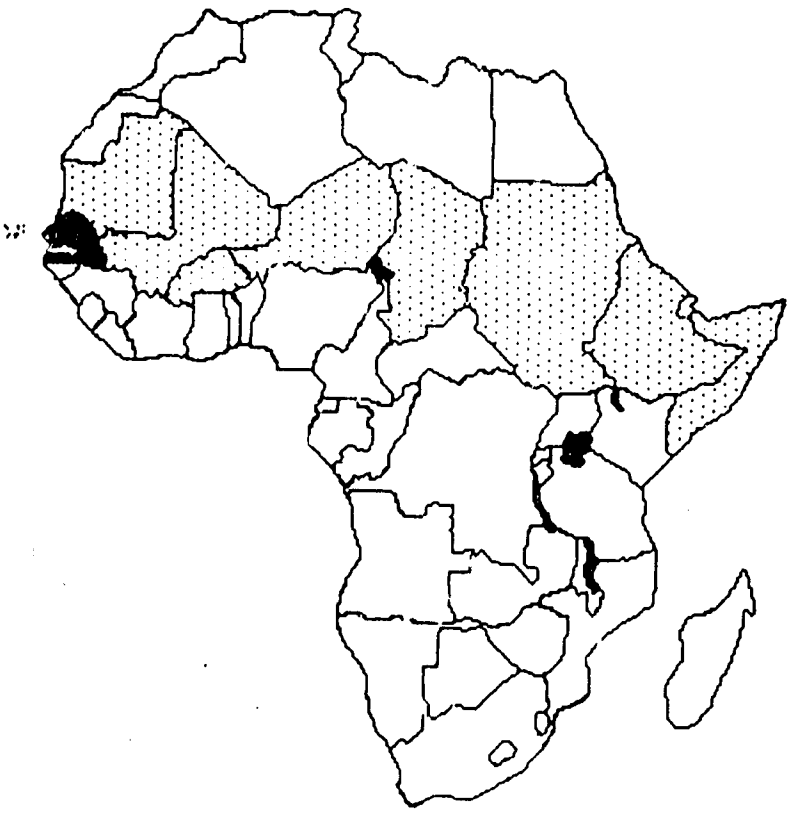
PN-ABE-430
64912

SPECIAL CLIMATE IMPACT ASSESSMENT

SENEGAL



NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)
NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE (NESDIS)
ASSESSMENT AND INFORMATION SERVICES CENTER (AISC)

PREPARED IN SUPPORT OF THE UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

MAY - JUNE 1985

ISSUED ON JULY 15, 1985

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INTRODUCTION

This is the first in a series of monthly assessment reports to be issued for the Sahel/Horn of Africa throughout the growing season by NOAA's Assessment and Information Services Center (AISC). These special reports are designed to use state-of-the-art techniques to (1) analyze rainfall and vegetation conditions and (2) present this information in a format that is useful for both non-technical and technical users alike. They are part of a program supported by USAID designed to significantly improve the capability of the Sahelian countries, as well as Somalia and Ethiopia, to assess the impact of weather on agriculture (food crops and rangeland).

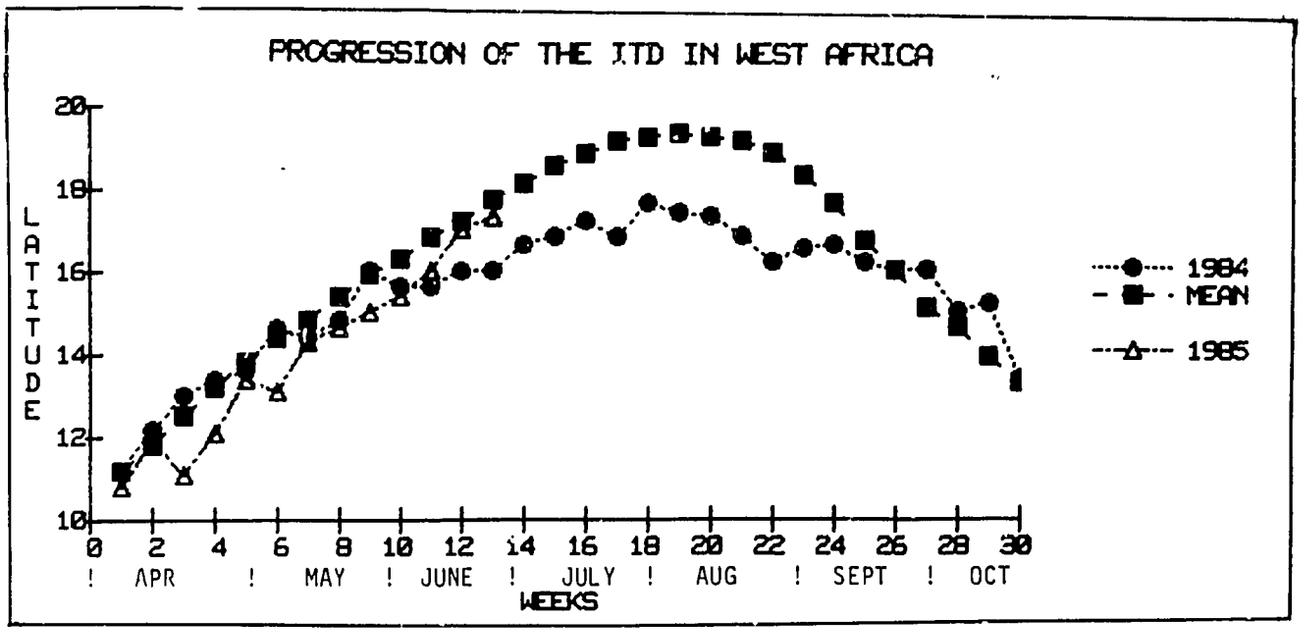
The special assessments, which are air-expressed or hand-carried to U.S. missions in the field, contain satellite images, narrative analyses of all pertinent data, crop and rangeland maps, and various tables and maps depicting crop production and rainfall estimates.

