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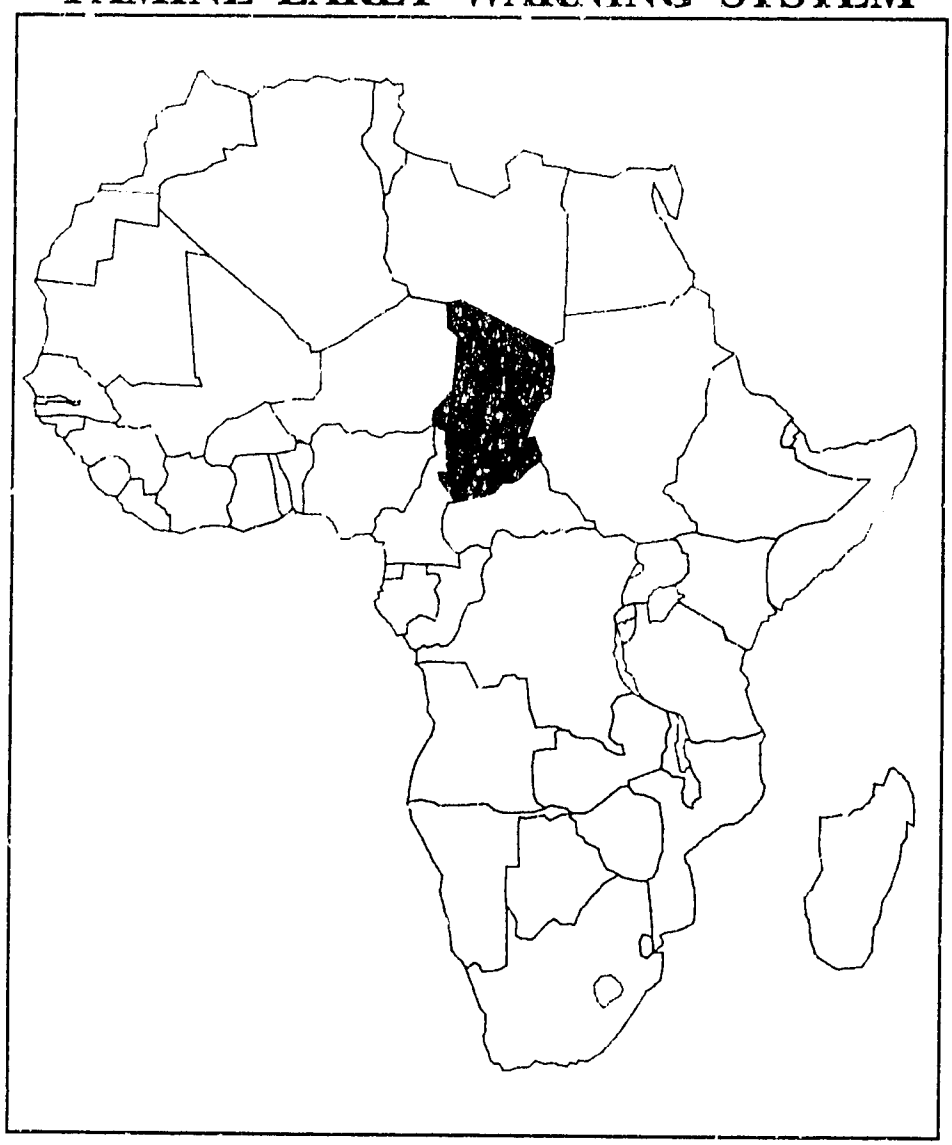
FEWS Country Report AUGUST 1988

CHAD

Optimistic Outlook for Production

FAMINE EARLY WARNING SYSTEM



Produced by the Office of Technical Resources - Africa Bureau - USAID

FAMINE EARLY WARNING SYSTEM

The Famine Early Warning System (FEWS) is an Agency-wide effort coordinated by the Africa Bureau of the U.S. Agency for International Development (USAID). Its mission is to assemble, analyze and report on the complex conditions which may lead to famine in any one of the following drought-prone countries in Africa:

- **Burkina**
- **Chad**
- **Ethiopia**
- **Mali**
- **Mauritania**
- **Mozambique**
- **Niger**
- **Sudan**

FEWS reflects the Africa Bureau's commitment to providing reliable and timely information to decision-makers within the Agency, within the eight countries, and among the broader donor community, so that they can take appropriate actions to avert a famine.

FEWS relies on information it obtains from a wide variety of sources including: USAID Missions, host governments, private voluntary organizations, international donor and relief agencies, and the remote sensing and academic communities. In addition, the FEWS system obtains information directly from FEWS Field Representatives currently assigned to six USAID Missions.

FEWS analyzes the information it collects, crosschecks and analyzes the data, and systematically disseminates its findings through the following publications:

- **FEWS Country Reports** - produced monthly during the growing season, and bimonthly during the rest of the year (for more information on FEWS publications turn to the back inside cover of this report); and
- **FEWS Bulletins** - produced every ten days during the growing season.

