segment. This basin is about 18 km wide.

(4) Ketaun-Seblat-Dikit fault segment and Muaraamen basin
The Keruh-Musi and Ketaun-Seblat-Dikit fault segments are disposed dextrally en echelon. The Ketaun-Seblat-Dikit segment consists of generally parallel west and east walls and horsts. The basin lies between the slight, dextrally en echelon array of the Ketaun and Seblat valleys. Kraeff (1953) reported that the Tes earthquakes in 1952 resultd in relative lateral displacements of houses, respectively towards southwest for those on the west side and towards southeast for those on the east side. Relative lateral displacements in the villages of Turunlalang and Tes amounted to 0.5 metres; similar amounts of lateral displacement occurred at Kotadonok and Talangratu villages.

Fissure eruptions along this fault segment produced the

Plio-Pleistocene ignimbrite sheets that cover areas near Keban (Van Bemmelen, 1949, p. 685).

(5) Siulak fault segment and Kerinci graben
This segment is disposed dextrally en echelon with respect to the former fault segment. The Siulak segment mainly consists of the 60 km long wedge-shaped graben in which the Siulak River flows. An E-W volcanic lineament that includes Gunungtujuh also occurs between the Siulak and Batang Saliti fault segments. Right-lateral displacement that accompanied an earthquake was recorded in the Kerinci Valley (earthquake occurred in 1909).

(6) Batang Saliti or Batanghari fault segment and the Danau di Atas and Danau di Bawah depressions
Between the Batang Saliti and Solok-Singkarak fault segments are found the Danau di Atas and Danau di Bawah depressions. Posavec et al., (1973) suspect that the lineament represents an intrusive body below the volcanoes.

(7) Solok - Singkarak fault segment
The Solok - Singkarak fault segment lies dextrally en echelon to the north of the Batang Saliti segment. The Solok - Singkarak fault segment is of predominantly basinal character. Several east-west faults have also been detected; other faults are diagonal to the trend of the main fault zone. Kastowo and Leo (1973) indicate two other N-S striking normal faults a few kilometres to the west of Lake Singkarak.

Best documented is the fault rupture associated with the 1943 earthquake, which was described to us (M. Untung, N. Buyung, E.K. Kertapati, Undang and C.R. Allen, 1984) with remarkable recall by long-term residents in 13 selected localities along a 50 km-long segment of the fault near the town of Solok, between Danau (Lake) Singkarak and Danau di Atas (Figure 1). Since the rupture clearly extended into Danau Singkarak on the northwest, and continued into an area of steep terrain and landsliding southeast of Danau di Atas, we estimate the total rupture length was at least 60 km. Ground cracking parallel to the fault was also described by local residents at least as far south as Surian, 15 km south of the southern border of Figure 1.

Local residents estimated strike-slip displacements in 1943 of up to 5 m, the largest horizontal displacement of which we could be convinced was 2 to 3 m, as represented by an offset road near Saloyo.

(8) Sianok and Masang fault segments
To the north the Solok-Singkarak fault segment is followed dextrally en echelon by the Sianok segment.

The Sianok segment is a comparatively narrow graben-like structure. This segment is joined by another narrow

structure, the Masang segment, that strikes north-south. Both narrow fault segments join without an intervening depression or volcanic range, as has been the case in all previous junctions. Right-lateral displacement that accompanied an earthquake was recorded in Padangpanjang (earthquake of 1926, reported by Visser & Akkersdijk, 1927).

(9) Sumpur fault segment and Bangkuang Terpanggang depression

Verstappen (1973) shows (in his Figure 18) that at the appoximate latitude of Lubuksikaping the Sumatera fault zone may consist of two major strands. One strand is called here the Sumpur fault and includes the town of Lubuk Sikaping, while the second parallel strand passes about 10 km farther to the west. The Sumpur graben joins the Masang fault segment without any appreciable en echelon arrangement.

Towards the north, the Sumpur segment is diposed dextrally en echelon with respect to the Asik segment. The junction between the two segments consists of the more than 40 km long, 9 km wide, Bangkuang Terpanggang basin. Normal faulting with a minimum throw of 450 m is indicated by the west scarp. The east scarp is lower (125 m above the floor of the basin) and has generally sinistral river off-sets amounting to between 70 and 200 metres. Right lateral displacement that accompanied an earthquake was recorded in Lubuksikaping (earthquake in 1977).

(10) Asik fault segment and Barumun plain, Batang Gadis fault segment and Panyabungan depression

The Asik fault segment forms part of the eastern fault strand and is located dextrally en echelon with respect to the Sumpur segment. The western fault strand is formed by the upper Batang Gadis valley that, towards the north, is joined through the 35 km long and 8 km wide Panyabungan depression with the Angkola south segment. The scarps are 150 m (west) and 50 m (east) high. River valley off-sets are all sinistral, between 240 and 300 metres on the west wall, and 160-200 metres along the east wall.

(11) Ula Aer fault segment and Lubukraya-Sibualbuali volcanic range; Angkola-south and Angkola-north fault segments and the Siabu depression

The eastern fault strand continues as the Ulu Aer fault segment that is disposed dextrally en echelon to the Asik segment. The Ulu Aer segment cuts through accidented terrain and is confined to an extremely narrow strip. Dextral river offsets along this stretch are the rule. The 35° trending Lubukraya - Sibualbuali volcanic range forms a 15 km-long positive lineament at the north end of the segment. Along the western fault strand, the Angkola-south fault segment lies dextrally en echelon in the continuation of the Batang Gadis segment. Farther northwards, the Angkola-north fault segment also lies dextrally en echelon with respect to the Angkola-south segment. The two Angkola segments are joined

by the 17 km long 5.5 km wide Siabu depression which has north-south striking margins in addition to those striking parallel to the axis of Sumatera.

The Angkola-north segment ends in the north against the earlier mentioned Lubukraya-Sibualbuali volcanic range.