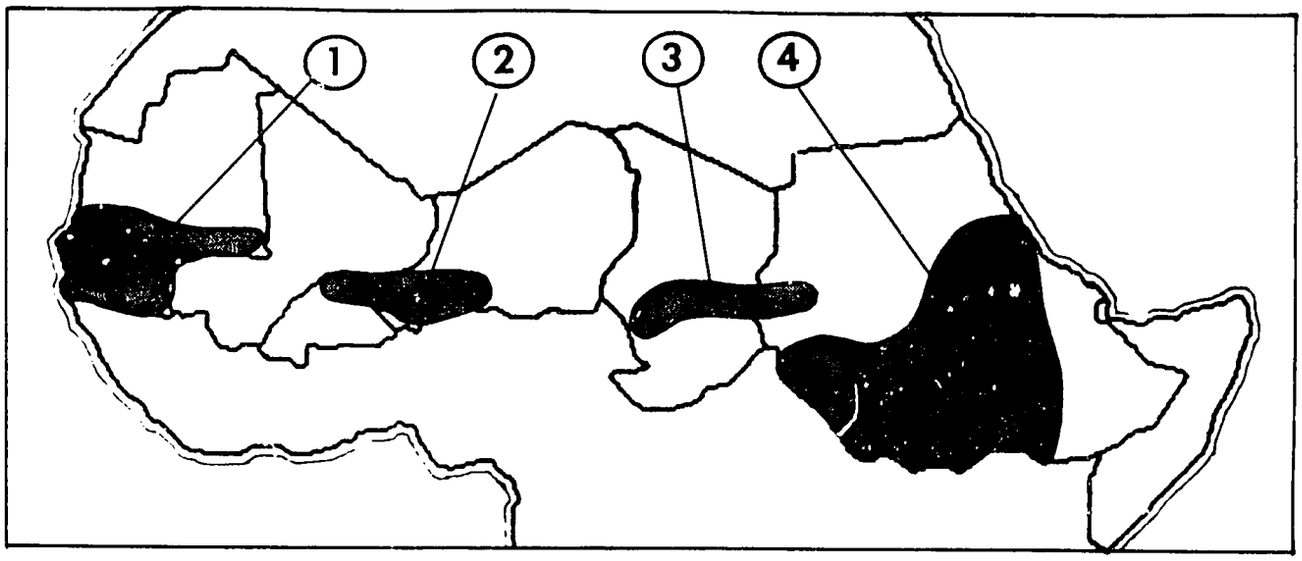
These reports will provide advanced warning of crop failures and facilitate early planning for food crisis amelioration and drought/famine relief.

As required, the special assessments will be updated every 10 days by cable. Beginning with the report issued in August, NOAA/AISC will include quantification of weather impacts on crop yields for major food crops within each country.

REGIONAL ANALYSIS

OVERVIEW





The rainy season got off to a slow start in western areas of the region (see map on page 3), delaying planting and slowing germination of cereal crops. Growing conditions towards the east (Sudan and Ethiopia) have been closer to normal. Even in the west, generous rains in late June and early July improved moisture conditions; overall prospects for the region are now rated better than in 1984.

Grassland conditions appeared poor in June (see page 4) as monitored by satellite. Vegetation had not yet responded to increased rainfall late in the month.

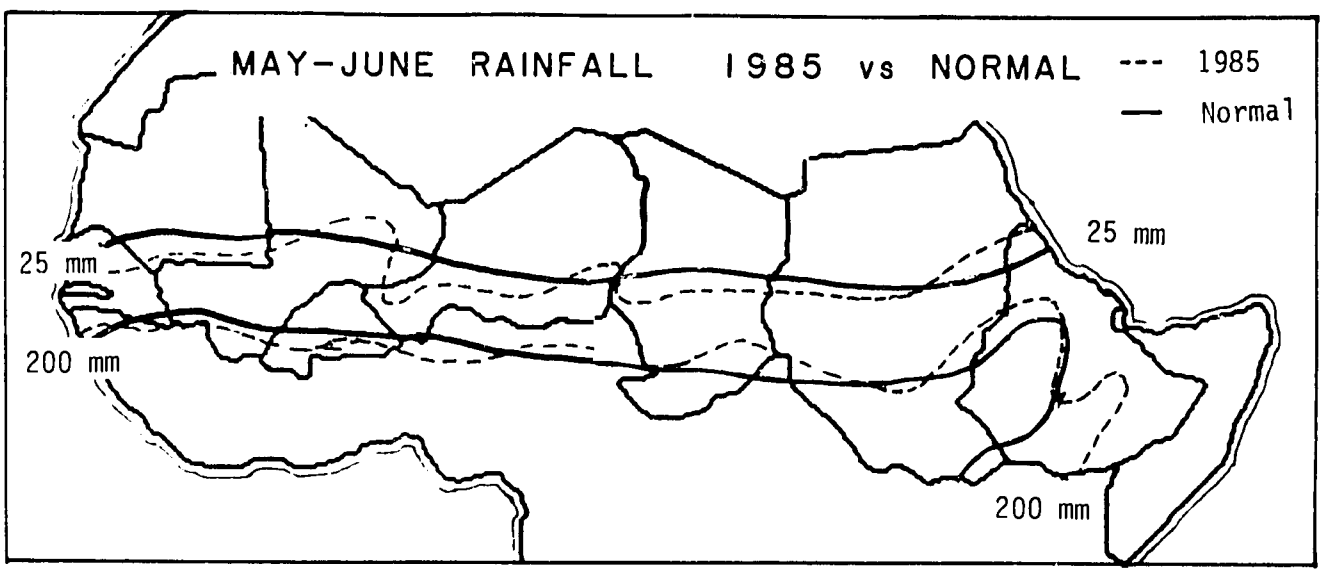
From May until mid-June, rainfall across much of the region from Chad westward to Senegal was below normal due to a lagging northward progression of the Intertropical Discontinuity (see above chart). The ITD, which marks the northern boundary of the moist, southerly air flow, has been close to the mean (based on 1979-'83 data) since mid-June, and is now well north of its 1984 position.

