Developments in the Early Warning against Weather Related Disasters in Southern Africa

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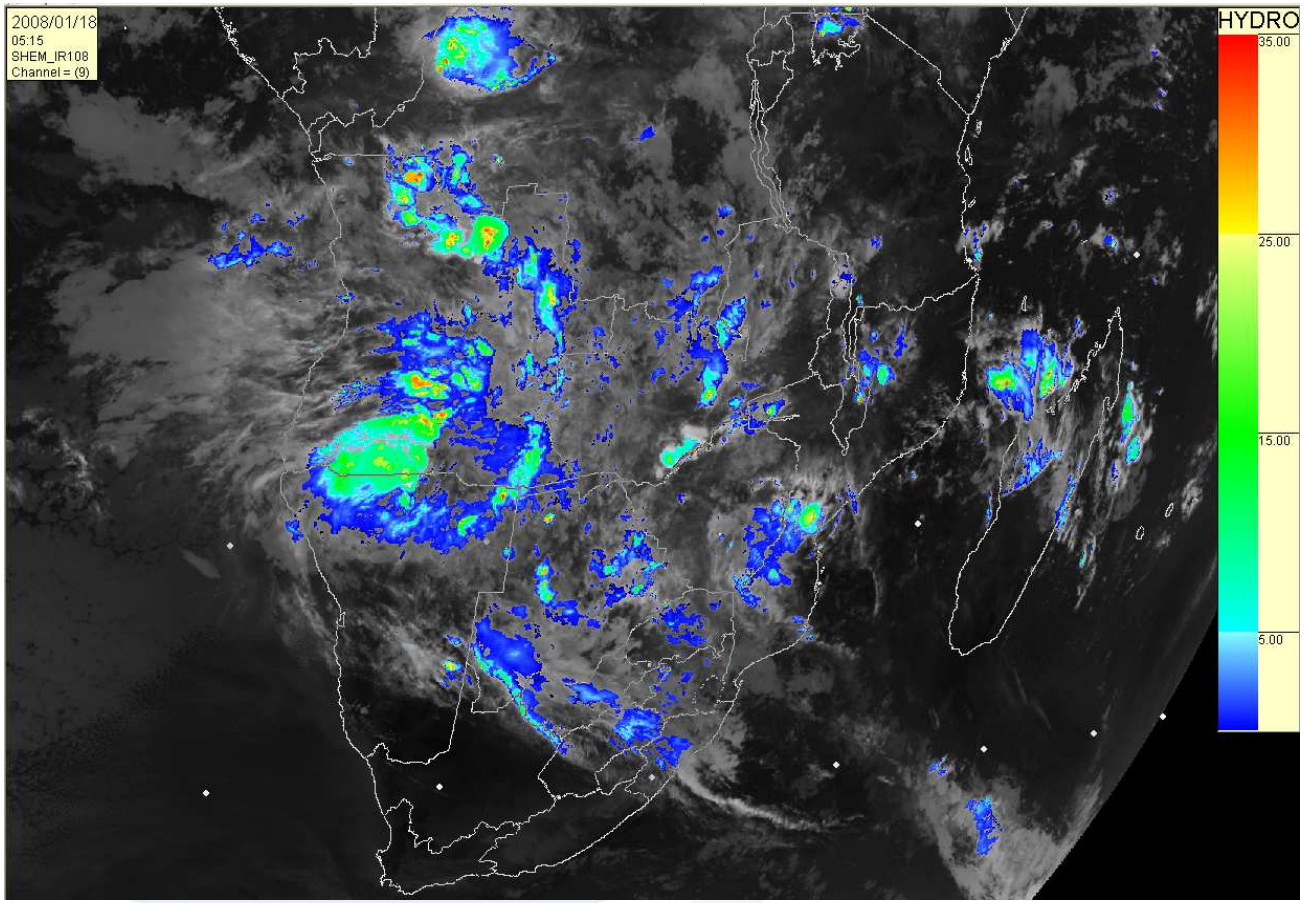
Flooding in the Zambezi Basin 2008



- A series of tropical low pressure systems moved over subcontinent
- Heavy rain fell over the entire Zambezi River basin during the season
- Severe flooding occurred in various countries

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Impact according to UN OCHA Situation Report 10: 2008

Table 1. Regional overview of affected persons

	Affected (persons)	**Cause**
Angola	81,594	Rains, flooding
Lesotho	4,500	Tornado, hailstones
Madagascar	331,010	Cyclone, rains, flooding
Malawi	180,246	Rains, flooding
Mozambique	113,,535 in resettlement centres + 160,000 (2007 caseload)	Flooding
Namibia	3,000+	Rains, flooding
Swaziland	2,500	Rains, hailstorms
Zambia	34,776	Rains, flooding
Zimbabwe	15,168	Rains, flooding
Total	**844,735**	