(12) Batang Toru fault segment and Tarutung depression
The Batang Toru fault segment lies sinistrally en echelon and dextrally en echelon to the north of, repectively, the Ulu Aer and Angkola-north segments. The southern Batang Toru valley is narrow and well defined. The north end of the fault segment is formed by the Tarutung basin. Right-lateral displacement that accompanied earthquakes was recorded in the Tapanuli area (earthquake of 17 May, 1892 reported by Muller, 1895) and attained 1.8 m to 1.9 m in distance, and the Pahajae/Tarutung area (earthquakes of 11 October, 1941; 25 July 1965, and 27 August 1984).

Verstappen (1973, p. 109) sees recent normal faulting in the straight alluvial/lacustrine terrace edge near Tarutung. North-south lineaments are again distinguishable along parts of the basinal boundaries.

(13) Lae Renum fault segment and Kutacane depression
The Lae Renum fault segment continues as a presumably dextrally en echelon strand to the north of the Batang Toru segment. Northwest of the Tarutung valley, lineaments in the so-called 'Sumatera Trend' can be followed up to Dolok Sigotigoti. Beyond this hill, consistent dextral valley displacements of the order of 500 metres or less are shown by the upper tributaries of the Air Doras. With a few gaps of 5 kilometres or more, compatible valley lineaments connect with the extremely well-defined, narrow Lae Renun valley. The Batang Ahirta valley is one of the more distinct lineaments. Dextral river offsets are also evident along the east side of the narrow basin.

(14) Wai Ni Gumpang fault segment
This fault segment lies dextrally en echelon in the continuation of the former segment. It begins as a narrow bundle of parallel drainage lines. Verstappen (1976, p. 116) reports that solfataras occur along the road between Kutacane and Blangkejeran. Blangkejeran lies in a basin, 9 km wide, with parallel fault scarps as flanks.

(15) Krueng Aceh fault segment and Banda Aceh depression
The Krueng Aceh fault segment begins near Pantelima and assumes the usual Sumatera trend. The segment lies dextrally en echelon with respect to the Wai Ni Gampang segment. The apparent 10 km offset is probably due to left slip along the Peusangan fault.

The Sumatera fault zone ends in the triangular alluvial plain of Banda Aceh (formerly known as Kutaraja); the base

of the triangle faces north. A few of the important earthquakes are; in the Aceh area (1964) where there was a displacement of 0.5 m; in the Tapanuli area in 1982, 1983 and in 1984. The general dextral slip character of the Sumatera fault zone is compatible with a regional compression that acts within the sector N 002 - 008 E (Tjia and Posavec, 1972).

Lembang Fault, Java

A 22 km long, northwards-facing scarp that strikes parallel to the long axis of Java and which outcrops amidst young volcanic deposits about 10 km north of Bandung has been designated as the Lembang fault. Twelve rivers and valleys that cross the fault from north to south indicate left-lateral displacements that range between 75 and 250 metres, with an average displacement of 140 metres (Fig. 2).

Anthropological data show that faulting must have occurred between 3000 and 6000 years ago (Van Bemmelen, 1934, 1949, p. 643).

The left-lateral slip component of the Lembang fault is compatible with a SSW - NNE regional compression.

Cimandiri Fault, Java

Many destructive earthquakes have had their epicentres within a northeast striking zone that is located in the Cimandiri River valley (Fig. 3). Katili and Tjia (1968) have mapped a normal fault zone that strikes ENE along the Cimandiri Valley. The downthrown block is to the south. The place the fault zone occupies is near the boundary between an area of tilting and warping (to the south and east) and a large area of folding (to the north and west).

Other faults have been mapped in the area. The Bency normal fault strikes ESE with the down-thrown side to the south due to the Sukabumi earthquake, 1982 (Kertapati and Koesoemadinata, 1982). Surface rupture following the main shock was also mapped by Kertapati and Koesoemadinata. They found mostly strike-slip faulting striking perpendicular to the Cimandiri Valley.

Citanduy Valley Fault and Banyumas Fault

The Cintanduy valley lies between two different morphotectonic complexes; the valley is actually a weak zone in a geological structure of a tectonic result. Simandjuntak (1982) and Sapei (1982) describe the Citanduy valley as a fault zone. Near Banjarsari, in the Citanduy River, Pliocene strata have been slightly affected by the fault. Many destructive earthquakes have had epicentres within a northwest striking zone that is located

between West and Central Java. Between 1961 and August 1971, two shallow earthquakes originated in the fault zone. The analysis of the focal mechanism of microearthquakes in the Citanduy valley shows a reverse fault with a component of a horizontal faulting (Kertapati, Djuhanda and Soehaimi, 1983). From gravity data of Java (density of measurement amounts to one station in very six square kilometres). Untung and Hasegawa (1975) interpreted the structure indicated by the Banyumas depression, or Citanduy valley, as representing normal faulting down-throwing to the east.

A few of the important active faults in Java are (S. Tjokrosapoetro, 1980); Bogotsari fault, Kemulan fault, Dieng fault, Rawapening fault, Semarang fault, Lasem fault, Solo fault, Lawu and Cemorosewu fault. Numerous earthquake epicentres are located within these fault zones. A few of the important earthquakes are; in the Wonosobo area (1924), in the Semarang area (1865, 1872, 1959, 1966, 1968), in the Lawu volcano area (Des 197c, 1981). In the Lasemarea area (1890, 1958, 1959 and 1966) a microearthquake study of the Lasem fault shows reverse faulting (Asdani Soehaimi, E.K. Kertapati, A. Djuhanda 1985).

Palu-Koro Fault Zone, Sulawesi

The Palu-Koro fault zone was formerly known as the Fossa Sarasina graben. It strikes south-southeast and stretches from Palu Bay towards SSE for 300 km on land, while it has a 400 km long submarine extension in the Gulf of Bone (Tjia and Zakaria, 1974).

The Palu bay and Palu valley are bordered by step-fault topography part of which consists of truncated alluvial fans, triangular to trapezoidal facetted scarps (Fig. 4). Farther towards the SSE the fault is indicated by straight narrow valleys that are interrupted by small basins. Within this narrow portion are found abundant indications of faulting: fissured rock, mylonite and striated fault planes (Brouwer, 1947).

