



Regional Remote Sensing Unit

 **REGIONAL FOOD SECURITY PROGRAMME**
Agromet-Update
Rainfall, Vegetation and Crop Monitoring



 **REGIONAL REMOTE SENSING UNIT**
Significant Weather Developments



Training Center

Southern African Development
Community (SADC)
Regional Remote Sensing Unit (RRSU)
Gaborone, Botswana

U.S. Geological Survey
Center for Earth Resources
Observation and Science (EROS)
Sioux Falls, South Dakota, USA

Applications of Coarse to High Resolution Satellite Imagery
for Land Productivity Assessment & Management



Regional Remote Sensing Unit

Blessing Siwela, SADC Regional Remote Sensing Unit



Bamako , Mali

6 - 17 February, 2006



Regional Remote Sensing Unit

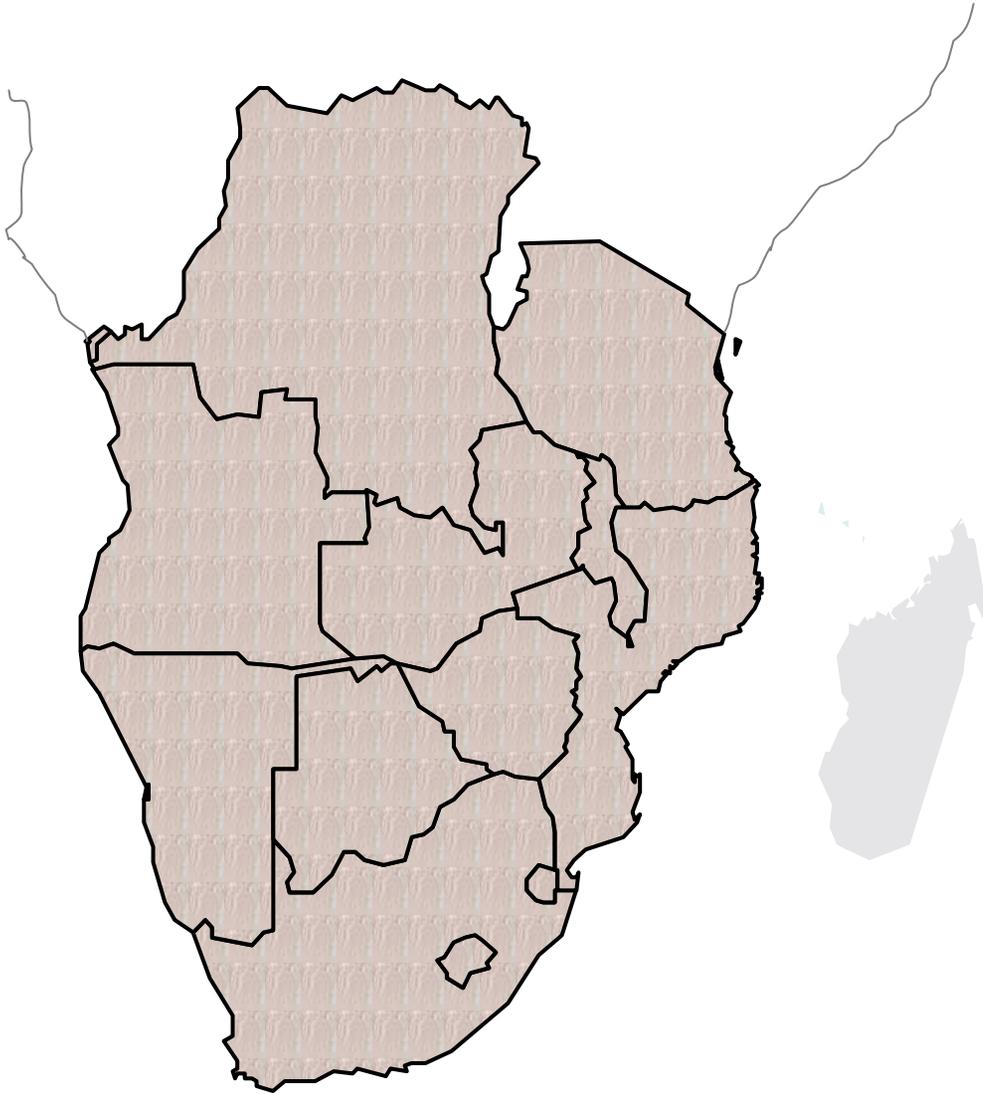
Blessing Siwela
SADC Regional Remote Sensing Unit

February 6 2006

Outline

- Regional Remote Sensing Unit (RRSU)
 - Brief introduction
 - Main activities
 - SDI related activities
 - disaster management activities
- Regional disaster management setup

The SADC Region



Prone to **floods** and **droughts**.

- 14 Member States.
- 200+ million people.
- Varied climate regions.
- Mostly uni-modal rainfall systems (bi-modal in the north).
- Varied cropping systems.
- Maize (corn) dominant crop
- Cassava and tubers important in the north.
- Rain fed agriculture – irrigation only significant in South Africa and Zimbabwe.

Case of 2004-2005 Season

- During the 2004/2005 agricultural season, all SADC countries except South Africa experienced cereal deficits, ranging from 100,000 tonnes in Zambia to 1.62 million tonnes in Zimbabwe. The deficits were significantly high in Angola, Lesotho, Malawi, Mozambique, Swaziland and Zimbabwe. Vulnerability assessments carried out in May 2005 indicate that the total number of people in need of food assistance in the six Member States of Lesotho, Malawi, Mozambique, Swaziland, Zambia and Zimbabwe has increased to **9.71 million** from 5.4 million during the 2004/05 consumption year. An approximately 730,000 tonnes of food aid is required to cover this need.

Main Objective of RRSU

- Strengthen national and regional capabilities in the area of Remote Sensing, Agrometeorology and GIS.
- Support early warning for food security and natural resources and disaster management.
- Principal contact institutions:
 - i. National Meteorological Services (NMSs).
 - ii. National Early Warning Units (NEWUs).
 - iii. National Disaster Management Units.

Institutional Setting

- Placed within the Food, Agriculture and Natural Resources Directorate
- RRSU Partners:



- Technical support and training.
- Emergency food assessments.
- Supply of satellite data.



- Technical support and training.
- Vulnerability assessment activities.
- Support to the Regional Disaster Management Strategy.
- Supply of satellite data.