Main areas of concern are Senegal, Gambia, and Mauritania (see area #1 on map above) and Niger and northern Burkina (2). Season-to-date rainfall (page 3) has been close to 50 percent of normal (30-year mean) in these areas, and abundant rainfall through early September is especially important this year.

Some Sahelian portions of Chad (3) were drier-than-normal in May and June, but July rainfall improved growing conditions. The dryness extended eastward into western Darfur in Sudan, according to satellite vegetative data. This part of Sudan, undergoing severe food shortages due to drought last year, received heavy rains in early July, boosting growing conditions but interfering with transport of relief supplies.

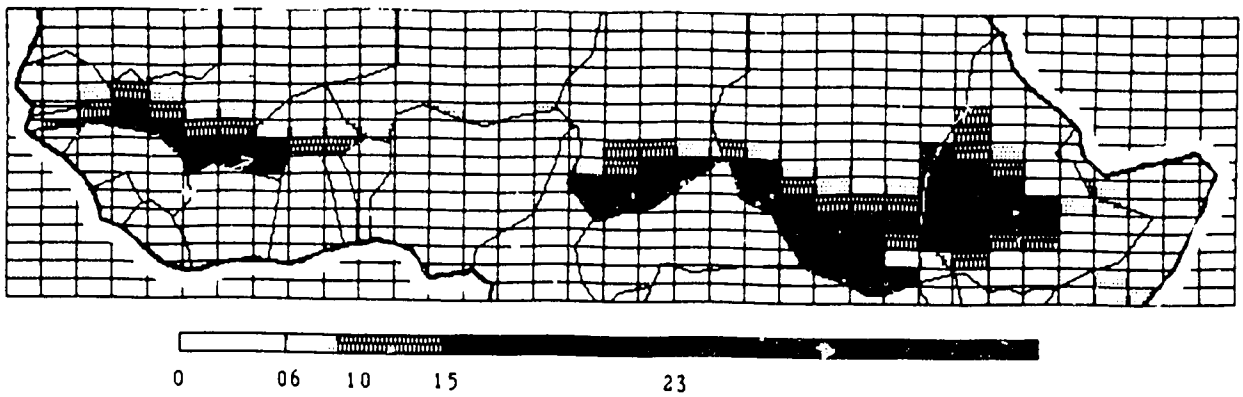
The rainy season began on time in eastern and southern Sudan in May (area 4 on page 2) and in Ethiopia in late June (area 4). Early prospects for main season crops in both countries are improved over last year.

The ACCS satellite image for 1985, which is a 5-km resolution image (page 5), indicates "greening" by late June was mainly limited to southeastern Senegal, southern Mali, southwest Burkina, southern Chad, southern Sudan, and the highlands of Ethiopia (there is considerable cloud "contamination" over Ethiopia in the ACCS image). The 1984 image (page 5), with a 20-km resolution, does not initially indicate much difference from this year's conditions. Quantitative measures of vegetation, however, show that biomass is less than last year in many areas from Chad westward to Senegal (page 4).