In addition, FEWS serves the USAID staff by:

- preparing **FEWS Alert Memoranda** for distribution to top USAID decision-makers when dictated by fast-breaking events;
- preparing **Special Reports, maps, briefings, analyses, etc.** upon request; and
- responding to **special inquiries.**

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The work of the FEWS Field Representatives is coordinated by **Tulane University's School of Public Health and Tropical Medicine.**

NOTE: This publication is a working document and should not be construed as an official pronouncement of the U. S. Agency for International Development.

CHAD

Optimistic Outlook for Production

August 1988

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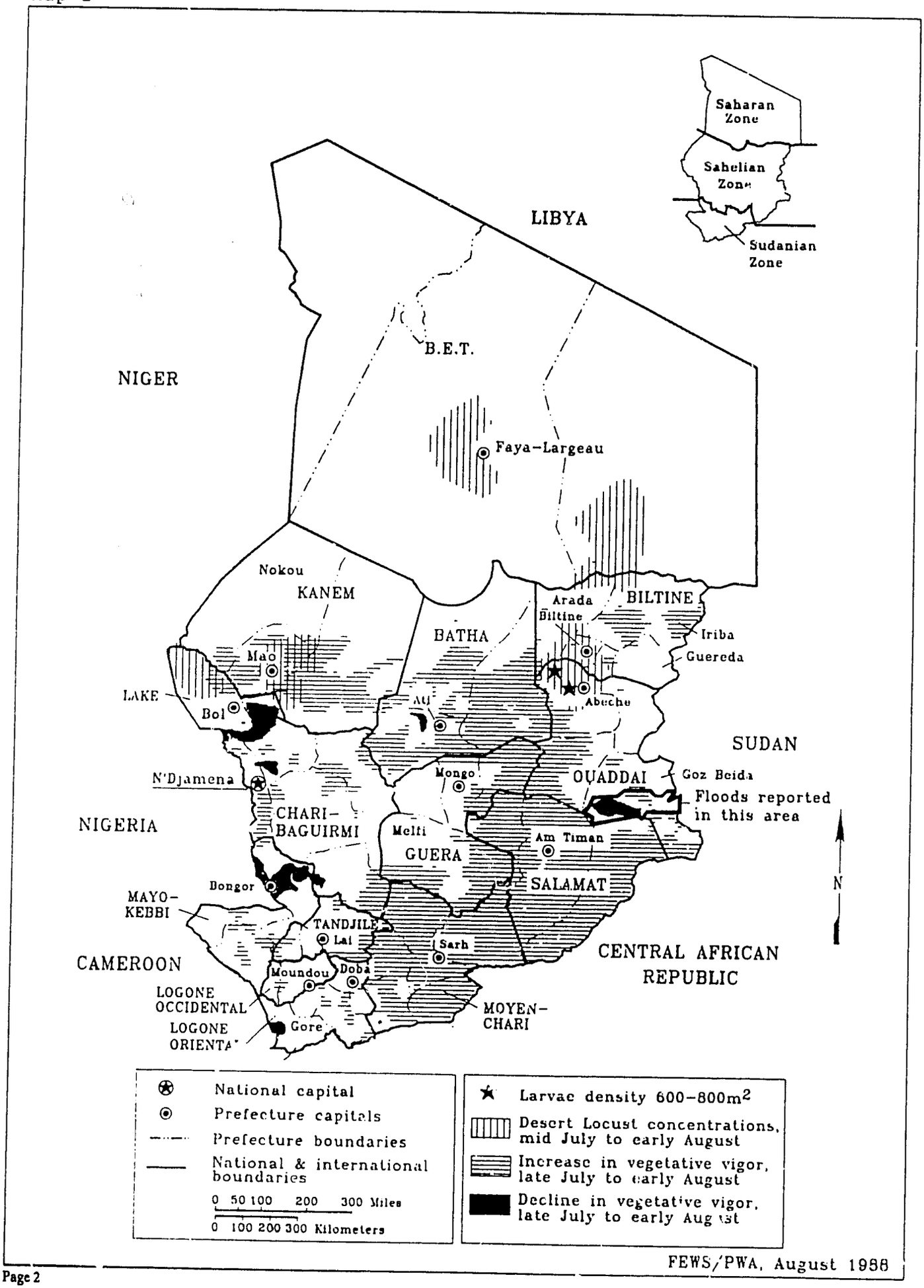
Map 1



FEWS/PWA, August 1988

CHAD

Optimistic Outlook for Production

Summary

Chad's growing season is progressing well throughout most of the country. Rains have been strong and, in much of the Sahelian zone, vegetative conditions are at the maximum seen for early August since 1982 The one area of concern (showing below-average vegetative conditions) is Arada Sub-prefecture of Biltine Prefecture. Unfortunately, the rains have also slowed delivery times to the east (to two weeks) and have caused floods in an important grain-producing area in southern Ouaddai Prefecture. Cereal prices in one Sahelian sub-prefecture (Iriba, in Biltine Prefecture) continued to increase dramatically from May to June, perhaps indicating that food supply problems there are still severe. Desert Locusts in eastern Chad are still quite worrisome. The current generation of hoppers will develop wings by the end of August and disperse beyond current control efforts before laying the next generation of eggs.