The Palu depression which includes Palu Bay and the Palu valley displays graben characteristics and step-faults have thrown reading 60 metres or more. Along the narrower southern part of the segment, sinistral stream offsets in the range of 100 to 600 metres are common features. Occasionally right-lateral displacements occur and have been interpreted as representing lag faults. Katili (1969) also noted consistent left-lateral stream offsets along the tributaries of the Koro River.

A kinematic analysis (Fig. 5, 6, 7) of fault motions of the Palu-Koro fault shows that the fracture system corresponded to horizontal regional compression that acted in an ESE - WNW direction.

Earthquake epicentres from within the fault zone prove the active nature of the fault zone. Three of the better known

earthquakes occurred at Gimpu (1905), Kulawi (1907) and at Kantewu (1934). R. McCaffrey et al., (1978) proposed that two microearthquakes were located in west-central Sulawesi where association with an active tectonic feature is unclear and that three occurred along the Palu fault - North Sulawesi trench system.

The lack of events recorded at Palu suggests that the Palu fault generates very little routine activity. Several large (M > 7.0) earthquakes have been centred on the Palu fault in the past 80 years, however, indicating its long-term importance in the tectonics of Sulawesi.

Matano Fault Zone, Sulawesi

The Matano fault zone is a 170 km-long topographic lineament that extends between Losoni Bay and a point close to Lake Poso in Central Sulawesi. The fault zone strikes WNW, with five sinistrally en echelon segments along the fault zone. Lake Matano occupies a 15 km-long graben that is located at the junction of two en echelon segments. Lateral offsets of lighological contacts are distinctly shown by the distribution of crystalline metamorphic rocks, Mesozoic sediments and ultrabasic rocks. Paralle to the fault zone, offsets amount to 19 or 20 km in the sinistral sense. Younger lateral shifts are represented by multiple sinistral stream displacements in the range of 200 to 600 metres. The Matano fault zone may be the western end of a huge left-lateral shift. Within the Matano fault zone are located three shallow earthquake epicentres that occurred between 1961 and August 1971.

Another of the important active faults in Sulawesi is the Gorontalo fault, as proposed earlier by Katili (1978). R. McCaffrey et al., (1978) reported that stations at Gorontalo and Luwuk show a broad range of S-P times, from 5 to 30 s. The scarcity of S-P times less than 105 at the Gorontalo station suggests that the Gorontalo fault is not a very active feature.

Based on data from the Institute of Meteorology and Geophysics, Jakarta, it is certain that within the Gorontalo fault are located shallow earthquake epicentres (see seismotectonic map of Indonesia).

The Sadang fault: R. McCa frey et al., (1978) reported that the Makale station recorded many local earthquakes with S-P intervals ranging from 5 to 7 s. All of these events occurred within about 50 km north of Makale. The region of intense activity north of Makale lies about halfway between the Palu and Sadang faults and is not easily interpreted. We have data which show that within the Sadang fault are located shallow earthquake epicentres (see seismotectonic map of Indonesia).

The Central Structural Valley of Timor

The so-called "central graben" (Umbgrove, 1949) of Timor extends for almost three quarters of its length along the axis of the island. The central valley reaches widths of 15 km and its morphology agrees with its original designation. However, one central strand of the fault zone that is exposed where the Noil (River) Mina begins, at the confluence of Noil Besiam and Noil Leke, displays features of lateral displacement.

The left-lateral slip along the Mina fault reflects the result of horizontal compression acting within the sector N 155 - 245 E. On 30 July 1975, an earthquake of magnitude 6.1 and of 30 to 50 km focal depth caused damage to man-made structures and activated or developed new mud cones. Its epicentre was located on the island. Three or four shallow earthquake epicentres are depicted on Hamilton's map (1974).

Reverse Fault at Dobo, Aru Island Group

The Aru Islands are situated at the western edge of the Sahul platform. A terrace surface cut in reef limestone near the town of Dobo had been faulted along a plane striking N 355 E and dipping 80 degrees towards the east. Reverse faulting is indicated by the displacement and markings on the fault plane. A 2 metre wide mylonite zone of the same material occurs on the downthrown side. The entire fault plane is located within the intertidal zone, but the fault markings in the calcareous rock look fresh, suggesting the faulting to have taken place within the last 50 years. (Tjia, 1978).

Irian Fault Zone

The Irian fault zone, as defined in this article, comprises (a) the Matano fault belt in central Sulawesi, (b) the Sorong fault zone that consists of a submarine lineament in the Sula Islands and eastward until it appears on land in Salawati and then continues through Sorong and the northern Bird's Head toward Manokwari, (c) the north-northwest trending Ransiki fault zone, (d) the Japan fault zone across Cendrawasih Bay and the Waropen area as a row of mud volcanoes, (e) the Apauwar and Nimboran fault zone, to which probably also belongs the Tolateri-Gauttier fault zone that is parallel to the north coast and is located some kilometres farther to the south, (f) distinct lineaments along the Bewani-Torricelli-Prince Alexander ranges in Australian New Guinea as far east as Wewak.

The Sorong Fault Zone

In the Bird's Head of West Irian the Sorong fault zone represents a distinct boundary between eugeosynclinal rocks to the north and miogeosynclinal rocks to the south. Within the

fault zone mixtures of both rock groups are present. In the western and in the eastern Bird's Head the Sorong fault zone averages 4 to 10 kilometres and sometimes exceeds 10 kilometres in width and comprises both gigantic blocks and slabs of modest dimensions that form a tectonic breccia with confused internal structure, relatively undeformed blocks lying embedded in a cataclastic to mylonitic groundmass. A granite outcrop near Sorong constitutes one tectonic unit of 10 kilometres length. In the northeastern Bird's Head a series of parallel, east-west striking faults and a 10 km wide zone of ultramafic rock seem to define the fault zone.