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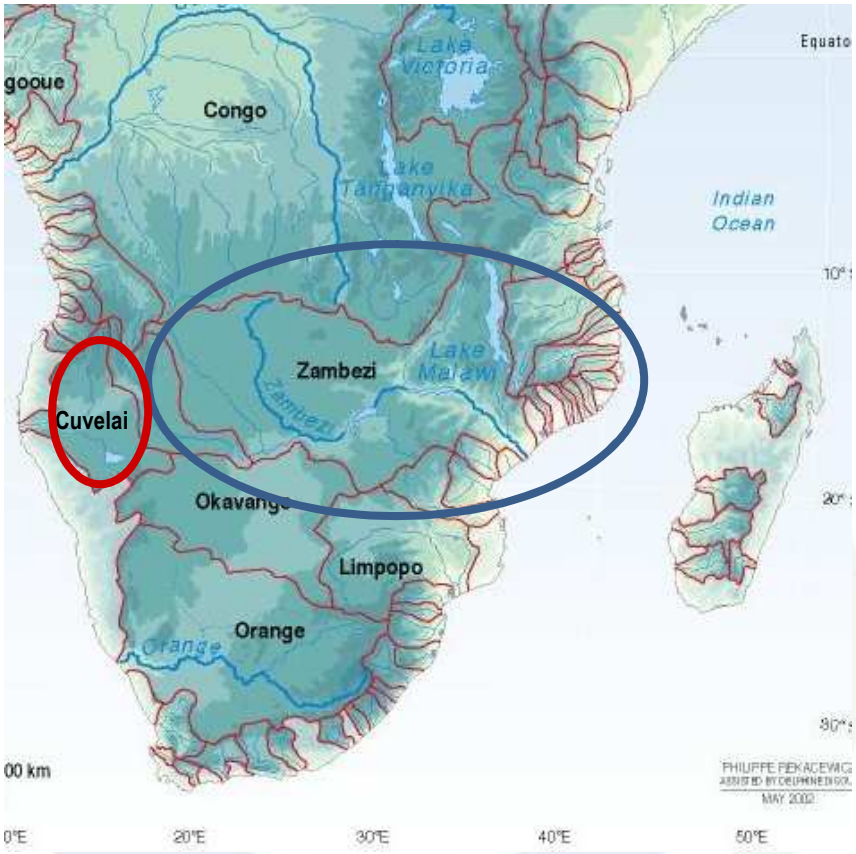
However….



- Early warning of the larger FLOODING events in 2008 and 2009 were extremely inadequate
- Lack of coordinated flood warning system over most river basins
- Similar examples of flooding in northern Namibia
  - ✓ Over last 6 years: 3 major floods in the Cuvelai basin
- "Flood damage could have been minimized if an early warning system had