Chad Weather, Vegetation, and Crop Conditions

As of August 10, rainfall is close to or greater than the 30-year average at most of the rain stations with complete data. Only one of these stations registered less than 80% of the National Oceanic and Atmospheric Administration's 30-year average for cumulative rainfall (Mao in Kanem Prefecture, a predominantly herding area). While rainfall there has reached only 76% of the long-term average, current rainfall is still twice that of 1986 and 1987. Pasture and crops should exist near this town, where last year they failed.

Crops in the Sudanian zone are now either heading (short cycle sorghum) or in the vegetative growth stage. In the Sahelian zone, crops are also in the vegetative growth stage. A cessation of rains at this time could still mean disaster for Chad's cereal crops. Barring such an event, however, and given that sufficient acreage has been planted, Chad should have an excellent cereal harvest in 1988.

Current satellite imagery shows vegetation levels (Normalized Difference Vegetation Index or NDVI -- see explanation on the back cover of this report) to be better to much better than average for Chad's agricultural areas and much of its potential pastoral areas. The only notable exceptions are south-central Melfi Sub-prefecture in Guera Prefecture and Arada Sub-prefecture in Biltine Prefecture. During the first ten days of August alone, vegetation levels increased substantially over much of the country, indicating a wealth of ground moisture (see Map 1). Although the view of areas in the central and eastern Sahelian zone was obscured by clouds, it is likely these areas experienced green-up similar to that of neighboring areas. Areas of no recent vegetative change along Chad's southern border and adjacent to the Sahara had no obscuring cloud cover. The few areas actually showing vegetative decline over the first ten days of August showed an increase in vegetation over the

period from mid to late July. The areas will be of concern if the pattern continues over the next ten days, verifying that the apparent decline is not an artifact caused by atmospheric interference.

The only Sahelian areas showing less vegetative vigor than in 1987 are Arada, northern Biltine, and southeastern Iriba sub-prefectures in Biltine Prefecture, and south-central Melfi Sub-prefecture in Guera Prefecture. Of these sub-prefectures, Biltine and Iriba also show lower vegetation levels than those of 1986. This might signal a repeat of food supply problems seen in these areas over the past two years. In the Sudanian zone, much more territory shows lower NDVI than in 1987, but only western Bongor Sub-prefecture (Mayo-Kebbi Prefecture) and the southern tip of Logone Oriental Prefecture also show lower vegetation levels than in 1986.

In contrast to these few areas, vegetation levels in most of the Sahelian zone and much of the Sudanian zone exceed the 1982 to 1987 historical maximum for early August. This remains true even when NDVI values are averaged over administrative districts, lumping pixels (geographic unit of satellite data) of much lower NDVI with neighboring pixels of high NDVI (see Map 2); only Arada Sub-prefecture shows average or below-average values. Again, because we have not yet reached the peak of the growing season (in terms of NDVI), predictions of a strong harvest may be premature -- if the rains were to stop tomorrow, yields would be greatly reduced over those of previous years.

Food Security

At mid July, the Ministry of Food Security and Disaster Victims (MSAPS), in conjunction with the multi-donor/ministry/private voluntary organization Food Aid Action Committee (CASAU), devised a plan for distributing the 2,210 metric tons (MT) of recently arrived food aid donated by Japan. The bulk of the planned distributions are to Kanem Prefecture (1,470 MT), with small amounts also planned for Borkou-Ennedi-Tibesti (BET), Biltine, and Guera prefectures. Extensive road flooding will delay the distribution of much of this aid, which may allow the responsible organizations to re-evaluate the distribution plan in light of conditions at the time the roads reopen. In the meantime, the French Aid and Cooperation Fund (FAC) may check the extent of road flooding via helicopter and develop a strategy for getting aid to those areas with the greatest need. From previous reports, such areas might include cantons in southern Chad (which did receive small amounts of aid during July), cantons in Bousso Sub-prefecture of Chari-Baguirmi, and cantons in Biltine and Ouaddai prefectures.