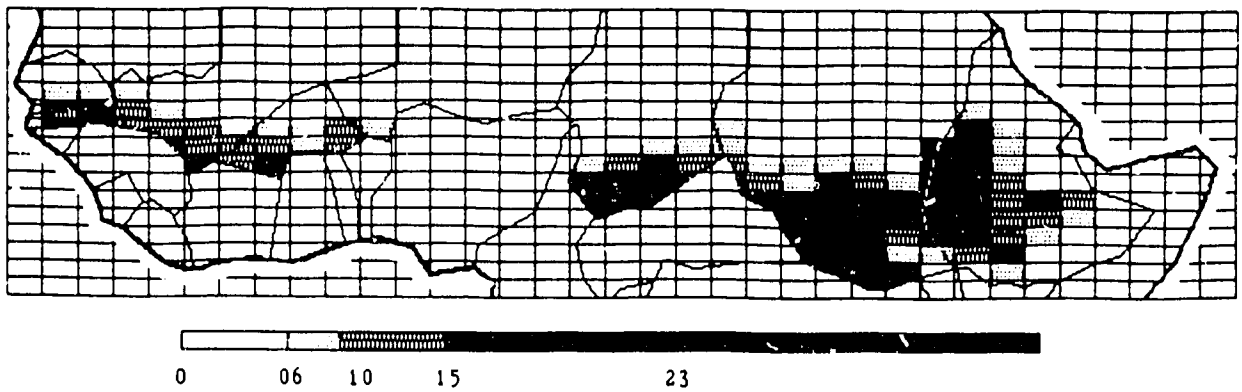


REGIONAL NORMALIZED VEGETATIVE INDEX

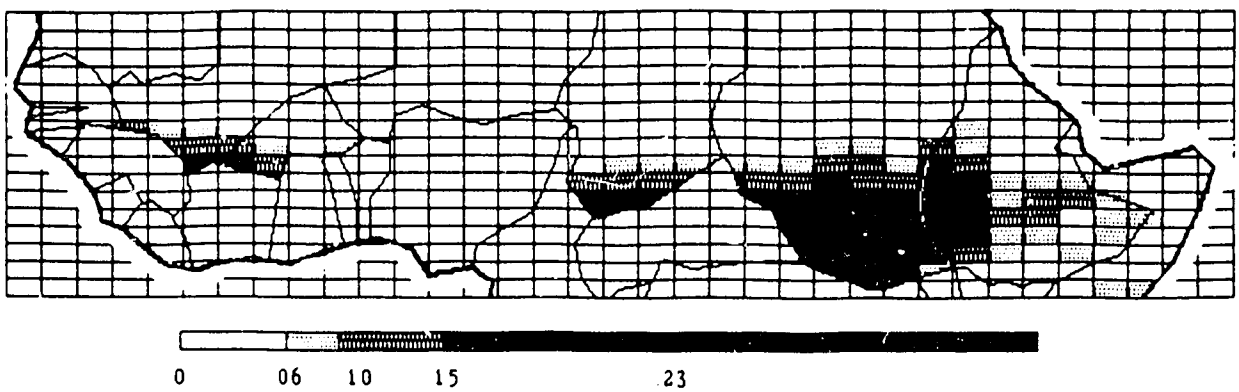
1983



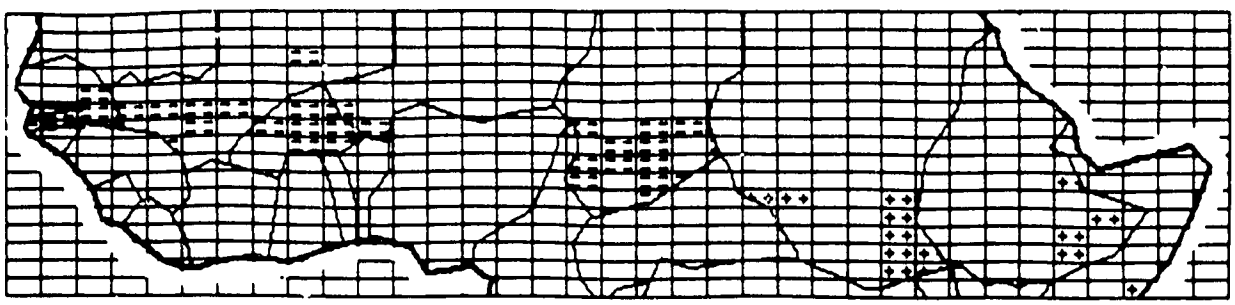
1984



1985

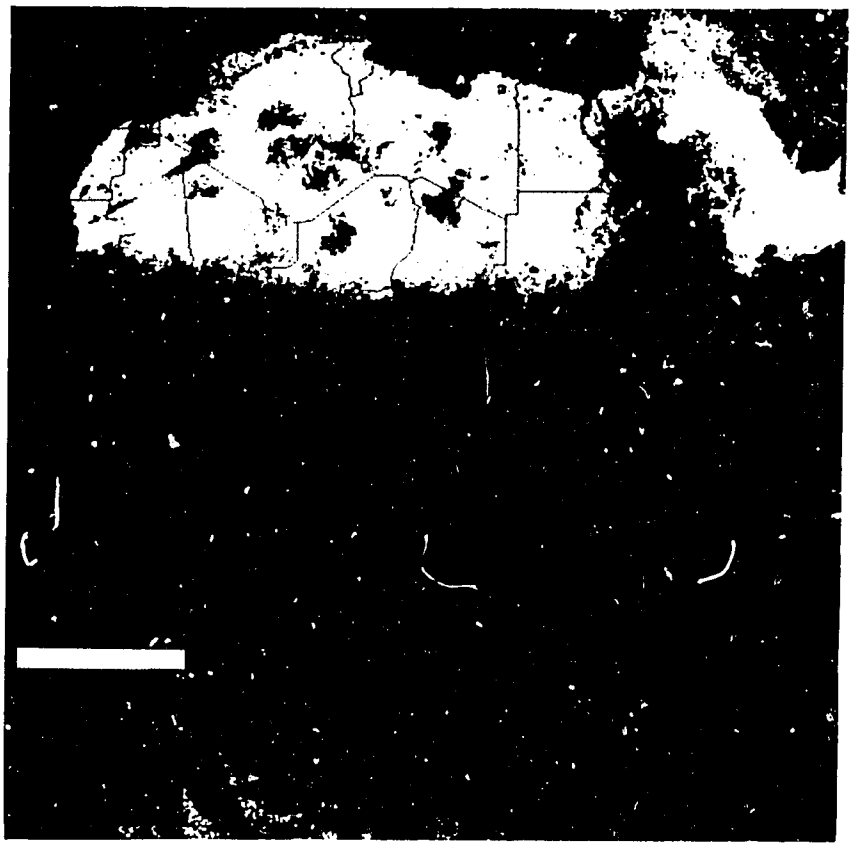


1985 - 1984



1985 greener 1984 greener

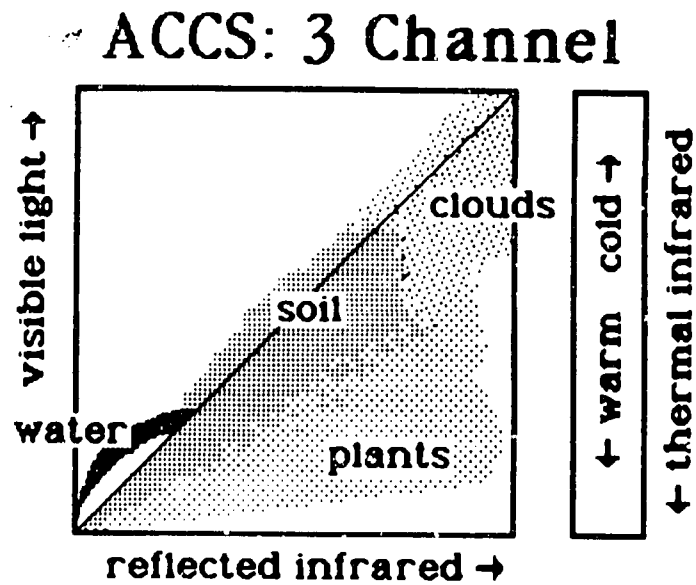
ACCS SATELLITE IMAGE JUNE 21-30, 1984



ACCS SATELLITE IMAGE JUNE 21-30, 1985

EXPLANATION OF THE COLOR IMAGES

The Ambroziak Color Coordinate System (ACCS), used to produce the satellite images in this assessment, shows the health of the vegetation using colors designed to maximize the information content and minimize the analysis time. Different hues (red - orange - yellow - green - cyan - blue) separate vegetation and water from soil and clouds using the visible and the infrared portions of the sunlight reflected from the surface. Saturation (red - pink - white) is used to identify clouds using the emitted thermal infrared radiation. Clouds are usually colder than the surface and they become white when the saturation of the colors is reduced for pixels with low temperatures.



The ACCS is an analysis coordinate system rather than a display system. Most color images use color for display rather than for analysis so people are not usually familiar with analysis systems and they may not even realize that there is a difference. An ***analysis system*** must display (1) all data, (2) without distortion, and (3) in a way that the human mind can analyze it. A ***display system*** (1) presents the results of analysis, (2) emphasizes differences, and (3) reduces the amount of information presented.

The colors of the ACCS display a continuum of hue and intensity which matches both the data and the mind's perception system. Sharp boundaries on the image, shown as large changes in hue, indicate actual sharp changes in surface vegetation.

The only other system which qualifies as an analysis system is False Color IR. It requires two or more years for a trained photo interpretor to learn to use False Color IR imagery for operational crop monitoring. Training courses have shown that the ACCS requires less than two weeks to learn to use it operationally and the analysis can be done much more accurately and quickly.

THE MEANING OF THE COLORS

Hue	Intensity	
	dark	**bright**
red	wet or dark soil*	sand or low clouds
yellow	emerging or sparse plant cover over wet of dark soil*	emerging or sparse plant cover over sand or under scattered clouds
green	very healthy plants combined with standing water or forest	healthy field crops or similar plants
cyan	dense forest	dense forest, maize, or rice cover
magenta	clear shallow or slightly turbid water	highly turbid, very shallow, or partially cloud covered water