been in place" (Botswana government official at a recent workshop)

➢ Need for an integrated multi-sectoral warning system for hydro-meteorological hazards

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Perspective on Flood Disasters in SADC

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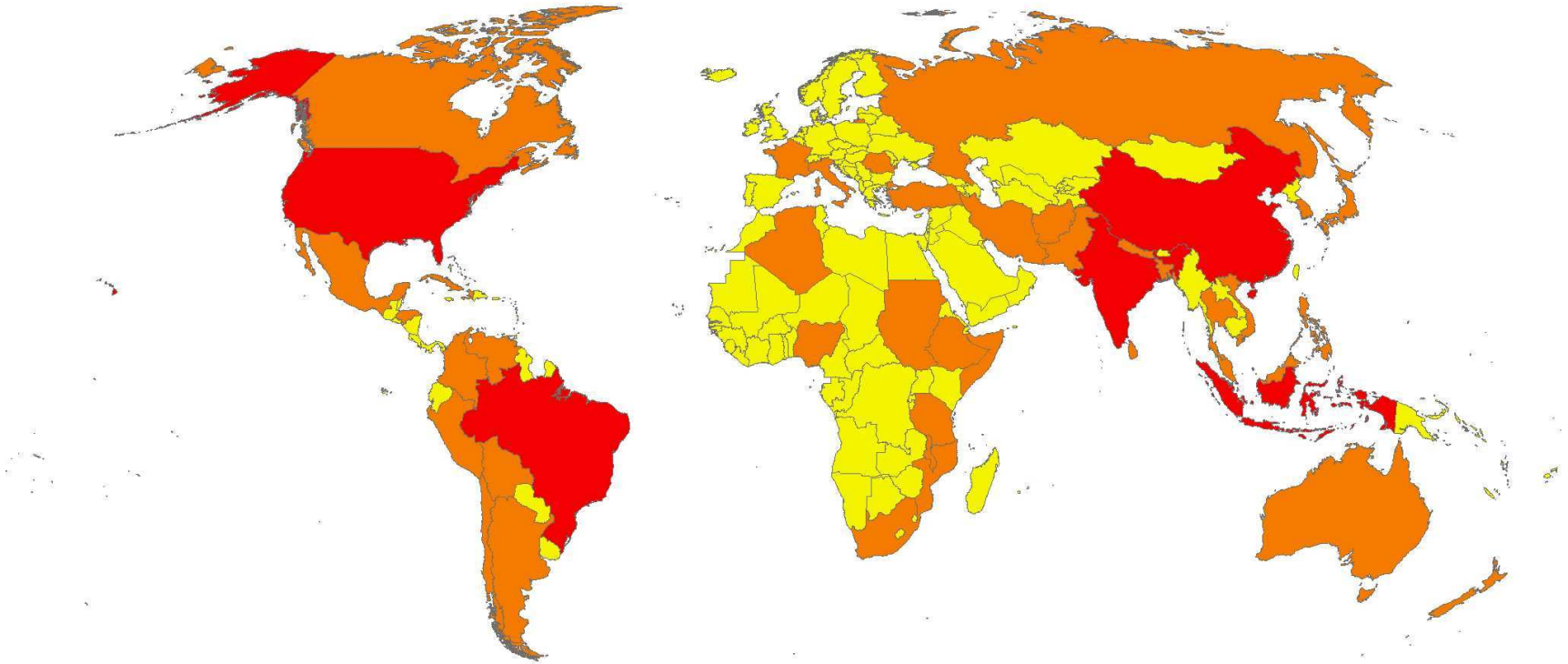
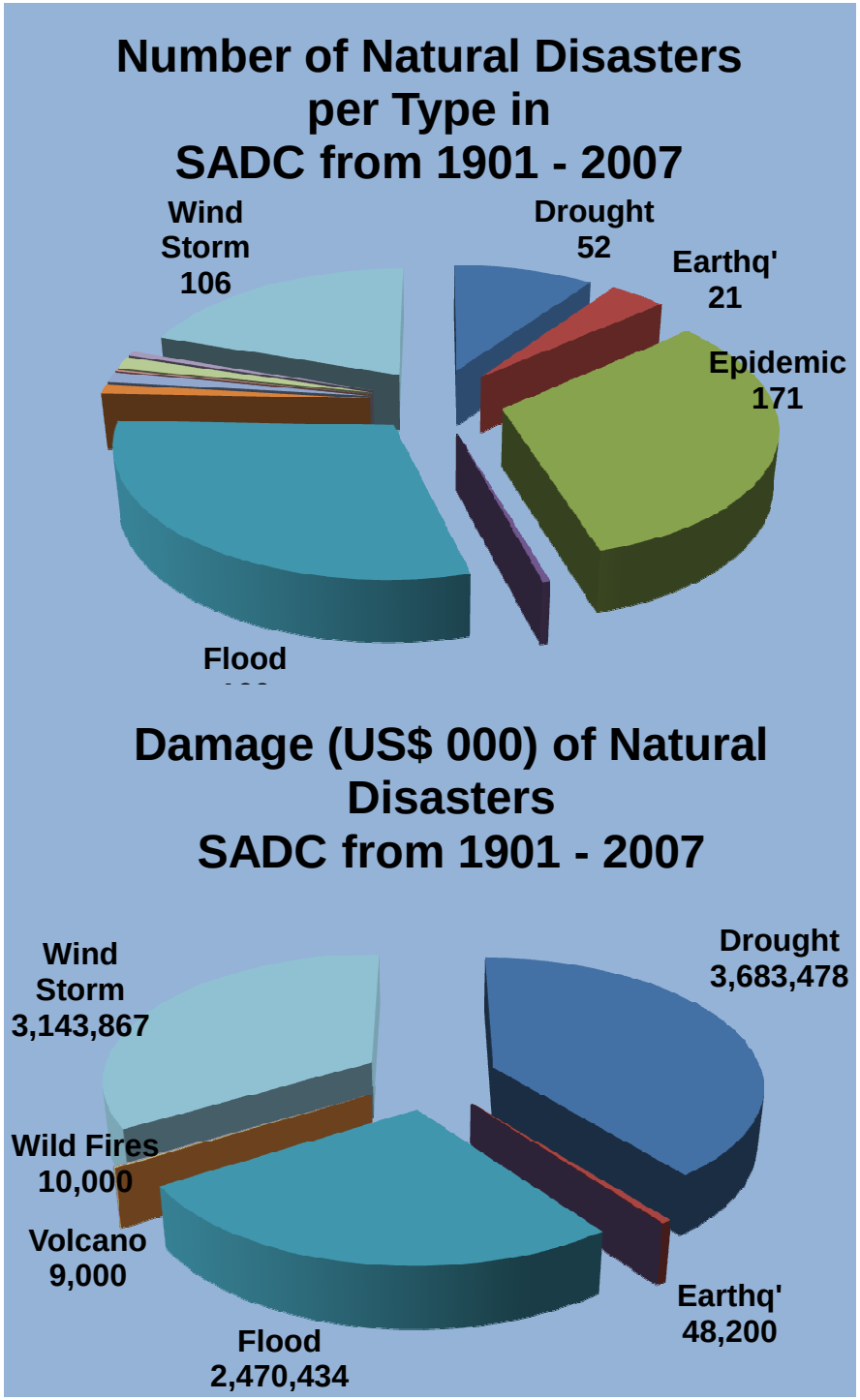
The number of flood disasters by country from 1974 to 2003