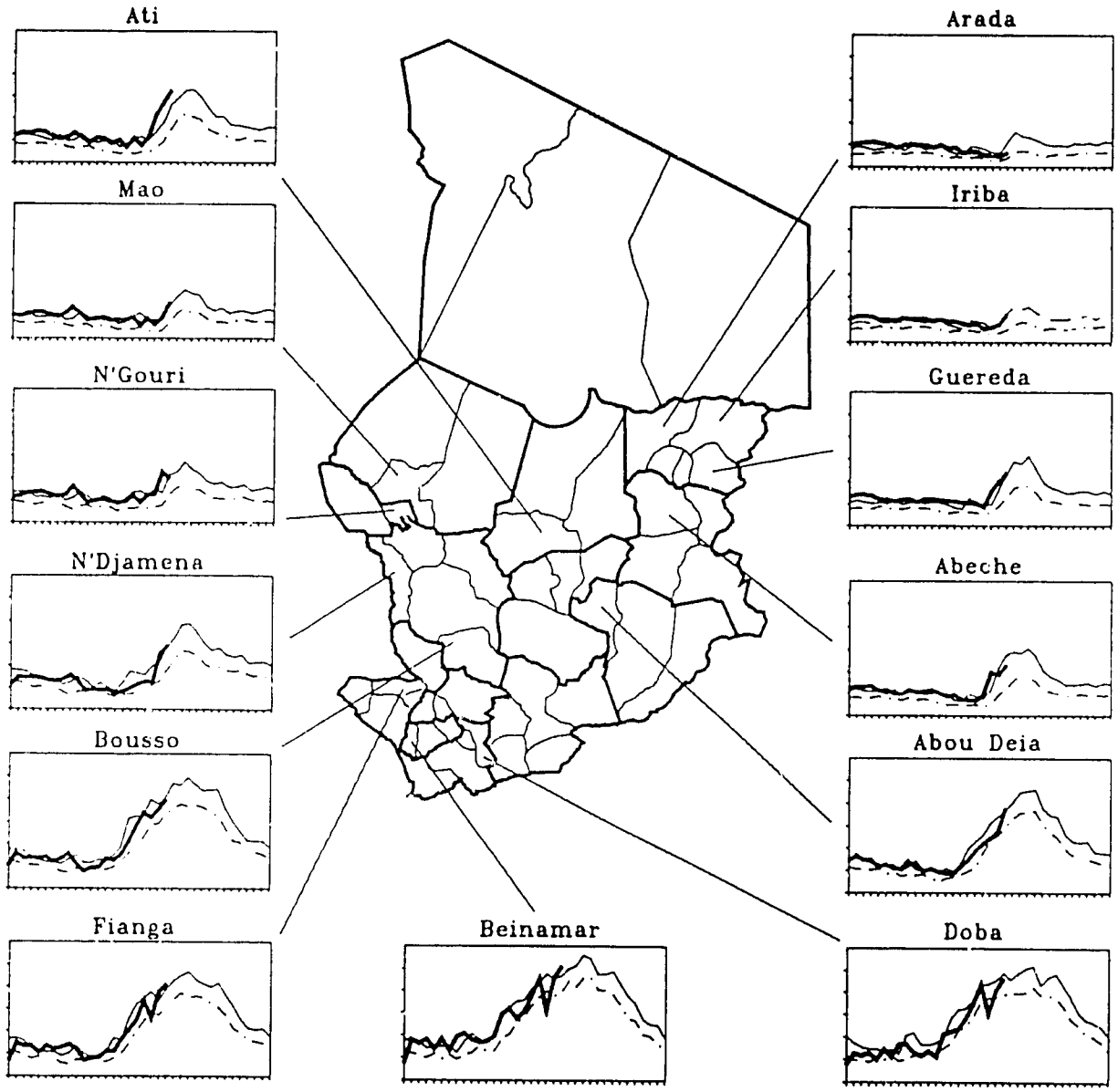
The League of International Red Cross Societies in Chad (LICROSS/Chad) has submitted a request for 3,500 MT of food aid and a transportation-distribution grant for 1989, with which LICROSS/ Geneva has concurred. The food aid should arrive during the last quarter of 1988 and will be distributed over an 18-month period. This pledge is important, as food stocks for emergency distributions are quite low.

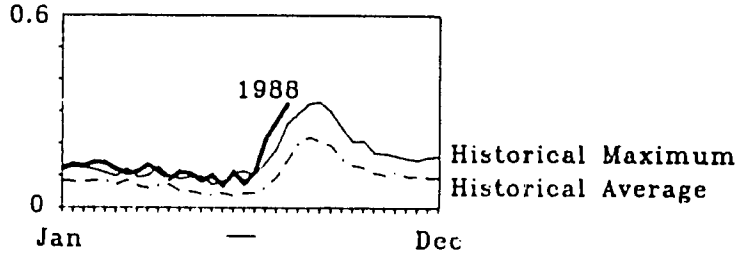
Millet prices (reported by the Système d'Alerte Précoce) in most of the Sahelian sub-prefectures either fell, or rose only slightly from May to June. This is normal price behavior for this time of year. In Iriba Sub-prefecture (Biltine Prefecture), however, millet prices continued the sharp increase evident since April. This may indicate minimal food supplies in the sub-prefecture. Peanuts and maize are now present in Sudanian zone markets, which should relieve food supply pressures existing in some localities since early winter. Because the prices of these commodities are not clear, however, it is not certain that those people most in need will be able to purchase them.

Flooding of the Kadja River and Bahr Azoum is reported to have destroyed crops and houses and drowned sheep and goats in Bahr Azoum, Sygnar, and Mouro cantons of Goz Beida Sub-prefecture, Ouaddai Prefecture (see Map 1). A subsequent aerial assessment by donors and the United Nations Development Program was less pessimistic than the original reports. The total extent of damage and the size of the affected population are not yet clear, although local officials have requested seed aid for

Map 2

Current Vegetation vs Historical Maximum and Average





Source: NOAA/NASA AVHRR GAC Imagery
FEWS/PWA, August 1988

replanting. It is too late for rainfed crops planted now to reach maturity before the end of the growing season. Farmers will have to make up the loss with recessional crops. This is a situation to monitor, as past food production surpluses in Goz Beida have been used by donors and the Government of Chad (GOC) to supply food aid needs farther north.