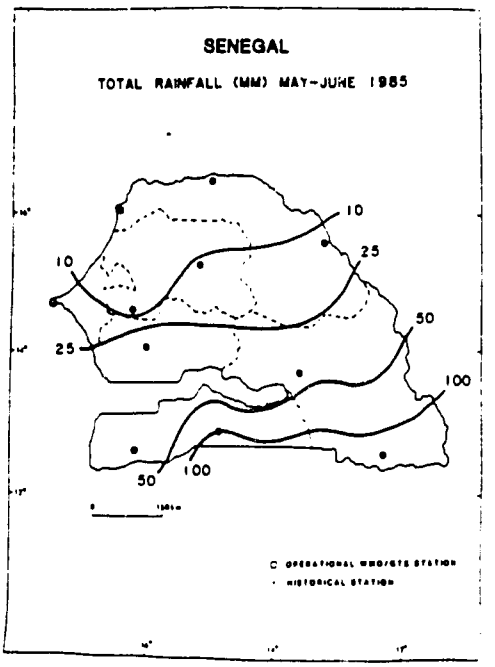
Colors Without Hue

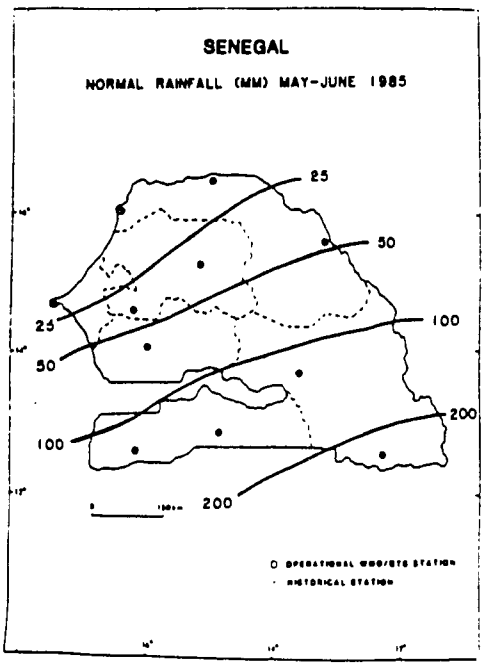
black	clear deep water or dark shadow
white	clouds, snow, or colder high terrain

* Dark reds, oranges, and yellows are shades of brown.

COUNTRY ANALYSIS

CURRENT ASSESSMENT





Because of the delayed beginning of the 1985 rainy season, vegetation/biomass conditions throughout most of Senegal are behind schedule compared to 1984 and 1983 (see pages 11-14). Normal crop planting in southern Senegal occurs from mid to late June; the 1985 planting conditions were generally favorable in southern Senegal by the second and third decades of June. This coincides with normal planting schedules.

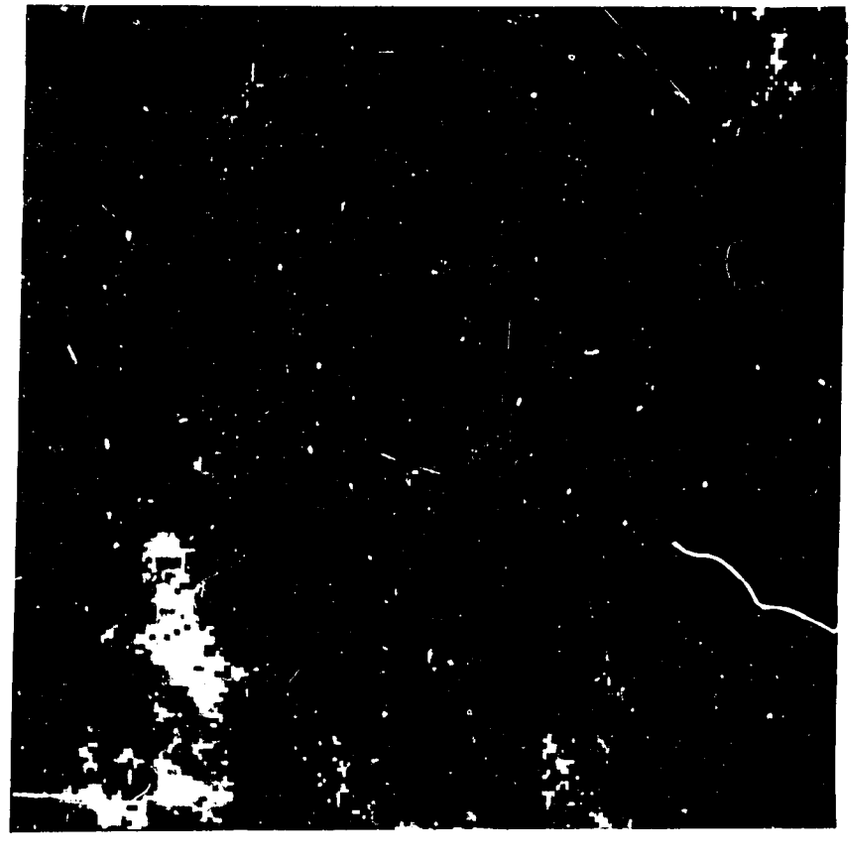
Satellite index analysis indicates that vegetation/biomass conditions at the end of June 1985 were significantly less advanced than those at the same time for 1984 and 1983. This is strongly supported by analysis of station rainfall amounts for June 1983/1984/1985, in mm:

Ziguinchor	108/265/41
Kadougou	156/272/148
Kolda	58/224/98
Tambacounda	94/126/40
Kaolack	28/180/32
Dakar	10/8/13
Diourbel	49/9/7
Linguere	16/154/18

Favorable rainfall conditions for planting of grain crops occurred only in the southern regions during June (third decade at Ziguinchor, Kaolack and Tambacounda; second decade at Kolda; and first decade at Kedougou). Crops planted at these times received timely rainfall; however, crops planted earlier suffered some moisture stress after emergence.

May rainfall was essentially 0 throughout the whole country. Rainfall did not begin in June until the third decade except at Kolda and Kedougou in the south. June rainfall was 80-90% of normal at Kolda and Kedougou (100 and 163 mm respectively), 70% of normal in the central regions of the country and only 40% of normal at Tambacounda and Ziguinchor. Percent normal May-June rainfall was comparable.