EM-DAT: The OFDA/CRED International Disaster Database
www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium



- In SADC floods follows
  - second to epidemics in frequency
  - Third to drought and wind storms on damage caused
- USD1,000 million flood damage caused by tropical cyclones Eline and Gloria in 2000 in Mozambique
  - 3 times their 1999 export
- Following global trends, flood disasters have increased in SADC
  - ✓ 1984 - 1988: 9
  - ✓ 1994 – 1998: 26
  - ✓ 1999 – 2003: 59

Source CRED EMDAT

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Floods as a Hazard

- “Recent findings of the WMO country-level survey where of the 139 countries, 105 indicated that **flash floods** were among the top two most important hazards around the world and require special attention”

- “On the average, these events kill more people worldwide than any other natural disaster – in an average year, flash floods kill over 5,000 unsuspecting people and cause millions of dollars of property damage”
  (WMO 2008)

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Advancement in Weather Forecasting Capabilities

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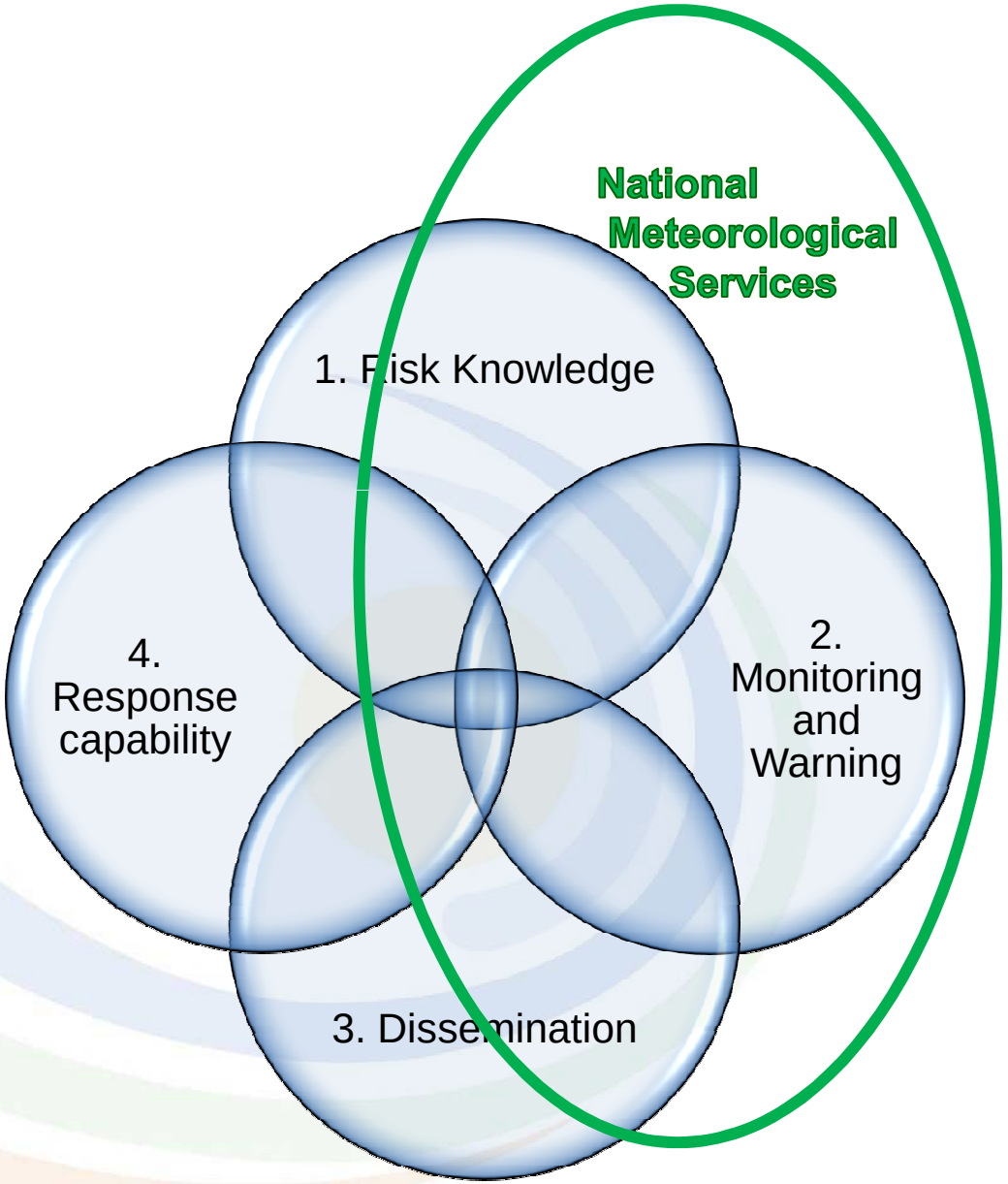
The 4 Elements of Effective Early Warning Systems



Improvement of forecasting technologies crucial to improve EWS

There were major advances in the last decade in forecasting technology

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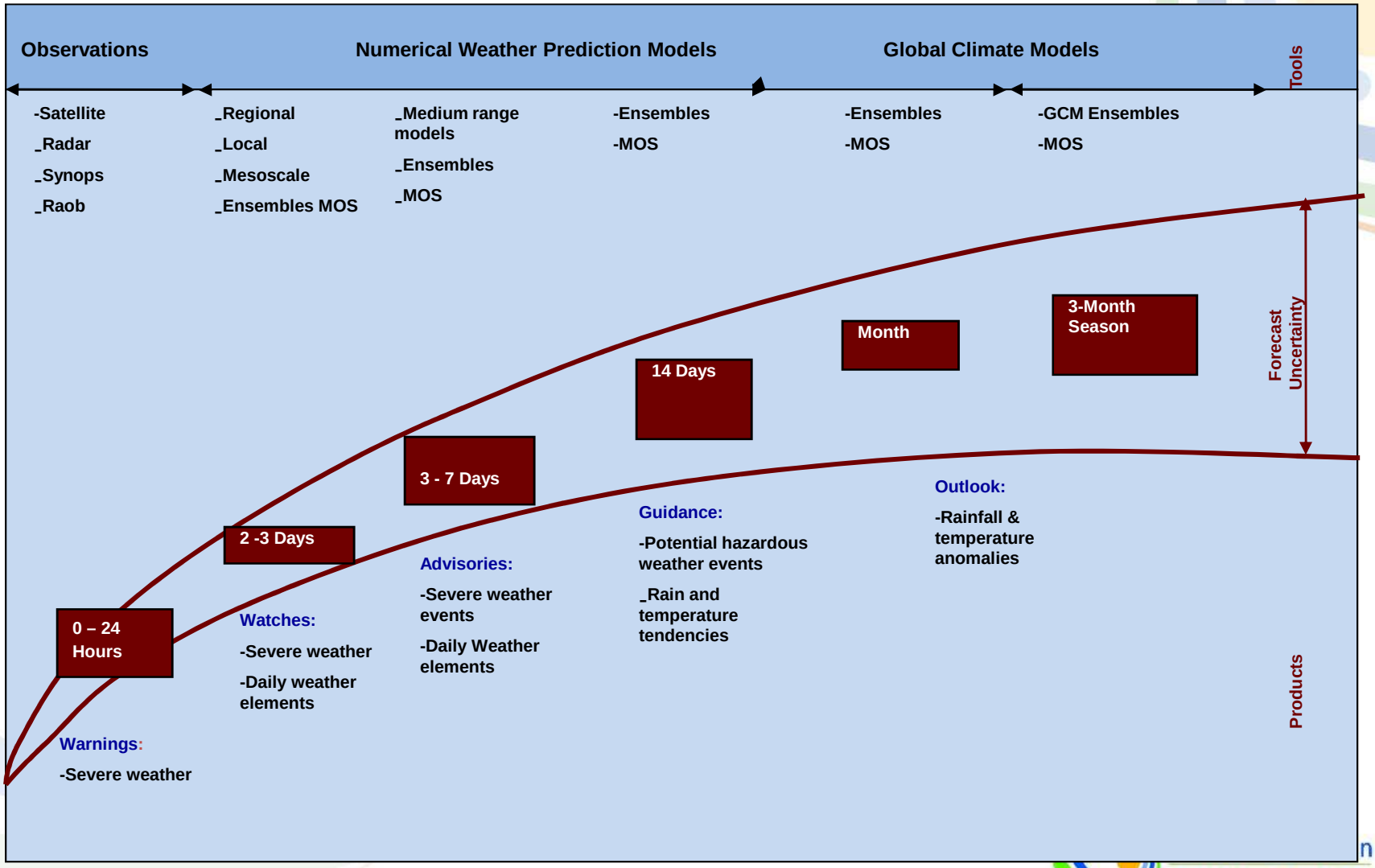
Increasing the lead time of forecasting