Vertical and very considerable lateral displacements have occurred in the Sorong fracture zone. Both fault movements persisted at least until the Plio-Pleistocene; near Manokawari, Plio-Pleistocene Befoor strata have been slightly affected by the fault. The left-lateral slip, as envisaged by Visser and Hermes (1962), involves some 350 kilometres since Miocene time.

The earthquake map covering the period 1961 to August 1971 (Hamilton, 1974) records more than a score of epicentres of shallow earthquakes along the Irian fault in Irian Jaya.

On 16 March 1983, an earthquake of 30 to 60 km focal depth generated several sets of subparallel fractures zones following the Sorong fault zone.

The Yapen Fault Zone, Irian

By this name is understood as 95° - lineament that comprises a submarine ridge in western Cendrawasih Bay, the straight north coast of Yapen Island, and a belt of mud volcanoes in the Waropen region (Visser and Hermes, 1962, pp. 192, 170). Yapen Island seems to represent a fractured fault block tilting to the south.

The Yapen fault zone consists of two main faults, the Jobi and the Randaway faults. The WNW - ESE trend, north of the Jobi, is composed of tectonic breccias or a chaotic sheared jumble of volcanics, intrusive and ultramafic rocks. The eatern extension of the fault is shown by a recent fault and mud volcanoes to the Memberamo River, and it runs into a zone of thrust faulting and diapiric intrusion further east.

A few of the important earthquakes in the vicinity of Waropen are: 1941, 1916, 1957 and in the Yapen are 1979.

The Ransiki Fault Zone

The Ransiki fault zone strikes 330°-335° and has been mapped along a distance of 43 kilometres. Four major shear zones, aplite dikes, and fault-bounded gabbro-diorite bodies characterize the fault zone that has a total width of about 1.5 kilometres. However, the Ransiki fault zone appears to have offset dextrally

for a distance of 70 kilometres two segments of the Irian fault belt, that is, the Sorong fault and the Yapen fault zones.

On 29 June, 1961, an earthquake of magnitude 3 to 4, had its epicentre in the Ransiki valley, and the earthquake probably represented movement along the Ransiki fault zone.

Other Active Faults in Irian Jaya

The Yakati-Yamur fault zone (Visser and Hermes, 1962) occurs at the neck of the Bird's Head and runs almost north-south. The fault extends from the Yakati valley to Yamur Lake.

Two shallow earthquake epicentres (on Hamilton's map, 1974) are located in this fault zone.

The Tarera-Aiduna fault zone trends east-west and separates predominantly pre-Tertiary sediments in the north from Tertiary deposits in the south. Immediately to the south of the fault left-lateral motion is implied by the disposition of WNW-striking fold axes in Tertiary sediments. Hamilton's map (1974) shows a close relation between the fault zone and about ten shallow earthquake epicentres.

REFERENCES

Asdani, S., Kertapati, E.K., Djuhanda (1984), Seismisitas Daerah zona Waspada Gempa Indonesia, No. 8. Laporan Penelitian Seismotektonic, P3G, Bandung.

Cardwell, K.R. & B.L. Isacks (1978), Geometry of the Subducted Lithosphere beneath the Banda Sea in Eastern Indonesia from Seismicity and Fault Plane Solutions, J. Geophys. Res., 83, 2825-2838.

Green, R., et al., (1981), Bouguer Gravity Map of Indonesia, Tectonophysics, 71, 267-280.

Hartono, H.M.S., (1984), Tectonic Development of Kalimantan and Adjacent Areas, Bull. Geol. Res. Dev. Cent., No. 9.

Hatherton, T., and Dickinson, W.R., (1969), The Relationship between Andesitic Volcanism and Seismicity in Indonesia, the Lesser Antilles, and Other Island Arcs. J. Geophys. Res., 74, 5301-5310.

Haile, N., (1981), Palaeomagnetic Evidence and the Geotectonic History and Palaeogeography of Eastern Indonesia, The Geology and Tectonics of Eastern Indonesia, Geol. Res. Dev. Cent., Spec. Publ. No. 2, 81-87.

Hedervari, P. and Z. Papp, (1981), Seismicity Maps of the Indonesian Region, Tectonophysics, 76, 131-148.

Johnstone, C.R. & Bowin, C.O. (1981), Crustal Reactions Resulting from the Mid-Pliocene to Recent Continent Island Arc Collision in the Timor Region BMR. Aus. Geol. Geophys., 6, 223-243.

Katili, J.A., (1981), Geology of Southeast Asia with Particular Reference to the South China Sea, Bull. Geol. Res. Dev. Cent., No. 4.

Kertapati, E.K., dkk., (1984), Penelitian Seismotektonik Teluk lampung dan sekitarnya, Laporam penelitian Pusat Penelitian dan Pengembangan Geologi, Bandung.

_____ & Koesoemadinata, S. (1983). Aftershock Studies of the Febr. 10, 1982, Sukabumi Earthquake, West Java, Indonesia, Bull. IISEE, 20, (Spec. Issue), 91-101.

Kieckhefer, R.M., (1980), Geophysical Studies of the Oblique Subduction Zone in Sumatra, A Dissertation Submitted in Partial Satisfaction of the Requirements for the Degree of Doctor of Philosophy in Earth Sciences, University of California, San Diego.

McCaffrey, R., (1982), Preliminary Result of the 1982 Micro-

Earthquake Survey in Nusa Tenggara Timur, Indonesia. Bull. Geol. Res. Dev. Cent., No. 10.

McCaffrey, R., et al., (1983), Microearthquake surveys of the Molucca Sea and Sulawesi, Indonesia, Bull. Geol. Res. Dev. Cent., No. 7, 13-23.

Nishimura, S., et al., (1981), Physical Geology of the Sumba, Sumbawa and Flores Islands., The Geology and Tectonics of Eastern Indonesia, Geol. Res. Dev. Cent., Spec. Publ. No. 2, 1981, 105-113.

Papp, Z., (1981), Temporal variation of elastic strain release in the Banda Sea region, Bull. Geol. Res. Dev. Cent., No. 4.