Operational Activities

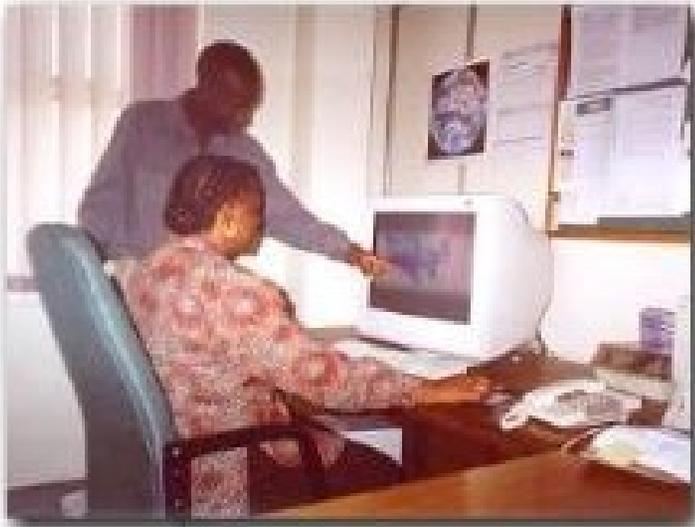
- Training of agro-meteorologists in the use of satellite imagery products and GIS for early warning for food security.
- Monitoring crops, vegetation and weather developments during the crop growing period using satellite images and GIS techniques.
- Developing and maintaining database of satellite images, maps and associated data.
- Distribution of satellite datasets

Principal Datasets at the RRSU

Imagery	Resolution	Main use(s)
METEOSAT	3 / 8 km	Monitoring rainfall, storms
Rainfall Estimates	8 km	Monitoring rainfall, floods
Water Requirements Satisfaction Index (WRSI)	8 km	Crop condition
NDVI (LAC/GAC)	1.1 km / 8 km	Monitoring crops, vegetation
SPOT-4 VGT	1.1 km	Monitoring crops, vegetation
MODIS	250 m	Monitoring crops, vegetation
LANDSAT	30 m	Land cover
ASTER	15 m	Land cover, terrain modelling, vegetation

Agromet & GIS Training

- Creating trained experts in RS and GIS applications.



- National staff seconded to RRSU
- Backstopping missions organized for on-the-job training in Member States.



- Subject- or application-specific workshops conducted at national and regional levels.

SDI Activities at RRSU

- Strengthen role of RRSU in meeting the natural resource information needs of SADC.
- Promoting new ways of managing data and reaching out to users
- Metadata and web mapping services
- Clearinghouse nodes and websites
- Training in metadata/clearinghouses/web mapping
- Supporting SDI activities in SADC
- Technical and Professional advice to SADC
- User networking through workshops / e-discussions

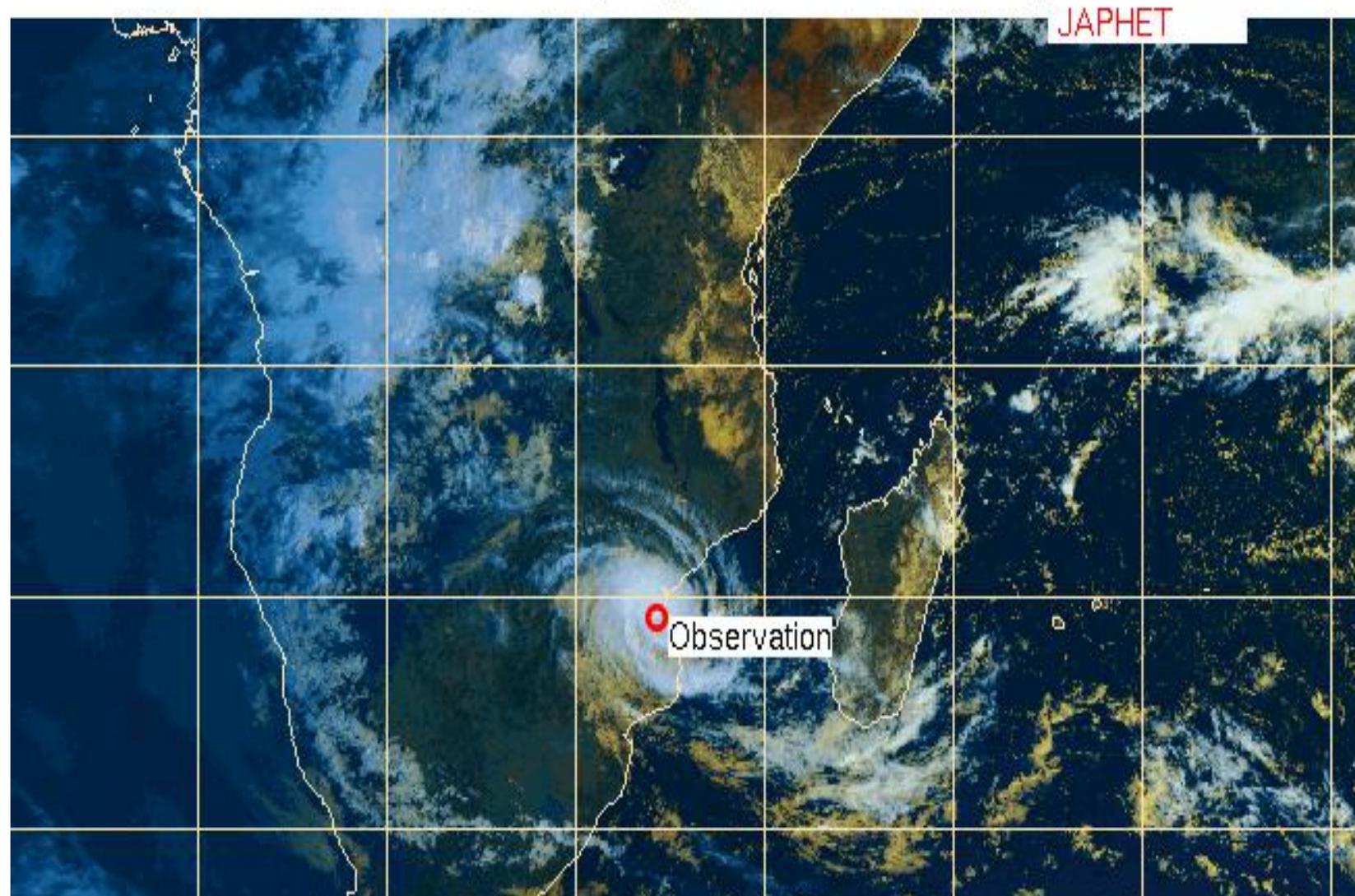
**Activities relating to disaster
management ...**