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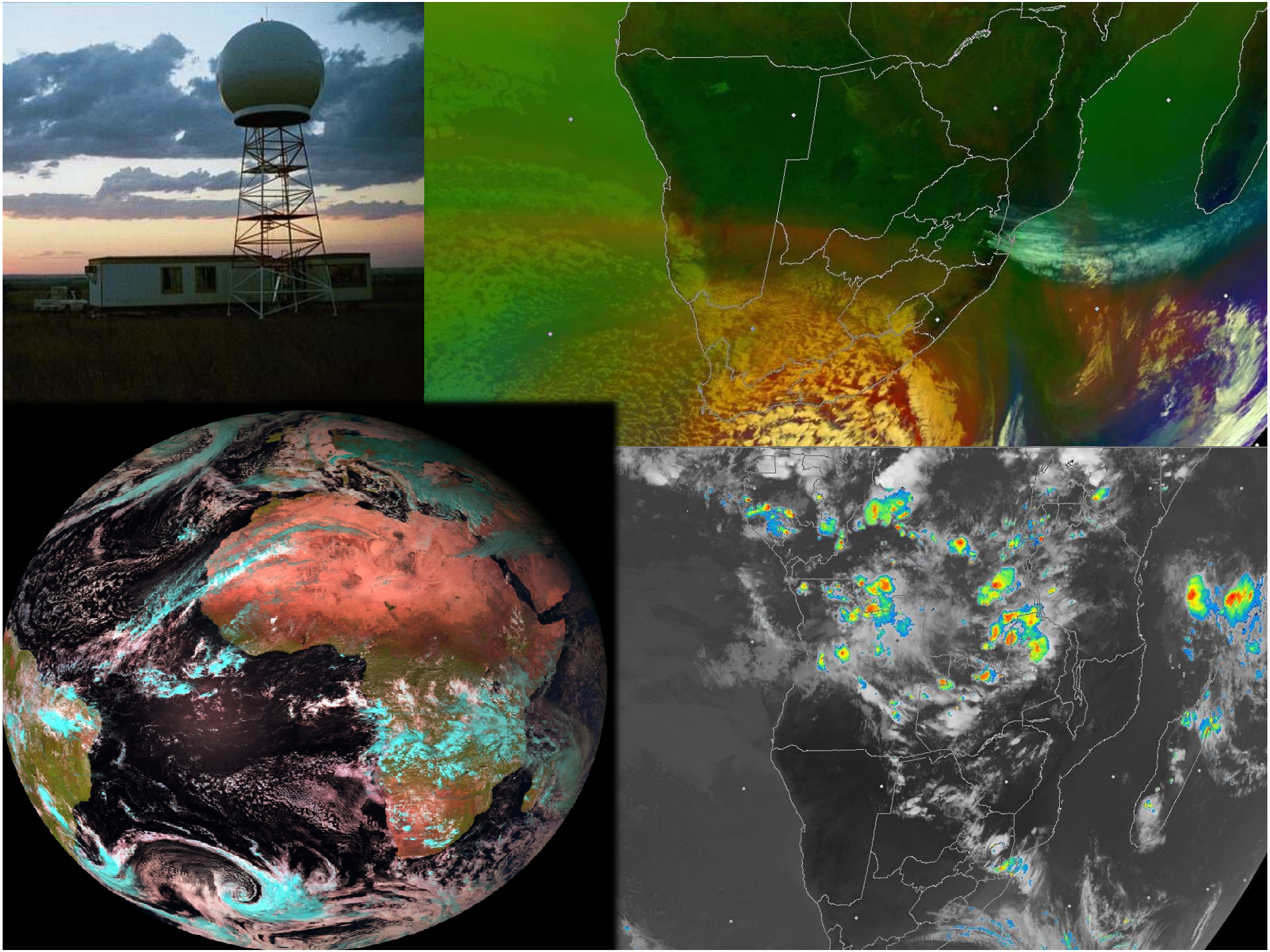
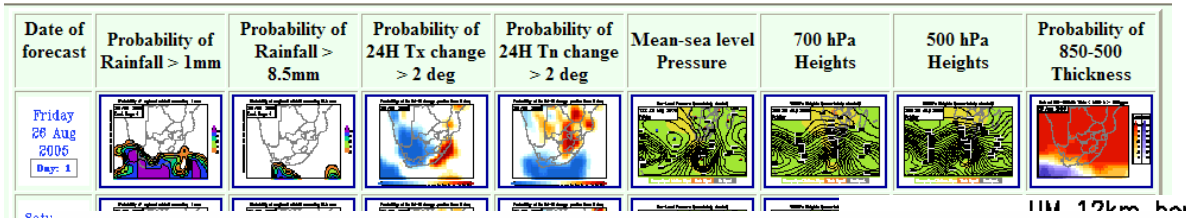
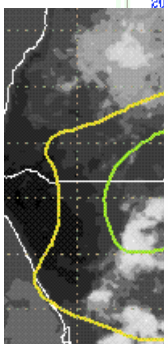
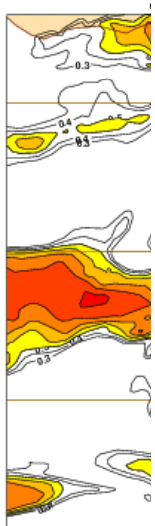
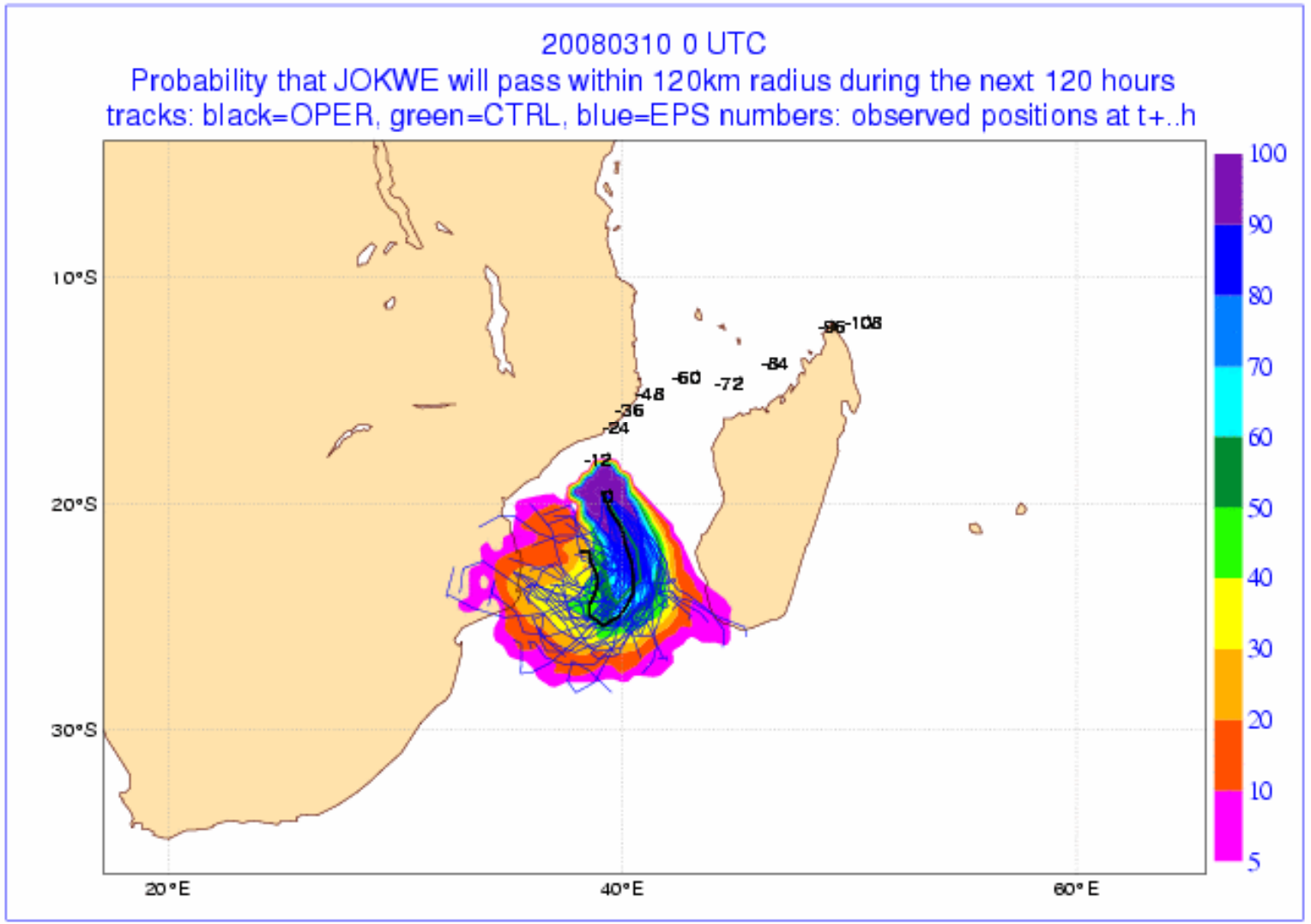