Pieters, P.E., et al., (1983), The Stratigraphy of Western Irian Jaya. Bull. Geol. Res. Dev. Cent., No. 8.

Rab, Sukamto & T.O. Simandjuntak, (1983), Tectonic Relationship between Geologic Provinces of Western Sulawesi, Eastern Sulawesi and Banggai-Sula in the Light of Sedimentological Aspects, Bull. Geol. Res. Dev. Cent., No. 7.

_____, (1979), Tectonic Siginficance of Melange on the Talaud Island, Northeastern Indonesia, Bull. Geol. Res. Dev. Cent., No. 2, 7-19.

_____, et al., (1981), The Geology and Tectonics of Halmahera Island and Surrounding Areas, The Geology and Tectonics of Eastern Indonesia, Geol. Res. Dev. Cent., Spec. Publ. No. 2, 349-364.

Silver, E.A., (1981), A New Tectonic Map of the Molucca Sea and East Sulawesi, Indonesia, with Implications for Hydrocarbon Potential and Metallogenesis, The Geology and Tectonics of Eastern Indonesia, Geol. Res. Dev. Cent., Spec. Publ. No. 2, 343-347.

_____, et al., (1983), Back Arc Thrusting in the Eastern Sunda Arc, Indonesia; A Consequence of Arc-Continent Collison, J. Geophys. Res., 88, 7429-7448.

Tjia, H.D., (1978), Active Faults in Indonesia, Bull. Geol. Soc. Malaysia, 10.

_____, (1973), Irian Fault Zone and Sorong Melange, Indonesia sains Malaysiana, 2 (1), p. 13-30.

Untung, M., et al., (1985), Rupture along the Great Sumatran Fault, Indonesia, during the Earthquakes of 1926 & 1943, Bull. Seism. Soc. Am., 75, 313-317.

_____, Barlow, B.C., (1981), The Gravity Field in Eastern Indonesia, The Geology and Tectonics of Eastern Indonesia, Geol. Res. Dev. Cent., Spec. Publ. No. 2, 53-63.

Van Leeuwen Th.M., (1981), The Geology of Southwest Sulawesi with special Reference to the Biru Area. The Geology and Tectonics of Eastern Indonesia, Geol. Res. Dev. Cent., Spec. Publ. No. 2, 277-304.

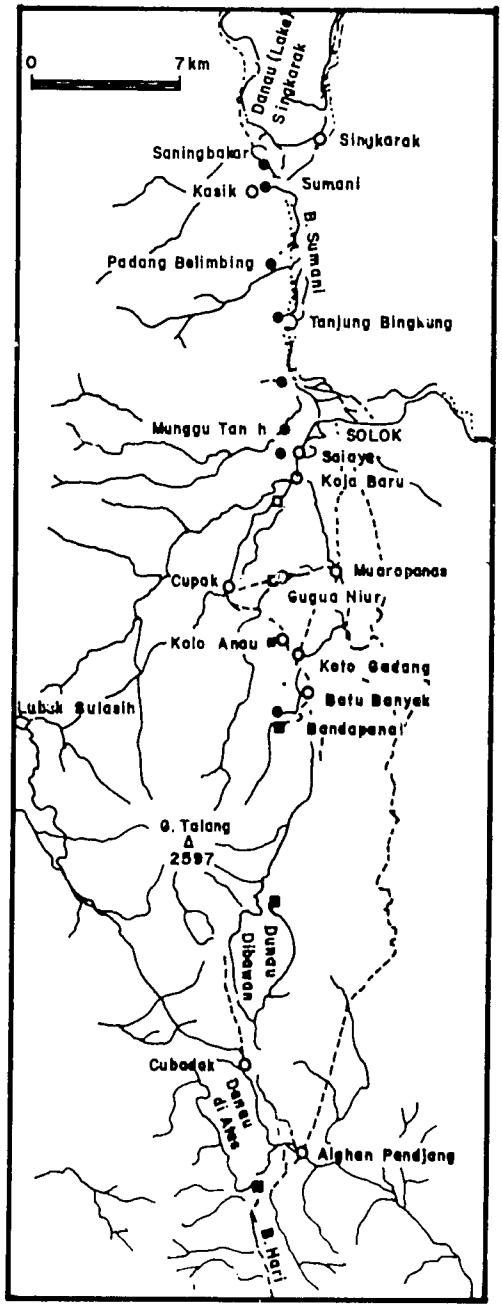


Fig. I Sketch Map Showing Localities (Solid Circles) Where Local Residents Reported Fault Displacements during the 1943 Earthquake. Solid Squares Are Localities of Major Landslides athwart the Fault Trace. Open Circles Are Towns and Villages. Heavy Solid Lines Are Main Roads; Dashed Lines Are Secondary Roads.