Desert Locusts in Chad

According to the United Nations Food and Agriculture Organization, more than 2 million hectares (ha) in Biltine and Ouaddai prefectures were affected in early August by Desert Locust hopper bands in early larval stages (see Map 1). Sites of new egg hatching are scattered throughout these two prefectures. By the end of the month, heavy rains in Ouaddai had caused a significant reduction in the locust population in that prefecture. The infestation in Biltine Prefecture has been developing rapidly, however, and is expected to expand northward into BET Prefecture. Steady rains across the Sahelian zone have created favorable habitats for further breeding and are making overland transport of pesticides difficult. If the rains hold through October, the locusts will pose little threat to cereal production as they prefer natural vegetation to cultivated crops. If the rains end early, however, the locusts could cause extensive crop damage in late September or October.

Hatchings and swarms have also been reported in western Chad (and neighboring Niger) and in BET Prefecture. Close to Mao (Kanem Prefecture), hopper densities are reported to range from 100 to 200 insects per square meter. Elsewhere in the west, densities are less similar to those seen in eastern Chad and infested areas are less favorable to Desert Locust development.

Control efforts are in progress in both the west and the east. By the end of July, a total of 4,560 ha had been treated. A further 4,000 hectares have been treated in Ouaddai Prefecture since then. Control efforts in the east have been hindered, however, by damage to a large-capacity spray plane on its way to Chad from Mali. While a smaller airplane and a French FAC helicopter are available in the east for spraying and surveying, the delay of the larger craft has greatly limited the control capacity in eastern Chad. The GOC has offered to transfer a mothballed transport plane from the Air Force to the Ministry of Agriculture's Crop Protection Service if a donor can be found to pay for repairing and refitting the plane for spraying pesticides. Repairs could not be made in time for use in meeting the end of August spraying requirements in the east. Even so, the craft would provide an efficient, effective, and permanent in-country capability that has been lacking and would be most valuable in grasshopper control campaigns later in the year. Two recently arrived USAID spray planes began operations in Biltine Prefecture at the end of August and should be joined there by a survey helicopter in early September. An FAO helicopter and two spray aircraft were also due to arrive at the end of August to join operations in Biltine.