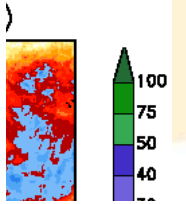


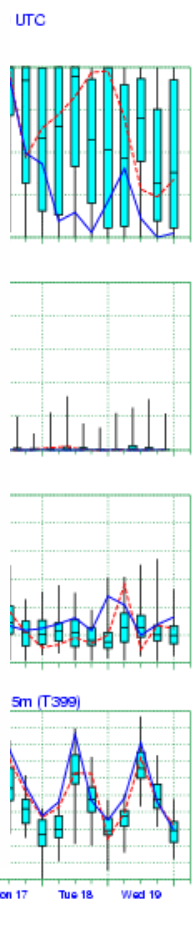


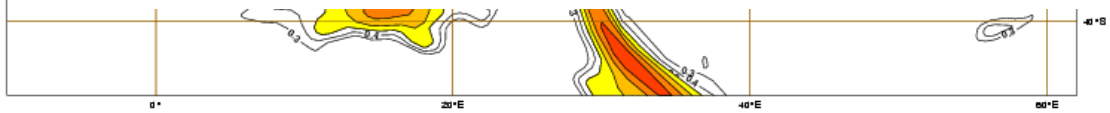
Monday 10 March 2008
Surface: Total precipita