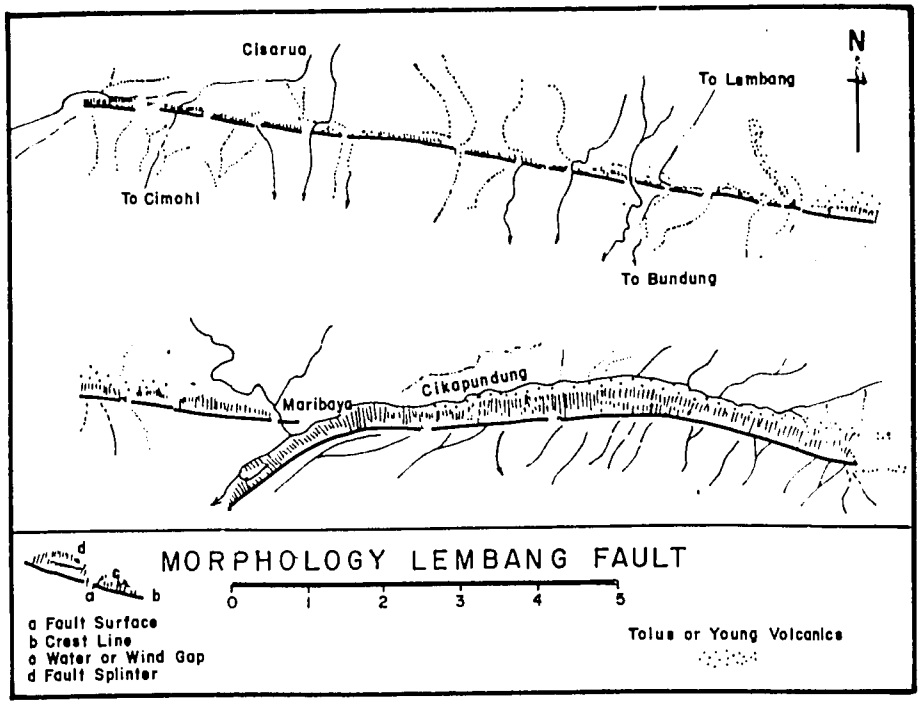


Fig. 2 The Lembang Fault, North of Bandung, West Java. Note Left Lateral Offsets of Valleys. The Right End of the Segment Joins the Left End of the Bottom Segment.

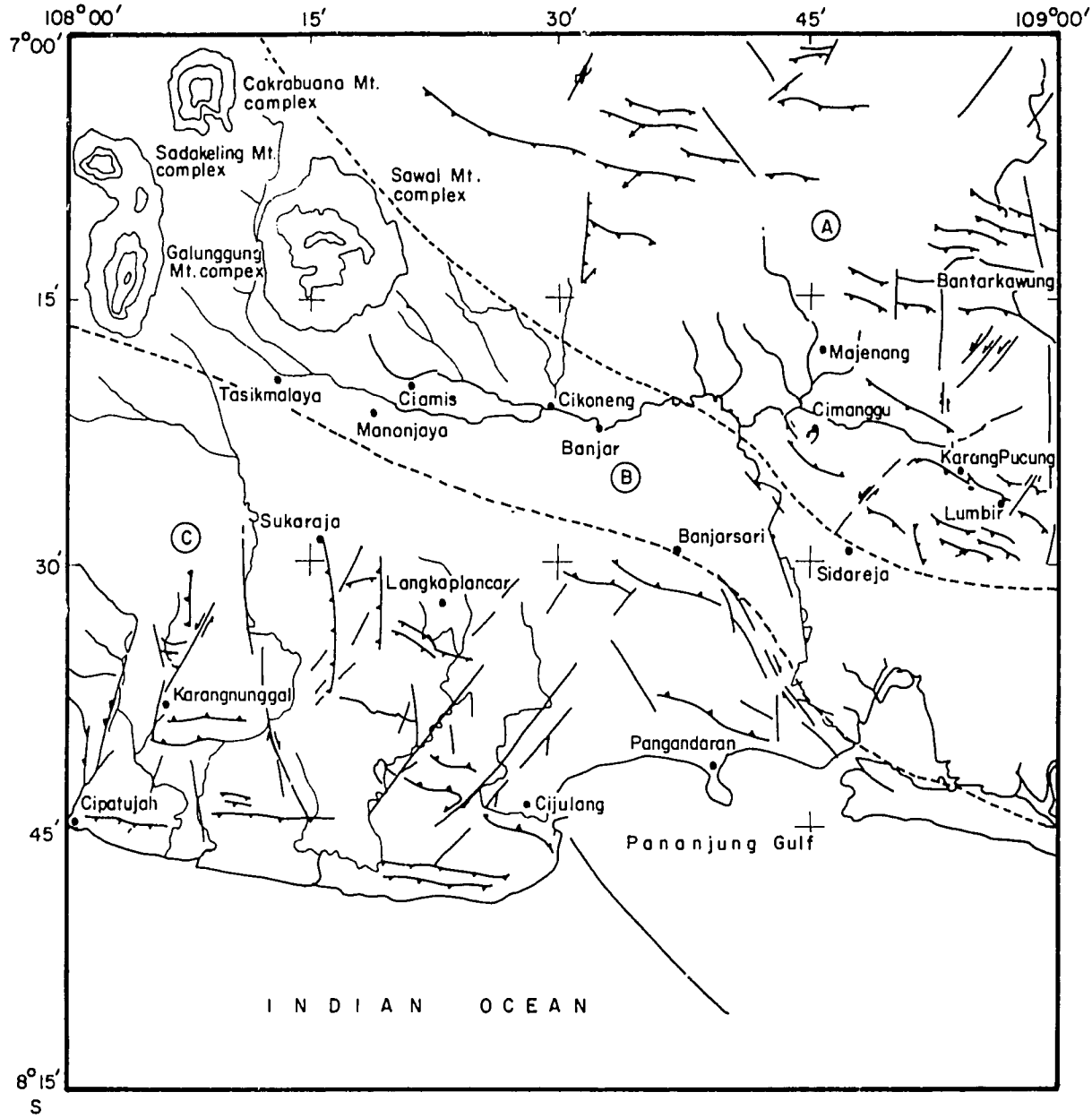
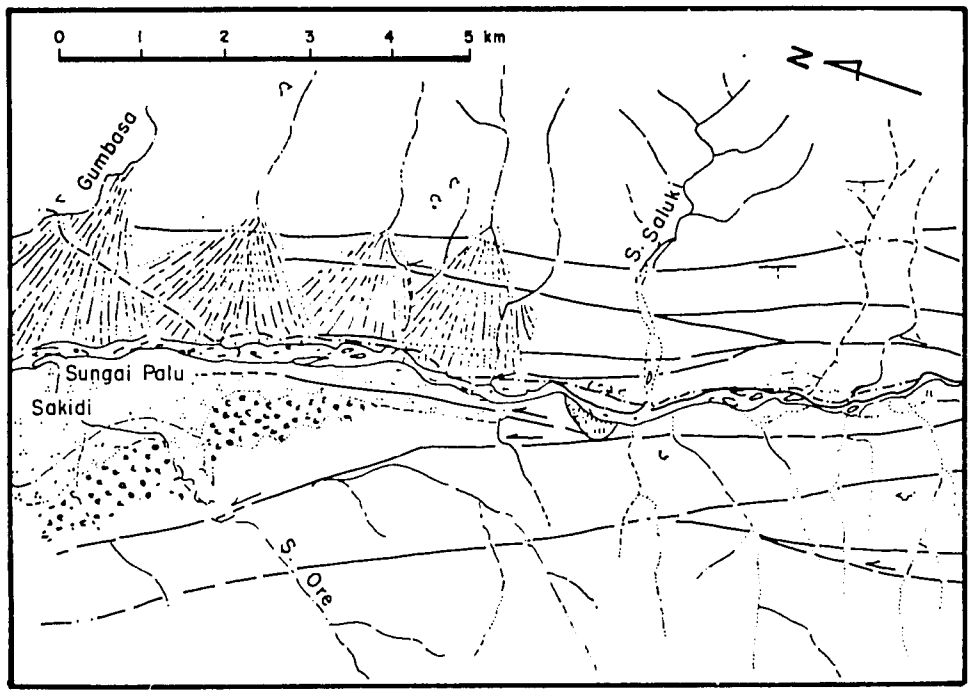