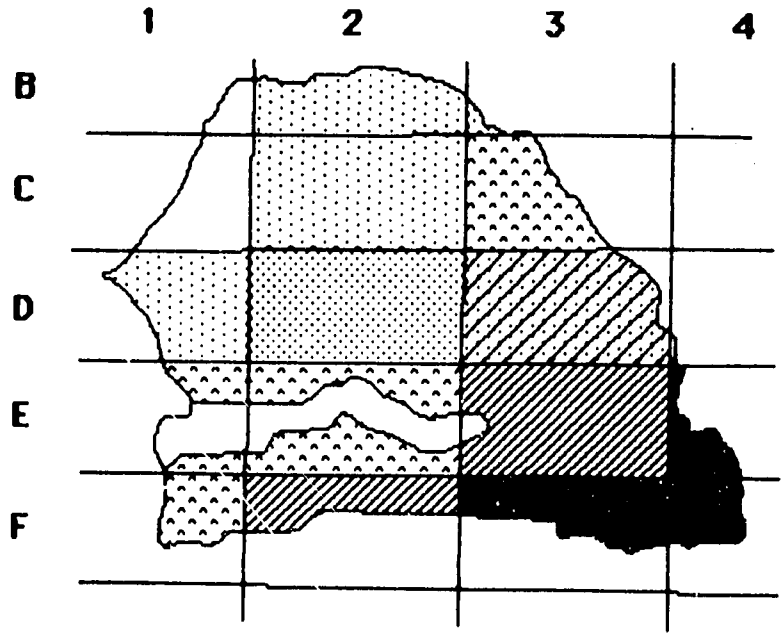
ACCS SATELLITE IMAGE JUNE 21-30, 1985



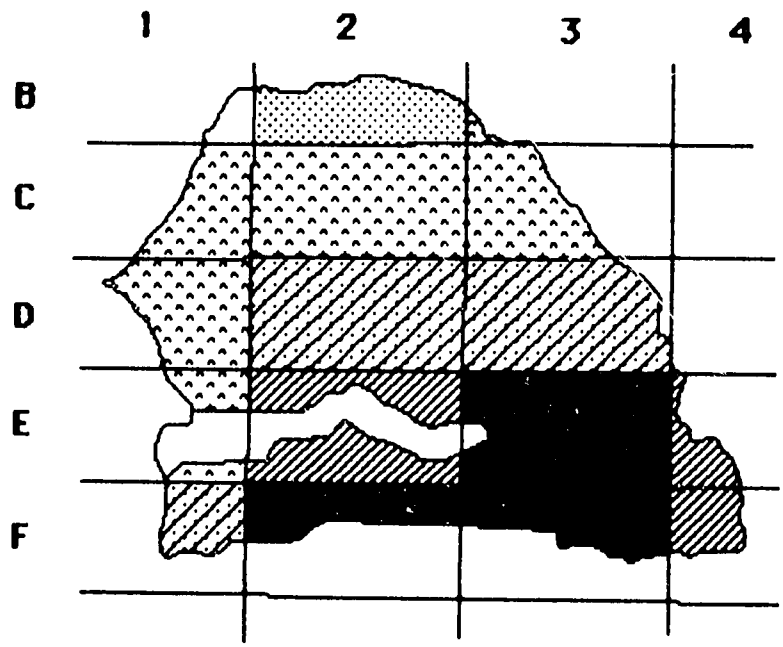
NORMALIZED VEGETATIVE INDEX

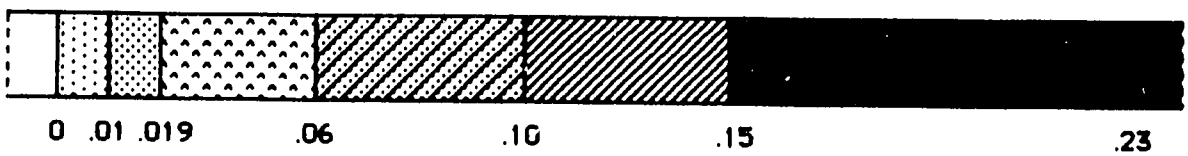
(LAST WEEK OF JUNE)