Monitoring of significant weather hazards

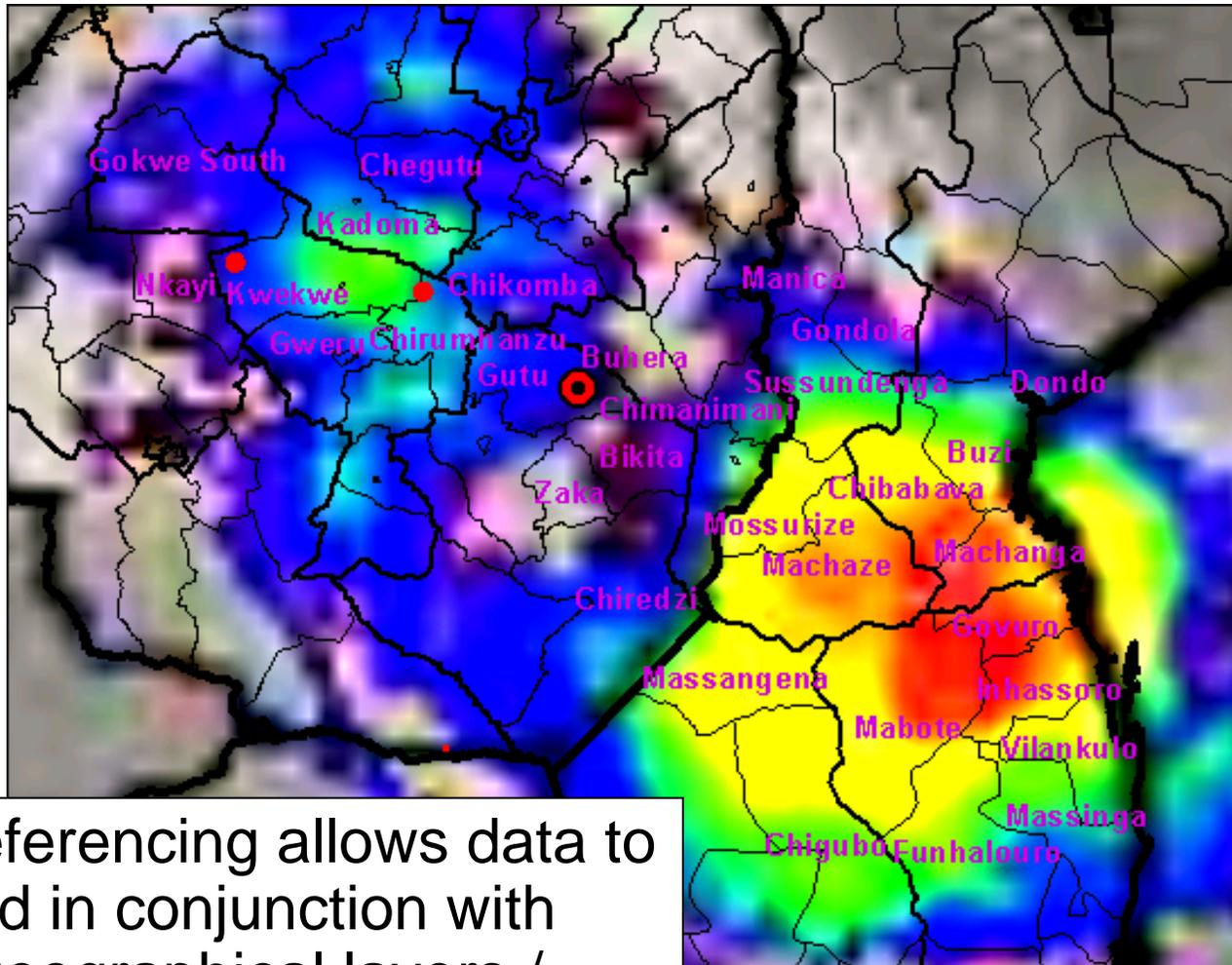
- Triggered by e-mail alerts from other centres monitoring the oceans (cyclone development)
- Monitoring storms, cyclones close to Member States using METEOSAT data
- Cold Cloud Duration derived from METEOSAT data used in analysis affected areas

Cyclone Monitoring

COMPOSITION COLOREE du 03/03/2003 06:00 UTC / METEO-FRANCE



Cyclone Monitoring

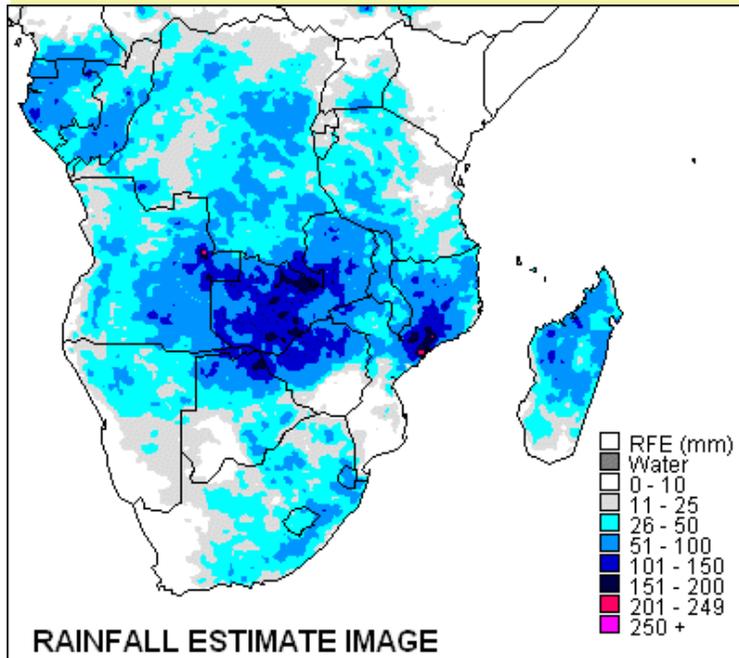


- Geo-referencing allows data to be used in conjunction with other geographical layers / maps