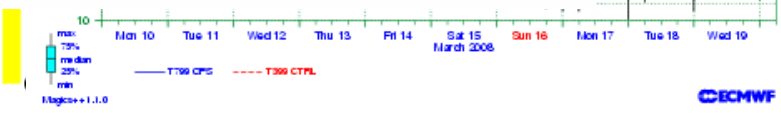




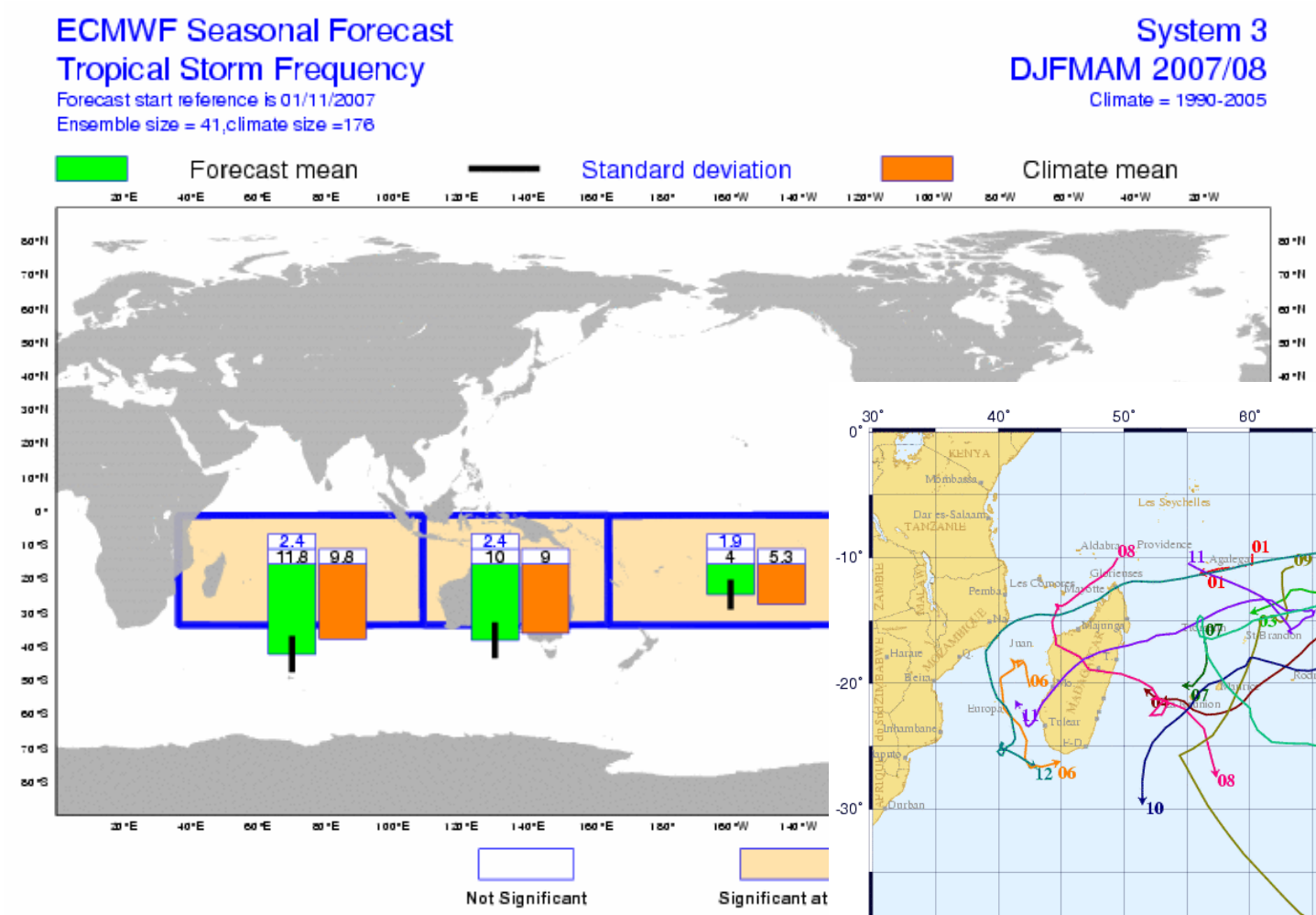


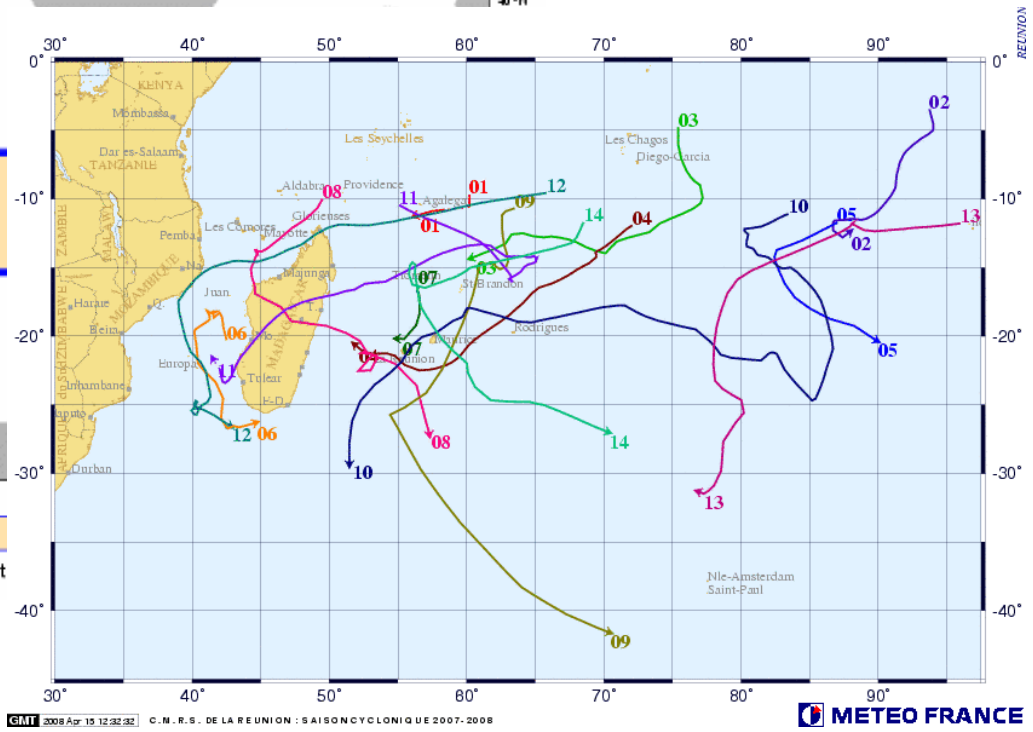




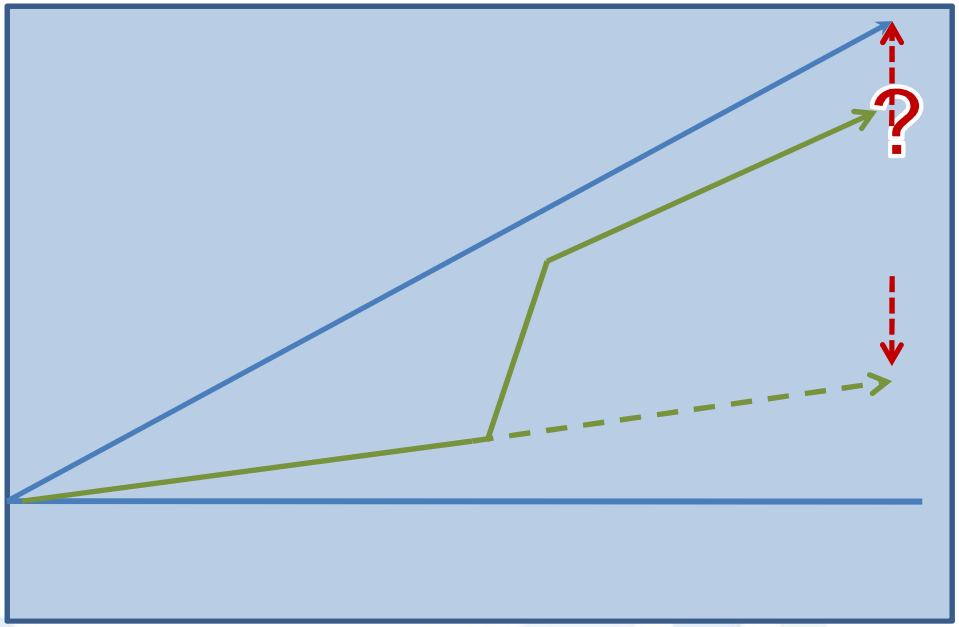


Tropical Cyclone season of 2007 / 2008





The Challenge: Overturning the Growing Technological Gap in Weather Forecasting



- Dramatic developments in weather forecasting science over the past decades – mainly due to NWP and Ensemble Prediction Systems (EPS)
- This has lead to improved severe weather warnings, and increased lead-times
- Developing countries (particularly LDCs) had little progress due to limited budgets, infrastructure, staff
- Increasing gap in application of advanced technology (NWP, EPS) in early warnings