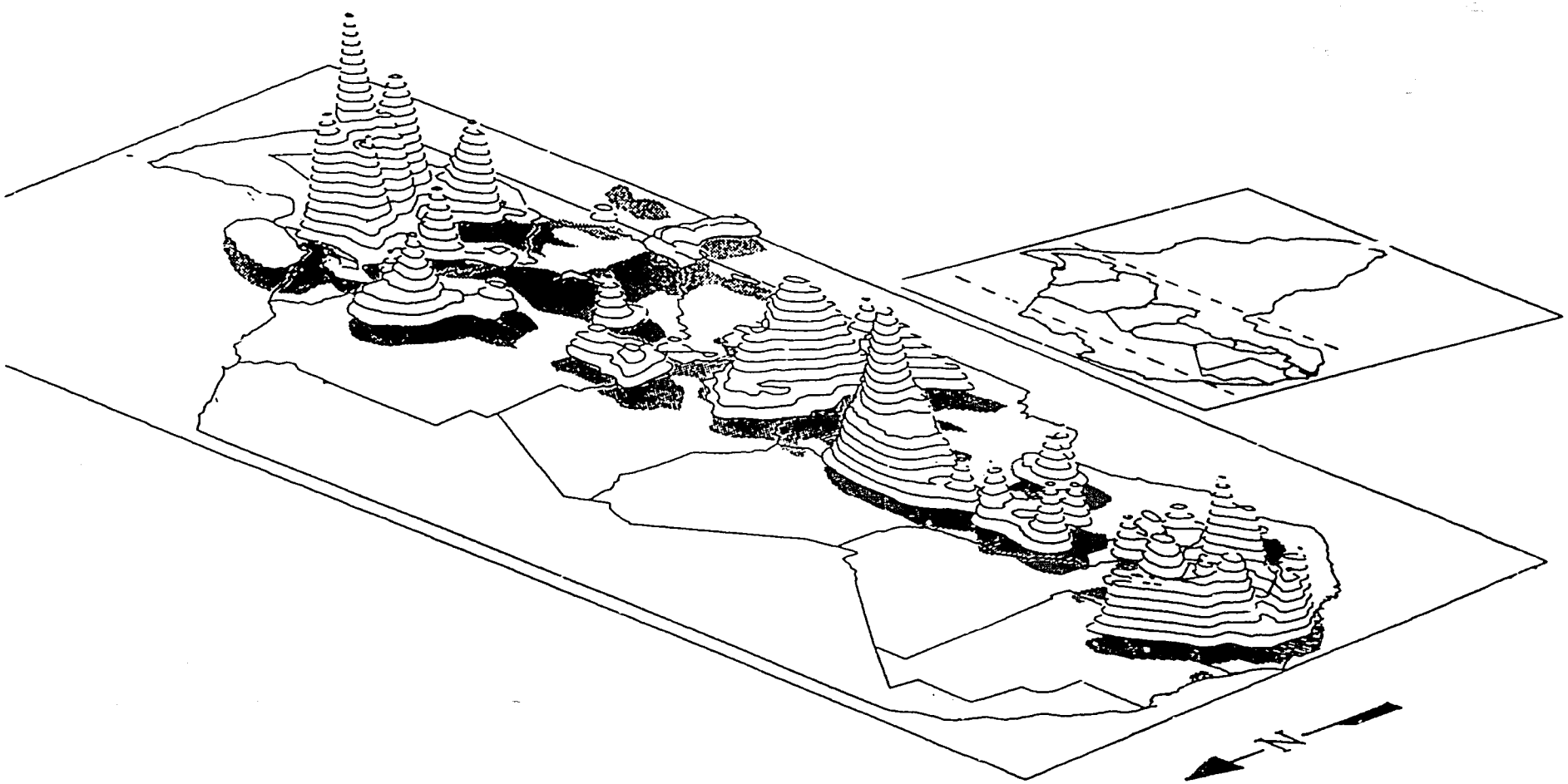
Regional Weather and Vegetation

Unusually heavy rains fell over northern Ethiopia's Blue Nile catchment basin and normally dry Red Sea Coast during the last week of July and the first week of August. Much of northern Ethiopia received over 100 millimeters between July 27 and August 2. Heavy rainfall was evident much farther north than usual in Sudan as well, causing severe flooding in Khartoum and other nearby areas. The very heavy rainfall in northern and central Ethiopia is especially worrisome. Although the Blue Nile is not expected to crest at Khartoum until September, by mid August its excessive height had already caused back-flooding of the White Nile.

The rainy season continues to progress very well over most of the Sahel. The Inter-Tropical Convergence Zone (ITCZ) is still unusually far north, hovering around 19° north and above. Some exceptions to this promising trend should be noted in Senegal, where the rainy season started late. For FEWS-monitored countries, cumulative rainfall for the first ten days of August showed a generally favorable pattern (see Map 3). Only two areas within the FEWS countries have received less than 75%

Early August Rainfall

Contour Interval Equals 5mm



FEWS/PWA, August 1988

of historical average rainfall: southeastern Burkina Faso and an area south of Khartoum. Southern Mali, western Burkina, the eastern half of Niger and all of Chad continue to show above-normal rainfall. Southeastern Mauritania is doing particularly well in a band approximately 100 kilometers wide along the Mali border. This is particularly good news for rangelands in the southeastern corner of Mauritania.

The upper Senegal River catchment basin is receiving average and above-average rainfall, which should bring a good flow to the Senegal from the Faleme and other tributaries below the Manantali Dam. High water levels should benefit the September-November flood recessional agriculture on the lower reaches of the Senegal. The Niger and its tributaries are generally at higher levels than last year, except at Banankoro and Koulikoro, Mali (where water levels are similar to those of last year at this time).

By early August, satellite imagery showed substantial green-up extending as far north as 17° north in Mauritania, 13.5° north in western Sudan and 16° north in eastern Sudan. Some green-up is also apparent in Mali's Adrar. While no increase in vegetation levels was visible in southwestern Niger and in the bulk of Burkina during early August, these two areas still display above-average vegetative conditions. Areas in central Ethiopia that were previously of concern because of below-average vegetative conditions were covered by clouds in the most recently available images. A strong upsurge in NDVI now would not necessarily reflect a favorable outlook for this area's long growing season sorghum and maize.

Satellite imagery for early August confirms the impression that cumulative rainfall this year is considerably greater than in the past several years (see Map 4). This is especially true for Sahelian Chad and western Sudan below 15° north, and in the normally desertic Butana area of Kassala Province in eastern Sudan. Vegetation levels in all three of these areas are much higher than the maximum levels for early August during the last seven years. At the least, these elevated values would imply a great improvement in pasturage over previous years. In agricultural areas, the high NDVI values may herald similarly high grain yields, although it is still possible for rainfed crops to fail should the rains cease after mid August. Scattered patches of historically high NDVI are also visible in agricultural and pastoral areas in the rest of the Sahel, including Desert Locust breeding areas in Mali's Adrar and in the vicinity of Niger's Air Mountains. In Ethiopia, recent rains have raised NDVI levels above the historical maximum along the escarpment in Tigray and Wello Regions. Other areas of Ethiopia, particularly the Hararghe and Bale highlands, still display below-average vegetation levels.