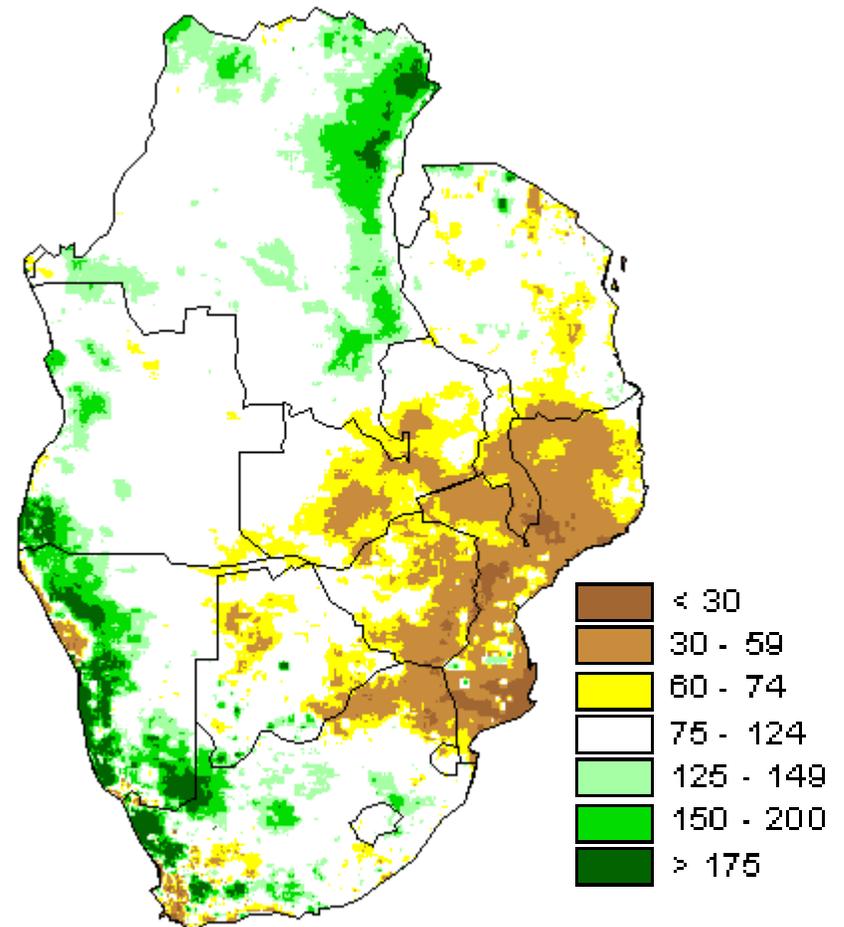
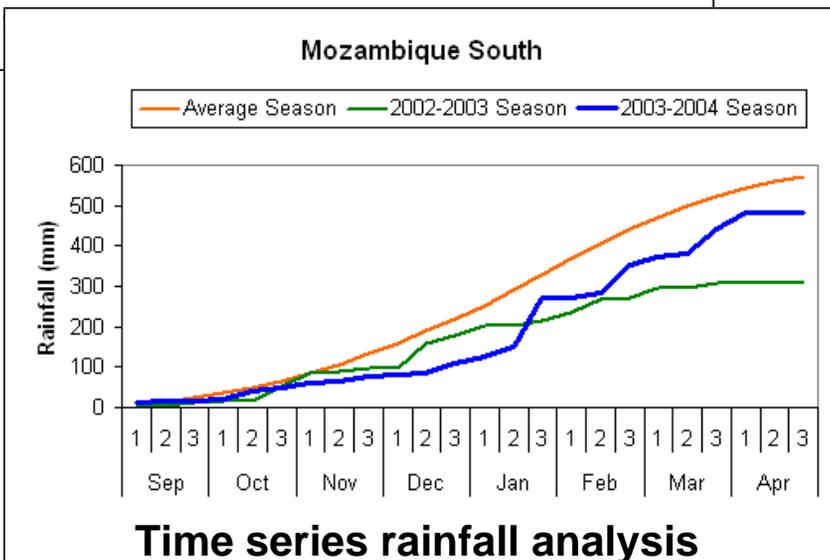
Drought Hazard Monitoring

- Rainfall performance
 - Rainfall Estimates (RS data + ground data)
- Vegetation condition
 - Normalized Difference Vegetation Index (NDVI)
- Crop condition
 - Water Requirement Satisfaction Index