1983



1984

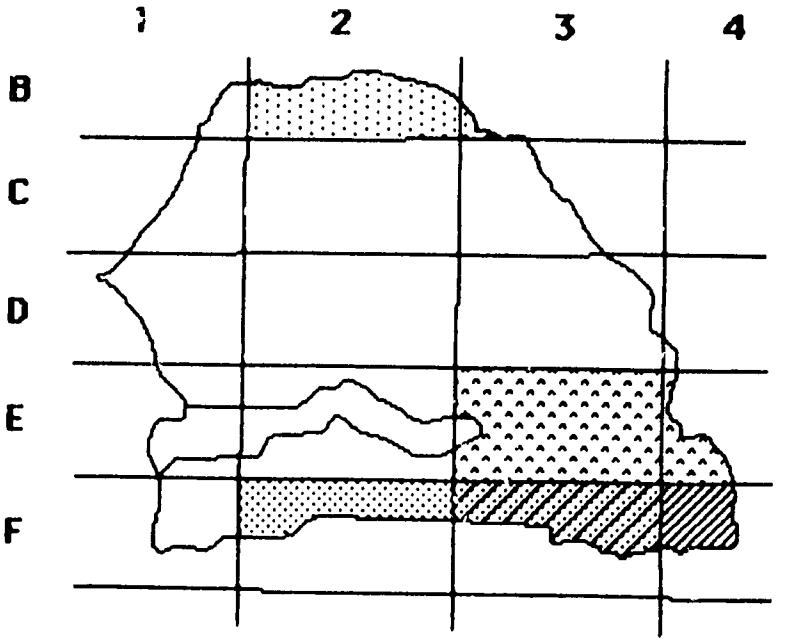


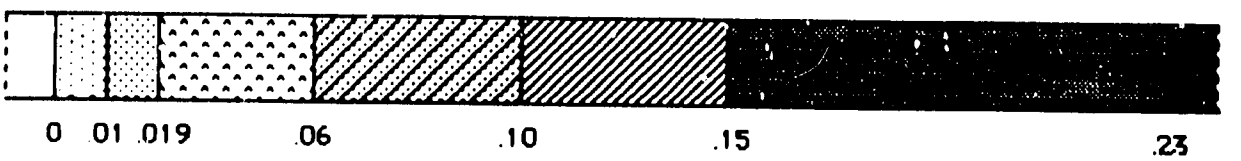


NORMALIZED VEGETATIVE INDEX

(LAST WEEK OF JUNE)

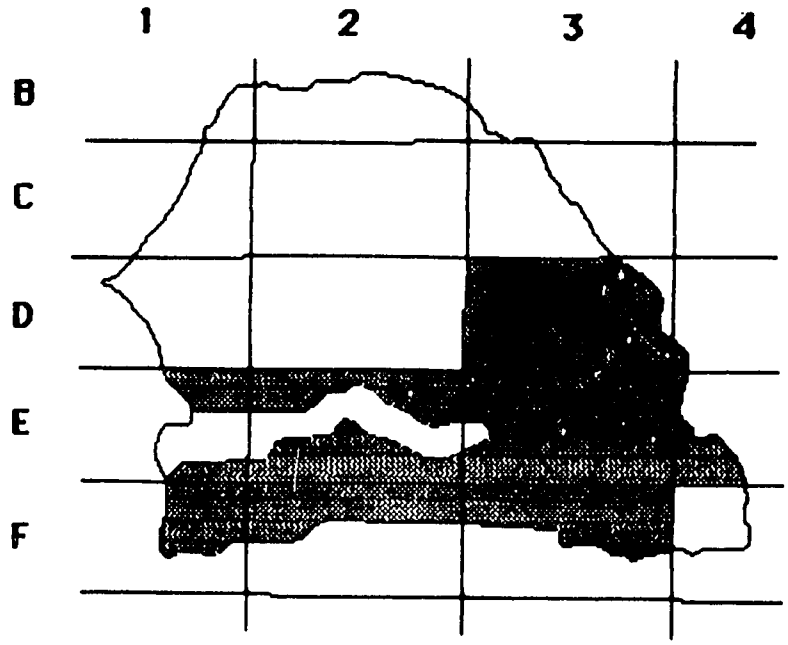
1985



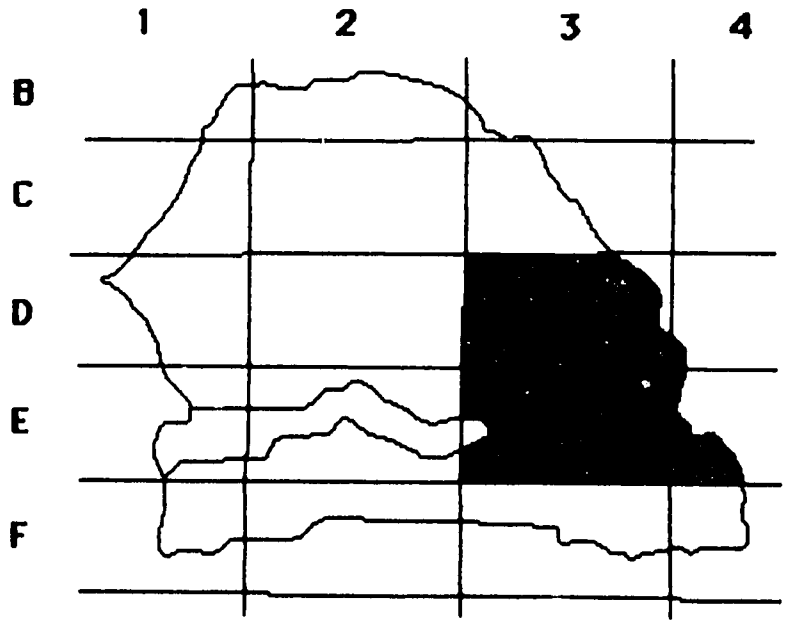


COMPARATIVE METSAT VEGETATIVE INDEX BASED ON LAST THREE WEEKS OF JUNE 1983, 1984, 1985

1985 VS 1984



1985 VS 1983



1985 WORSE THAN PREVIOUS YEAR 1985 BETTER THAN PREVIOUS YEAR

CUMULATIVE RAINFALL TABLE

Monthly Rainfall in mm, Percent of Normal and Percentile Rank

Country: Senegal Year: 1985

Station	Region	April (4)			May (5)			June (6)		
		mm	%	Rnk	mm	%	Rnk	mm	%	Rnk
Dakar/Yoff	South				0	0		13	130	75
Diourbel	North				0	0		7	19	25
Kaolack	North				1	20	75	31	63	42
Kedougou	South				4	9	6	158	87	36
Kolda	South				0	0		98	81	47
Linguere	North				0	0		18	67	50
Matam	North				0	0		20	69	39
Podor	North				0	0		0	0	
Saint Louis	North				0			4	57	58
Tambacounda	South				0	0		40	39	11
Ziguinchor	South				0	0		42	38	14