Regional Desert Locust Summary

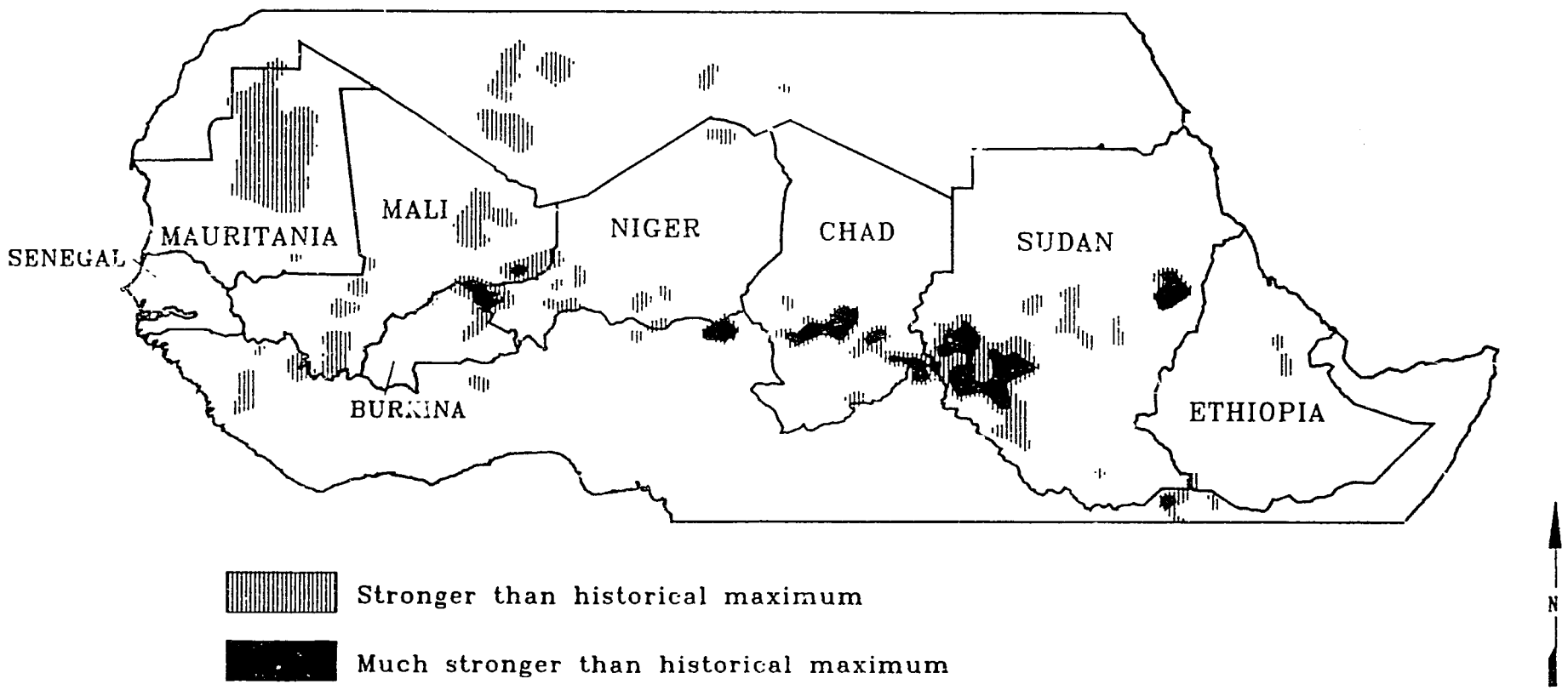
Large desert areas in all the Sahelian countries show above-average vegetative conditions this summer, reinforcing the likelihood that Desert Locusts will find favorable conditions in most of their traditional breeding areas. However, an overall late start in the locust breeding cycle may limit the number of generations to two in most areas, instead of the three feared earlier. The most serious Desert Locust outbreaks (shown on Map 5) remain

- in east-central Chad and bordering areas of Sudan, and
- west of Niger's Air Mountains.

The infested areas in Chad and western Sudan coincide with areas of persistent cloud cover, which would imply a beneficial environment for locust development. Control efforts in eastern Chad are impeded by the delayed arrival of a spraycraft, which sustained storm damage while laying over in Niger. The position of the Inter-Tropical Convergence Zone (ITCZ) over eastern Chad and western Sudan will determine the direction in which the locusts will fly. If the ITCZ remains to the north, the

Much Stronger Vegetation than Historical Maximum

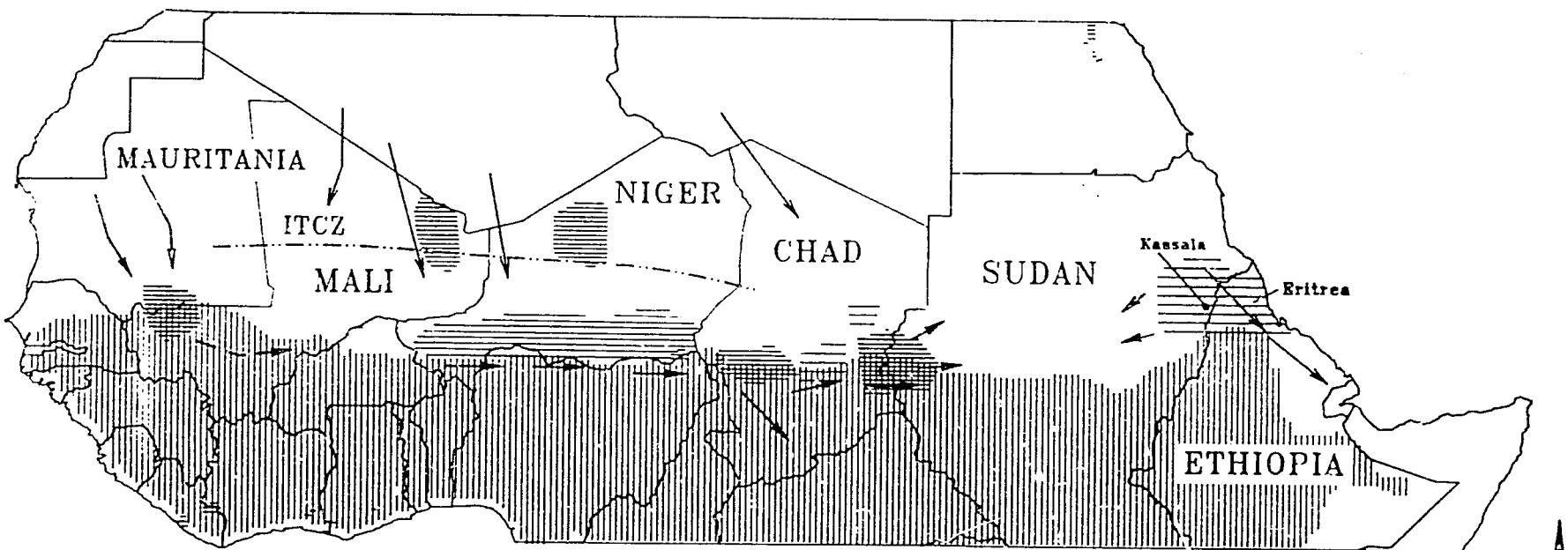
August 1-10, 1988 vs 1982-87 Maximum for Same Decade