Rainfall Performance monitoring

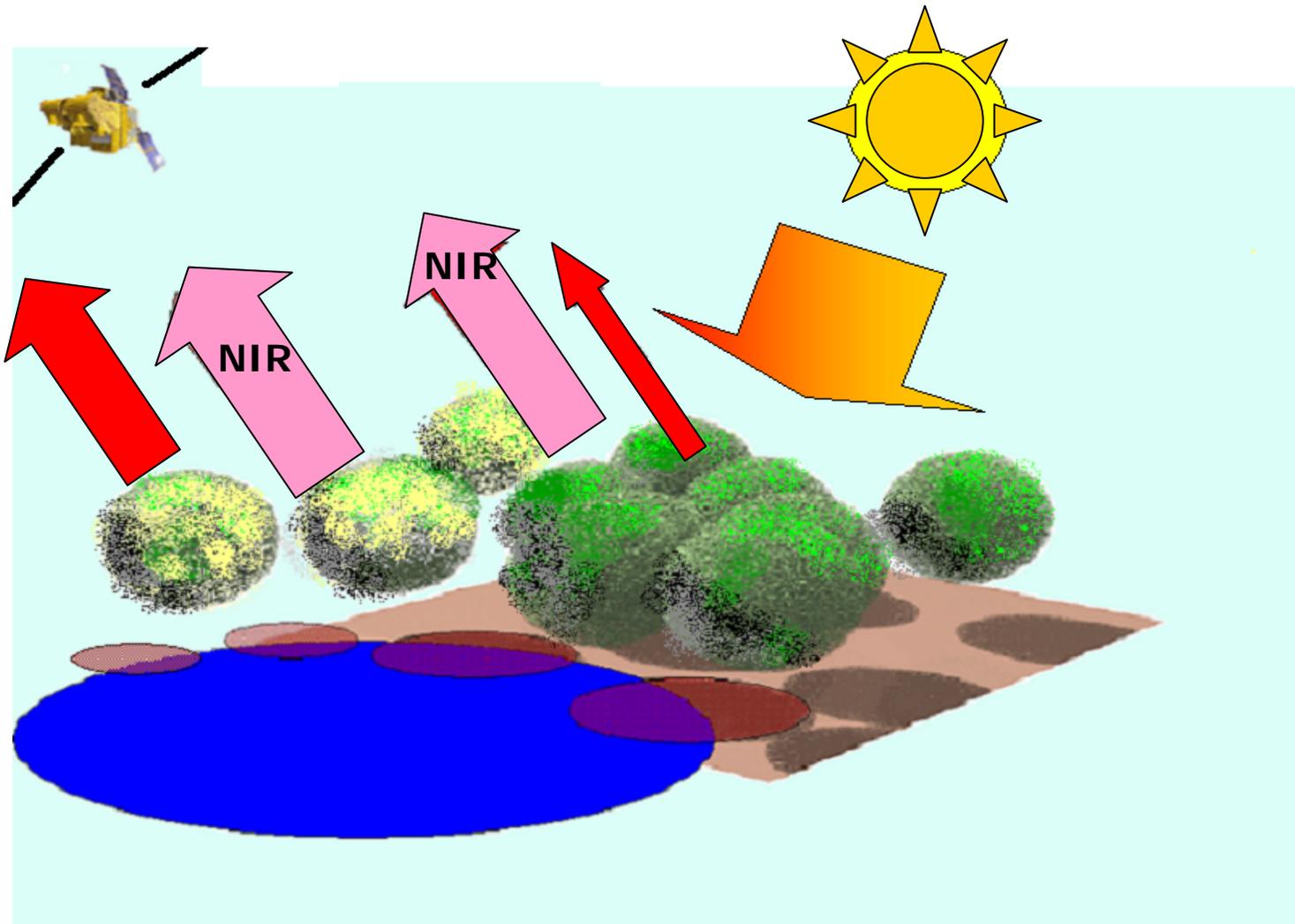


RAINFALL ESTIMATE IMAGE

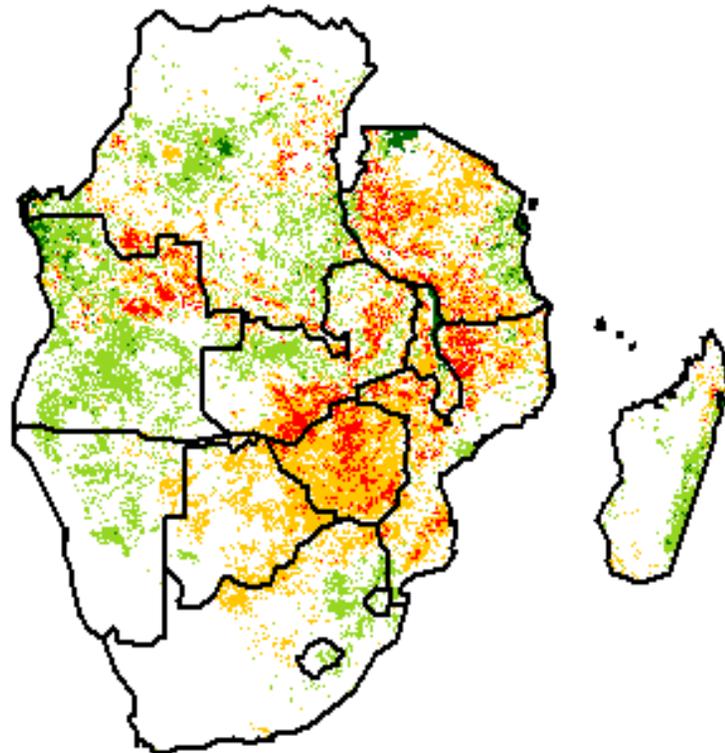
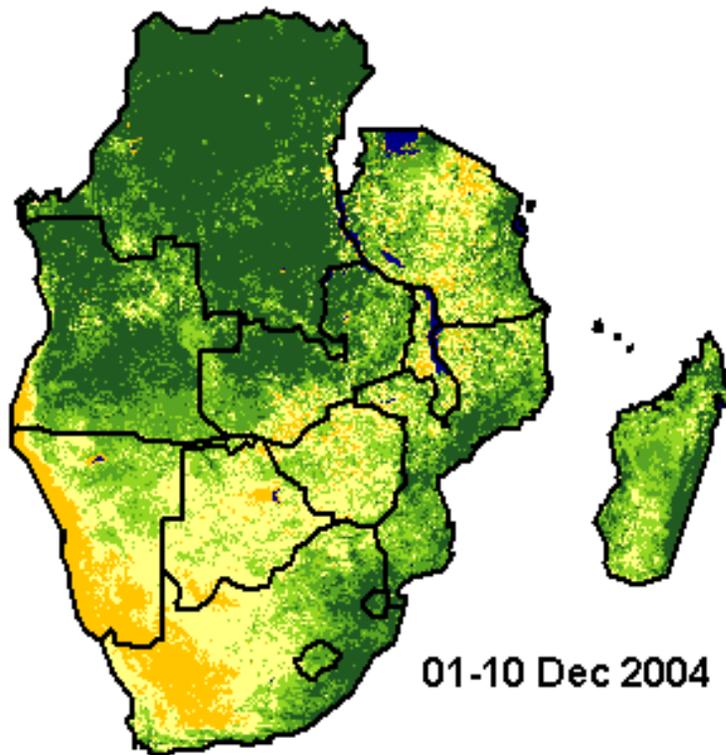


Percentage cumulative rainfall received

Vegetation Monitoring



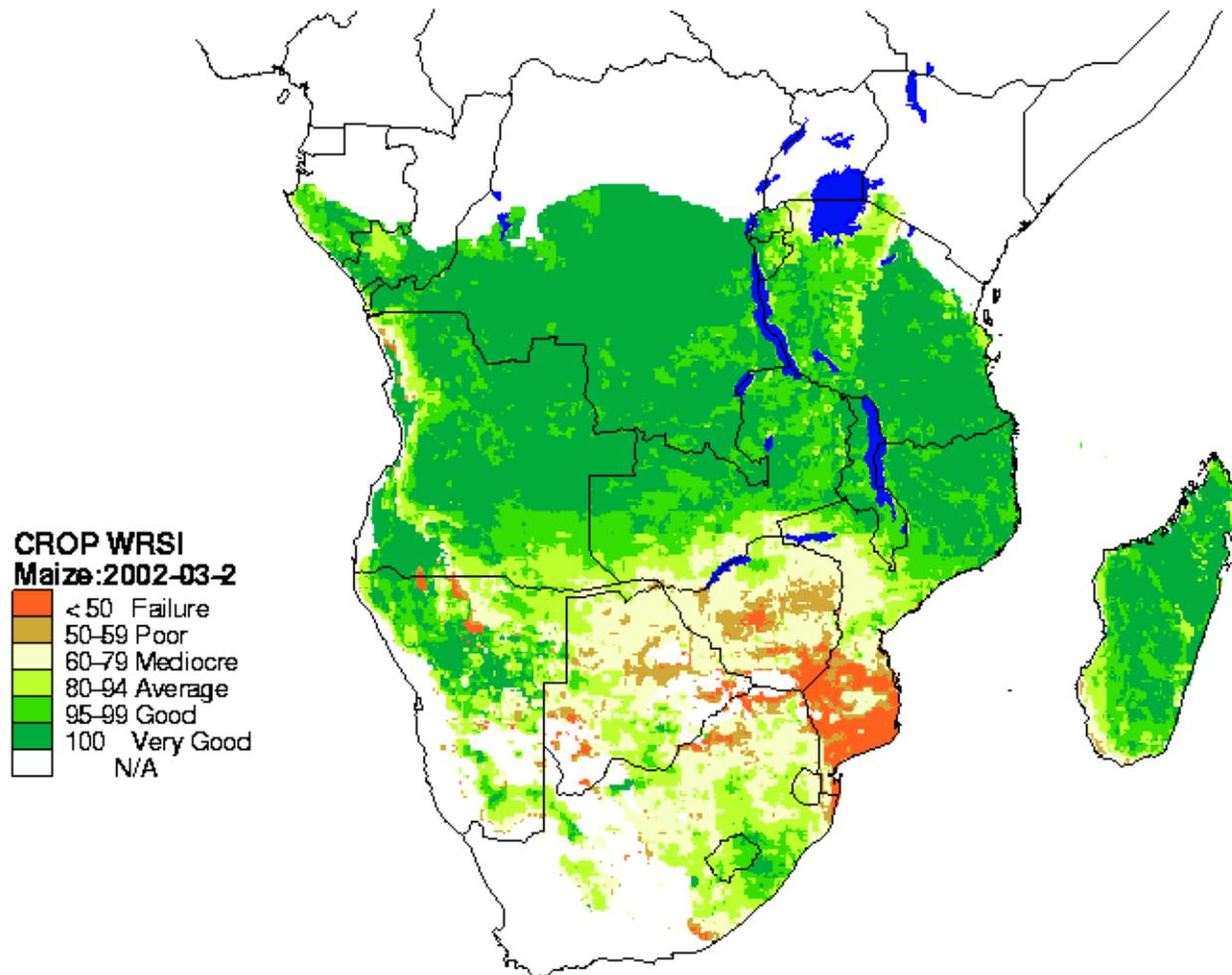
Vegetation Monitoring



Crop condition modelling

- Water Requirement Satisfaction Index (WRSI)
 - Is an indication of the extent to which the water requirements of a crop are satisfied, during the growing season
 - Has been shown to be closely related to grain crop yield in some areas, in particular water-limited areas, and during drought conditions