Fig. 3 Cimandiri Fault , Java



Alluvium Occurring as Flood Plain Deposits and Low River Terraces

Alluvial Fans of Contributing Rivers

Colluvium That May Occur as Higher Valley Terraces

Lithological Boundary

Exposed Fault Scarp or Scar by Slumping or Landsliding

Strike Slip Fault

Strike Ridge

Fig. 4 Fragment of the Palu-Koro Fault Zone near Sakidi Village, South of the Gumbasa River Confluence. Lateral Motions Are Mainly Sinistral and Are Fault Plane Markings. Note That Some of the Alluvial Fans Are Transected Suggesting Very Young Ages of the Faults.

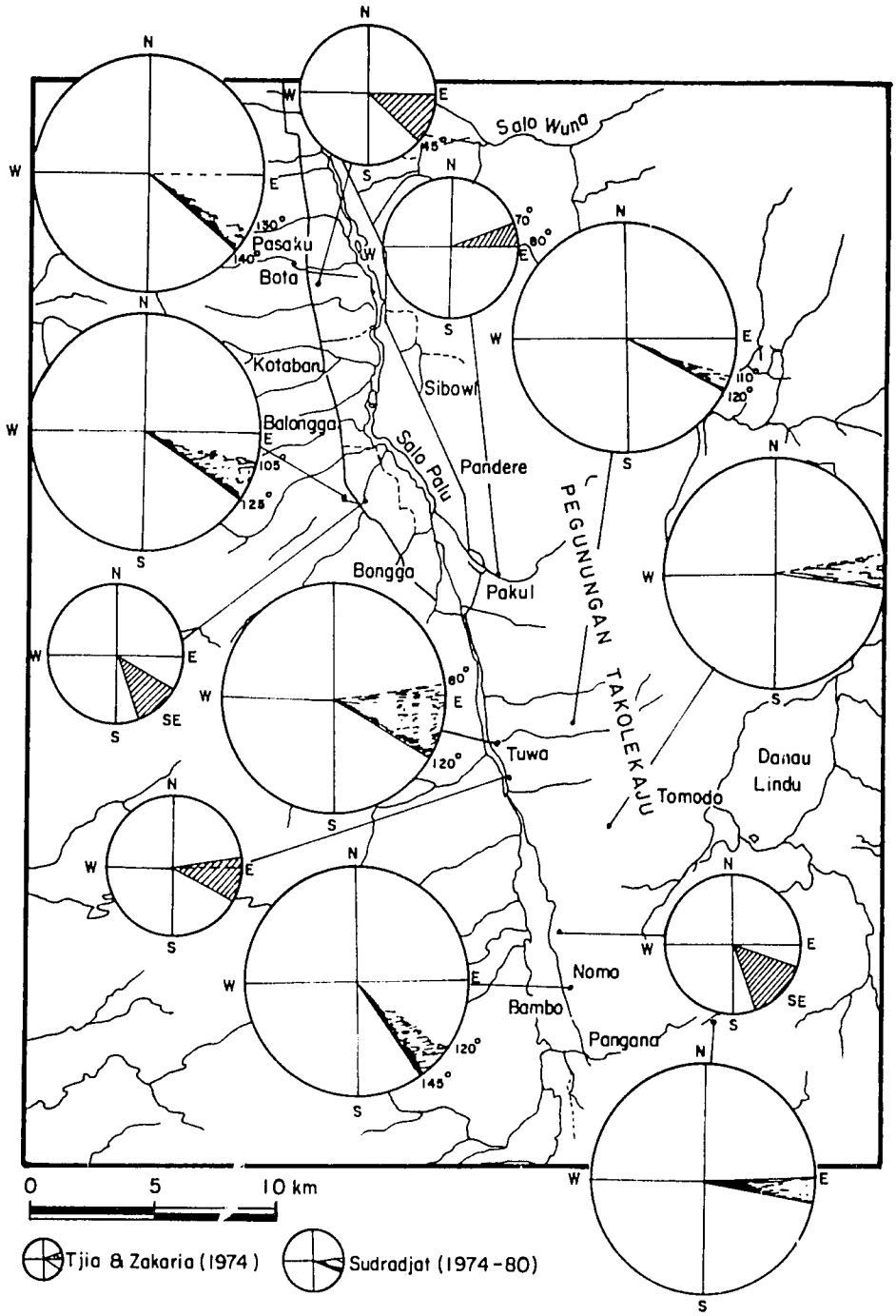


Fig. 5 Fault Traces and Kinematic Analysis of the Palu-Koro Fault Zone

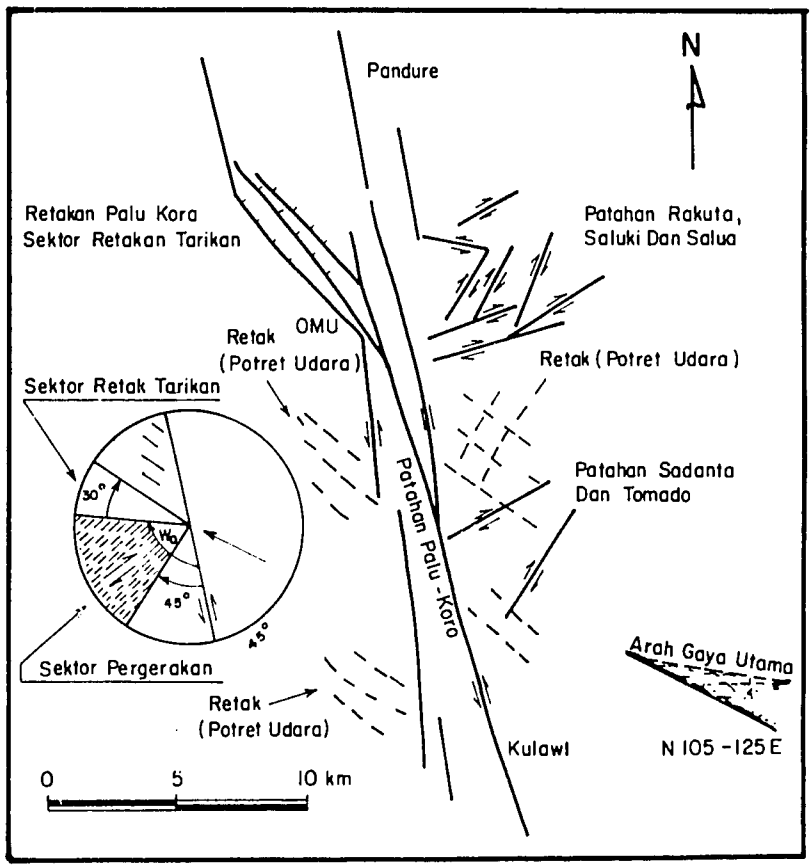


Fig. 6 Fault Traces and Stress Direction of the Palu-Koro Fault Zone

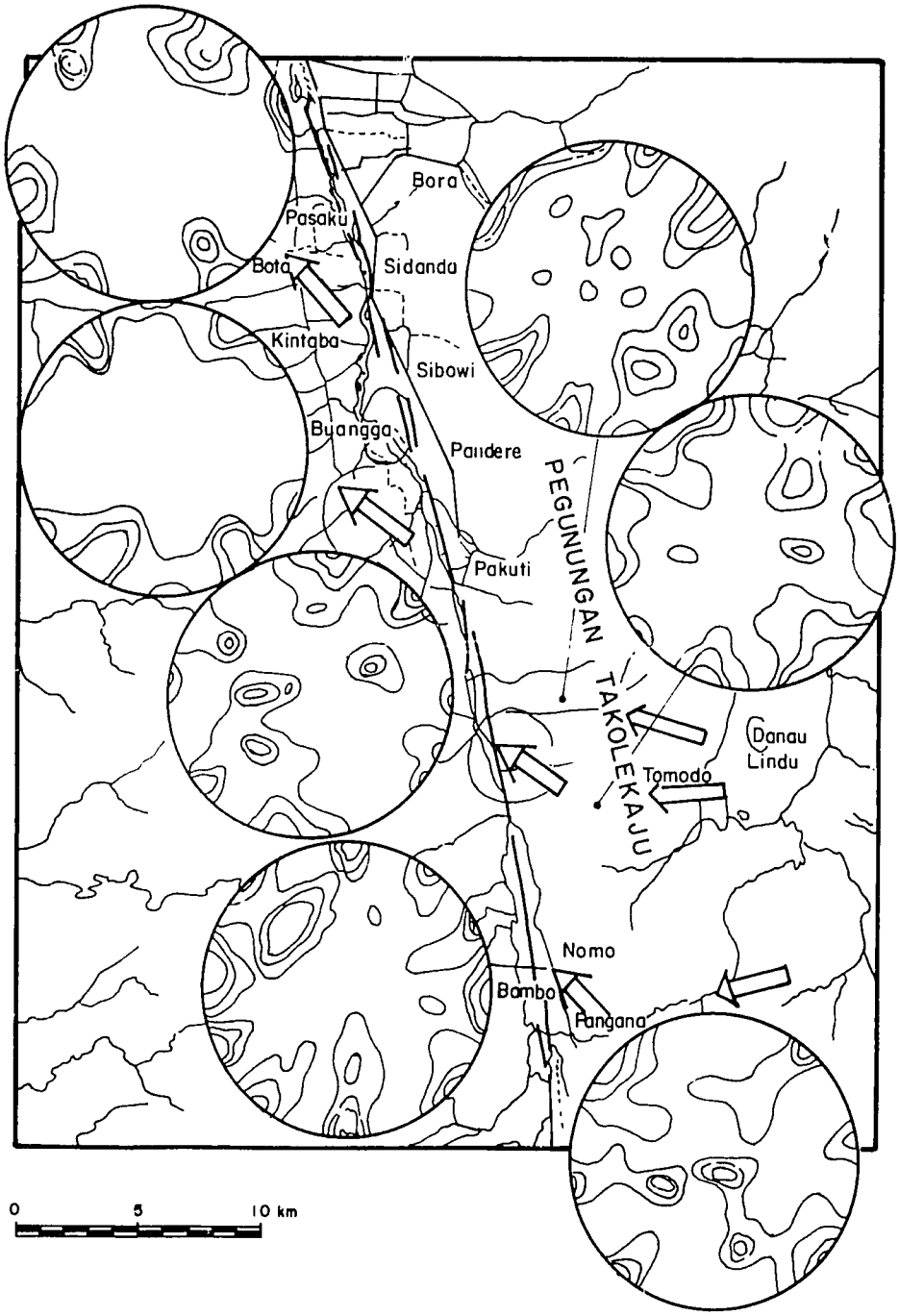


Fig. 7 Fault Traces and Lower Hemisphere , Equal-Area Projection of Fault
(Palu-Koro Fault Zone)