Source: NOAA/NASA GAC Imagery
FEWS/PWA, July 1988

Desert Locust Swarms

To August 10



Vegetation index of 0.1 or above, July 1–31

Major Desert Locust sightings

Scattered and broken Desert Locust Swarms

→ Recent movement of swarms and hopper bands

SOURCE: Mission Cables; AID/OFDA/DLTF; NOAA/NASA AVHRR GAC Imagery: NOAA FEWS/PWA, August 1988

accompanying winds will push the locusts to the north and west, into the desert and away from croplands. If the western end of the ITCZ swings south, the Desert Locusts will be funneled into generally advantageous winter breeding grounds in Ethiopia and Somalia. The infestations in northern Niger are important both because of their size and because of their inaccessible location, making control of the area difficult.

Less serious, but still important, outbreak areas include

- the border area between western Mali and southern Mauritania,
- the Adrar des Iforas in Mali,
- a long band across southern Niger,
- west-central Chad, and
- the border area between Kassala Province in Sudan and Eritrea Region in Ethiopia (these areas might become very important later in the season).

The southern Niger outbreak zone and the Mali-Mauritania area contain some recent vegetative growth and recently emerged larvae, but these areas are not considered as great a threat as the outbreak areas in Chad and western Sudan. In southern Niger, the swarms are broken and scattered, making imminent gregarious behavior unlikely; in Mali and Mauritania, the individual infestations are small (making control a bit easier than in other parts of the Sahel).

Recent rainfall in summer Desert Locust breeding areas on the Red Sea Coast could significantly improve breeding conditions. In the fall, Desert Locusts could pose a serious threat to both Sudanese and Ethiopian agriculture.

Key Terms

At Risk - FEWS Reports employ the term "at risk" to describe those populations or areas either currently or in the near future expected to be lacking sufficient food, or resources to acquire sufficient food, to avert a nutritional crisis (i.e., a progressive deterioration in their health or nutritional condition below the status quo), and who, as a result, require specific intervention to avoid a life-threatening situation.

Where possible, food needs estimates are included in the FEWS reports. It is important to understand, however, that no direct relation exists between numbers of persons at risk and the quantity of food assistance needed. This is because famines are the culmination of slow-onset disaster processes which can be complex in the extreme. The food needs of individual populations at risk depend upon when in the disaster process identification is made and the extent of its cumulative impact on the individuals concerned. Further, the amount of food assistance required, whether from internal or external sources, depends upon a host of considerations. Thus the food needs estimates presented periodically in FEWS reports *should not* be interpreted to mean food aid needs, e.g., as under PL480 or other donor programs.

ITCZ - The ITCZ is a warm, moist weather front which originates in equatorial regions and tends to move northward during the Spring and Summer in response to normal global weather patterns. As it oscillates northward, the ITCZ collides with cold air masses descending from Europe, producing the Sahelian rainy season. The ITCZ normally defines the northern limits of possible precipitation in the Sahel. Rainfall generally occurs 100 to 300 kilometers south of the ITCZ.

NDVI - Normalized Difference Vegetation Index (NDVI) images are created at the laboratory of the National Aeronautic and Space Administration (NASA) Global Inventory Modeling and Monitoring System (GIMMS). The images are derived from Global Area Coverage (GAC) approximately 4 km resolution images received from the Advanced Very High Resolution Radiometer (AVHRR) sensors on board the National Oceanic and Atmospheric Administration (NOAA) Polar Orbiting series of satellites. The polar orbiter satellites remotely sense the entire Earth and its atmosphere once each day and once each night, collecting data in 5 spectral bands. Bands 1 and 2 sense reflected red and infra-red wavelengths respectively, and the remaining 3 bands sense emitted radiation in 3 different spectral bands. The NDVI images are created by calculating:

$$(\text{infrared} - \text{red}) / (\text{infrared} + \text{red})$$

for each pixel from the daytime satellite passes. Since chlorophyll reflects more in the infrared band than in the red band, higher NDVI values indicate the presence of more chlorophyll and, by inference, more live vegetation. A composite of daily NDVI images is created for each 10-day period, using the highest NDVI value for each pixel during that period. This technique minimizes the effects of clouds and other forms of atmospheric interference that tend to reduce NDVI values. NDVI is often referred to as a measure of "greenness" or "vegetative vigor." The NDVI images are used to monitor the response of vegetation to weather conditions.