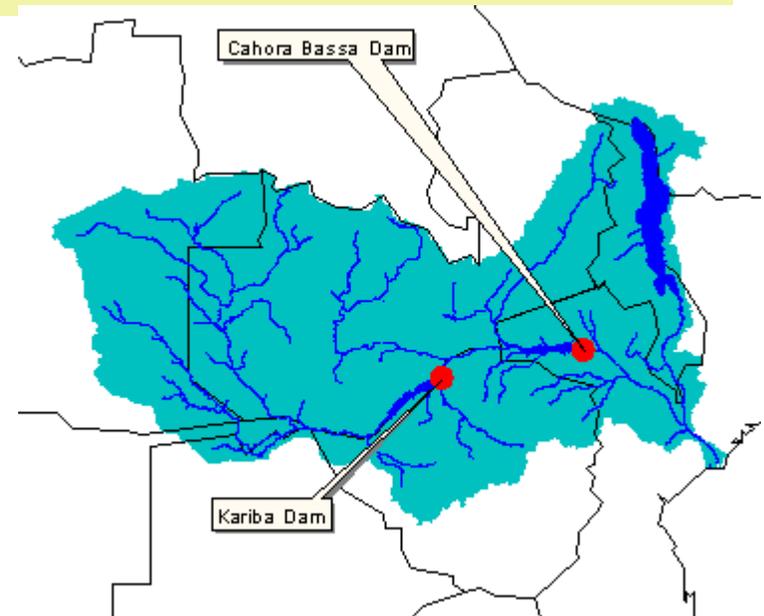
Use of WRSI in crop monitoring



As of March 20, 2002

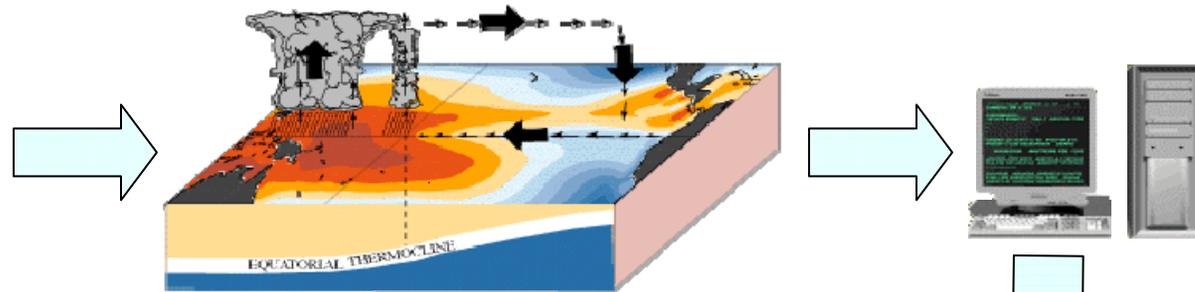
Flood Monitoring

- Indicators used include:
 - (Excess) rainfall
 - Levels of major dam
 - Soil moisture in major river basins
- Products used
 - Rainfall Estimates
 - Soil moisture
 - Basin Excess Rainfall Maps



Seasonal Climate Forecasts

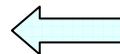
Rainfall History + Ocean Temperatures & Wind Patterns + Computer Prediction



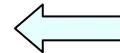
NOAA, Climate Prediction Center



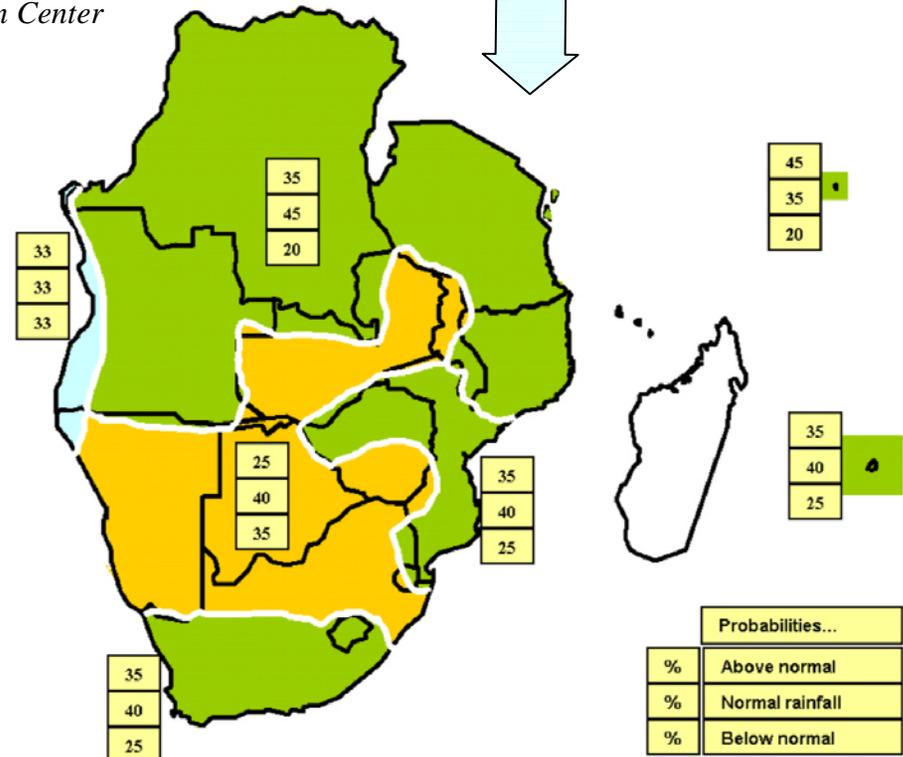
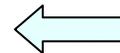
Water Conservation



Agricultural Planning



Rangeland Management



Probabilities...	
%	Above normal
%	Normal rainfall
%	Below normal

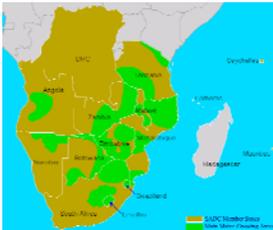
Information products

- 10-day agromet update (rainfall, crop and vegetation condition)
- Monthly bulletins on status of crop growing season
- Significant Weather Development Reports
- Flood Watch reports

Rainfall



Areas



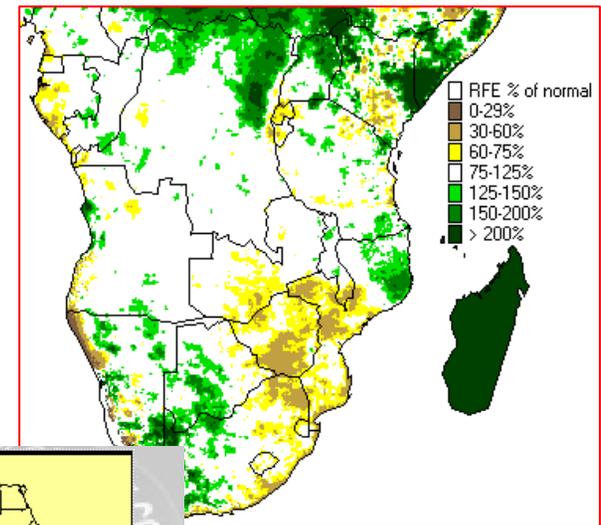
Crops



Models



Agromet Up-dates





REGIONAL FOOD SECURITY PROGRAMME
Agromet-Update

Rainfall, Vegetation and Crop Monitoring



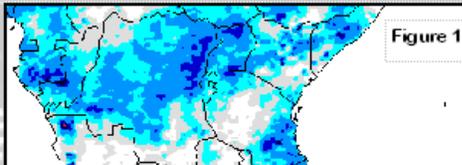
Issue Number: 17 Month: 4 Season: 2003/2004 Release date: 07-05-2004

Highlights

- ♣ Wide spread conditions of little or no rainfall in southern Africa ...
- ♣ Malawi experiences dry spell of up to 30 days in parts of the southern region...
- ♣ 20000 people displaced by flooding in the Caprivi strip ...
- ♣ Lower rainfall received in the north of Lesotho...

Rainfall Performance from 11-20 April 2004

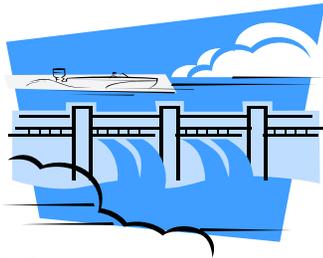
The month of April is normally the month that rainfall in southern Africa begins to reduce and crops are expected to have reached their maturity. The commencement of rainfall normally starts from the northern parts of the sub-region moving south wards down to Kwa-Zulu Natal although other systems contribute to rainfall in South Africa. The cessation takes a reverse process withdrawing from the south to the northern parts of the region. During the first two decades in April, there was



Rainfall



Dams



Rivers



Models



Regional Remote Sensing Unit

Regional Flood Watch

25 January 2002



Famine Early Warning System Network

HEAVY RAINS HIT SOME AREAS, WHILE DRY SPELL CONTINUES IN OTHER AREAS

HEAVY RAINS RAISE CONCERN IN SOUTHERN MALAWI

At the end of December 2001, heavy rains, favorable for crop production, fell over much of Malawi causing flash floods in Koronga, Salima and Chikwawa districts. Following a rapid assessment of flood-affected areas in southern Chikwawa district, WFP reported the situation as not alarming, and that about 1,750 households were affected in 13 villages. Heavy rains continued at the beginning of January in central and northern parts of the country, moving south by the second dekad of the month. The heavy rains were due to a deep

low pressure area situated over Mozambique, drawing in moist air from the Indian Ocean. Most areas over the Shire Highlands and the Shire Valley received heavy rainfall, beginning on 20 January. Although no serious flooding has so far been reported, many households in southern Malawi are still recovering from last season's floods. Furthermore, many of the Lower Zambezi River tributaries, including the Shire River, originate in southern Malawi, and could pose a risk to households in the Zambezi Basin in Mozambique.

MOZAMBIQUE RIVER LEVELS REMAIN BELOW ALERT LEVELS

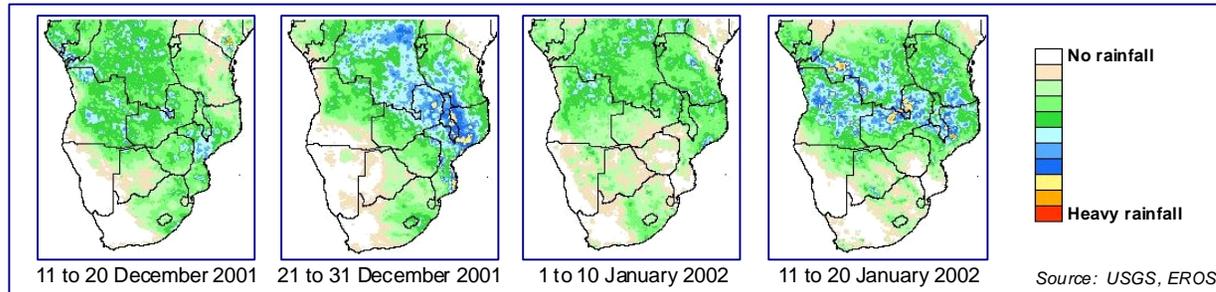
The Mozambique National Directorate of Water (DNA) reported that as of 24 January 2002, river levels at gauging stations throughout the country were below the ALERT level, with the exception of the Gurue Station on the Licungo River. For up-to-date information on river levels visit www.dna.mz.

MOZAMBIQUE: Rainy Season Update

This new publication has been launched by FEWS NET/MIND and partners, and will be produced periodically throughout the rainy season.

For more information contact MIND@fews.net

Meteosat Satellite Imagery Rainfall Estimates, 11 December 2001 to 20 January 2002



SEASONAL DRY SPELLS REPORTED IN SOME COUNTRIES

Much of southern Africa typically experiences dry spells during the crop season. Despite variation in the onset of the rains in the region, overall rainfall performance was largely satisfactory until the second dekad of December, when Botswana reported dry conditions. Since then, dry spells have also been reported in parts of Zimbabwe, Zambia, Mozambique, Namibia and Swaziland. Zambia issued a press release explaining that dry spells are normal for this time of year, and that relief is expected during the second part of January. The main areas affected in Zambia were southern, western, central, eastern and parts of Lusaka.

The satellite imagery above shows dry conditions at various times in southern Mozambique, Zimbabwe, Botswana and northern South Africa. In Zimbabwe, dry conditions since mid-January have been confirmed by field reports in almost three-quarters of the country. Reports of water stress on crops have been received from Mashonaland and Matabeleland. In Botswana, where dry conditions have persisted for more than two dekads, crops are reported to be wilting due to water stress. Swaziland also reported signs of moisture stress in its maize crops due to dry conditions and high temperatures through mid-January.



REGIONAL REMOTE SENSING UNIT

Significant Weather Developments

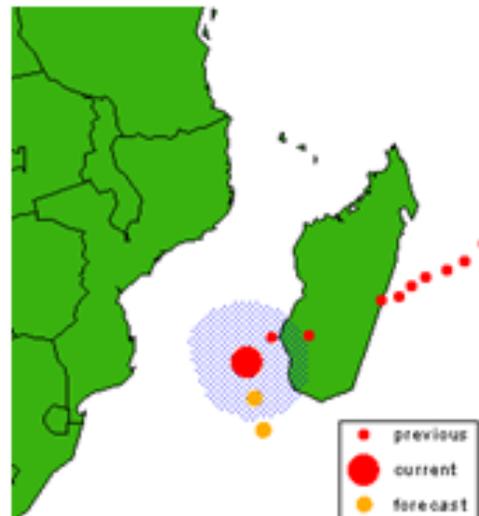


Release Date: 30 January 2003: 1500 GMT

EX-TROPICAL CYCLONE FARI ENTERS MOZAMBIQUE CHANNEL

Ex-Tropical cyclone Fari back over water.

Ex-Tropical Cyclone Fari crossed Madagascar on 29 January 2003, and is now located in the Mozambique Channel, which is the area of water between Madagascar and mainland southern Africa. The ex-tropical cyclone has now been downgraded to a tropical disturbance¹. The disturbance has been tracking south-westwards over the past few days, but observations and forecasts by La-Reunion and other cyclone-monitoring institutions are indicating that the disturbance is changing direction, and that it will be tracking south over the next 12 to 24 hours. This forecast direction implies for very low chances of the depression reaching the southern Africa mainland.



The depression is not expected to increase in intensity over the next 12 hours, but forecasts indicate that it may reintensify slightly over the next 12 to 24 hours.

Isolated squalls, associated with strong winds, can be found within a radius of 400 km of the center of the depression. Earlier forecasts were predicting that at this time, the depression would be having maximum sustained winds were at 37 km/hr, gusting to 55 km/hr. Winds of 76 to 88 km/hr are generally associated with slight structural damage (ref: Beaufort Scale).

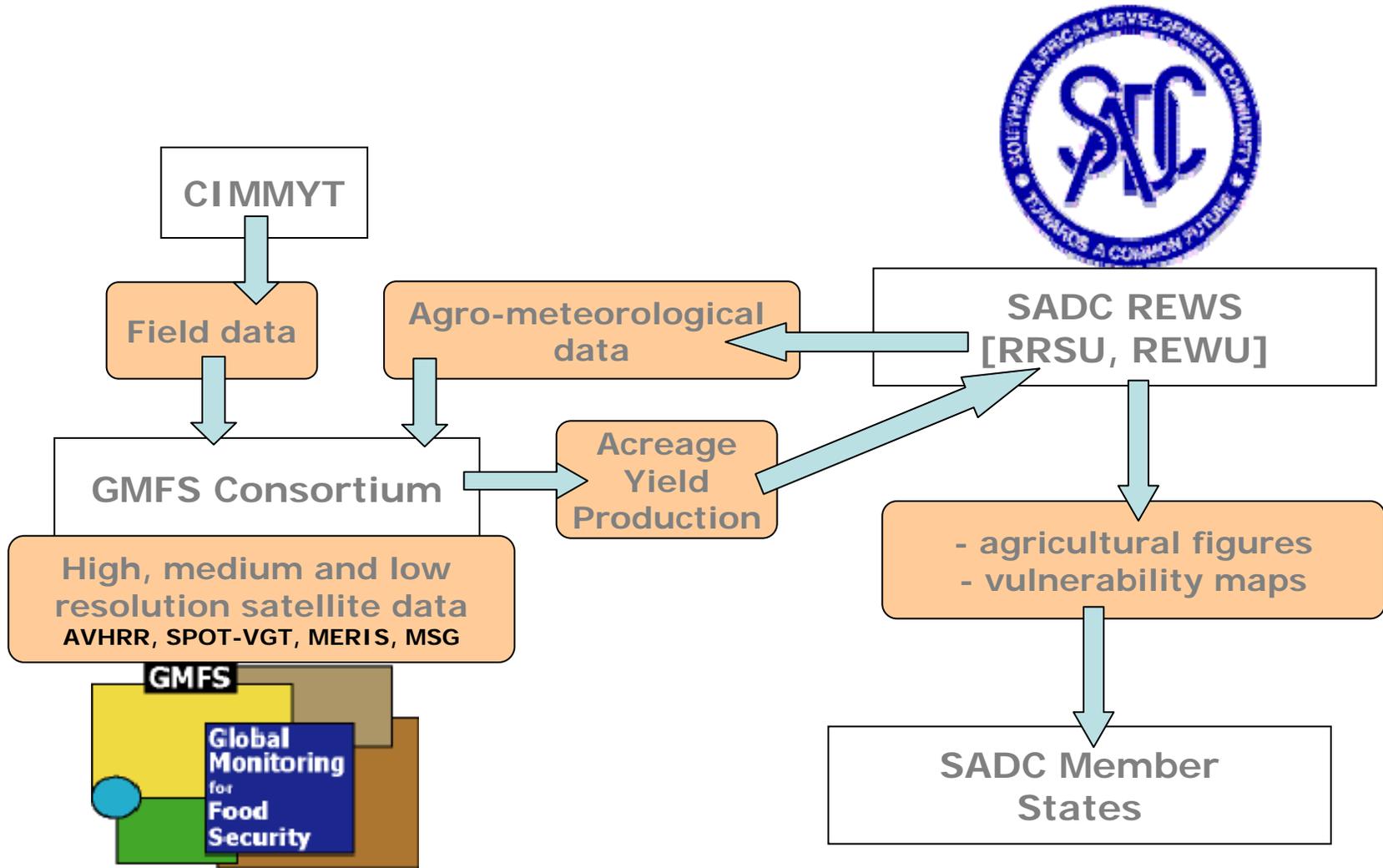
Dissemination

- E-mail distribution of reports
- Website posted reports
 - www.sadc.int
 - www.sadc-hazards.net

RRSU collaboration with Global Monitoring for Food Security (GMFS)

- GMFS aims to consolidate, support and complement existing regional information and early warning systems on food and agriculture
- Provision of products that will help answer critical questions in food security early warning community
- Working relationships between GMFS, RRSU and other active partners already defined
- Training in preparation and use of developed products
- Work already underway in pilot study areas

RRSU collaboration GMFS Consortium



Thank you

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www.sadc.int