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Developing a Meteorological Early Warning System – Collaboration among Countries

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WMO Project: SWFDP
(Severe Weather Forecast Demonstration Project)

- Effort of WMO to enhance early warning globally to:
  - Improve severe weather forecast services in NMHSs where sophisticated model products are not effectively used
  - Increase the lead time of warnings
- First regional demonstration project in Southern Africa from Nov 2006 to Nov 2007 involving 5 countries, 1 regional centre and 3 global centers

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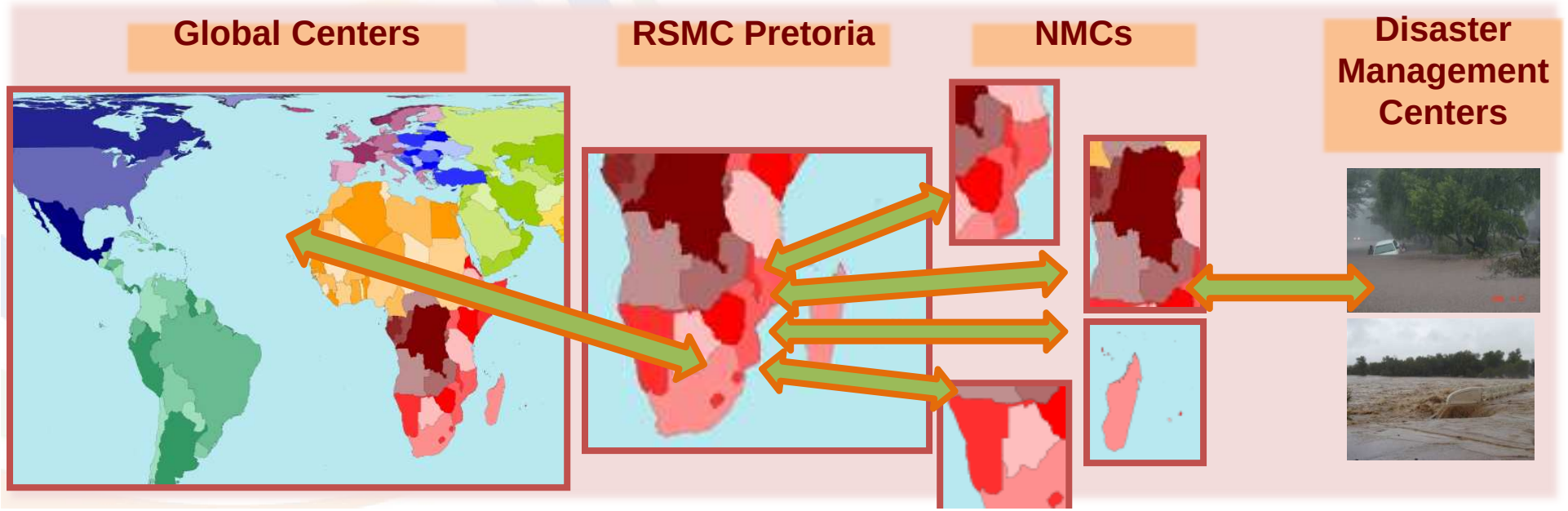
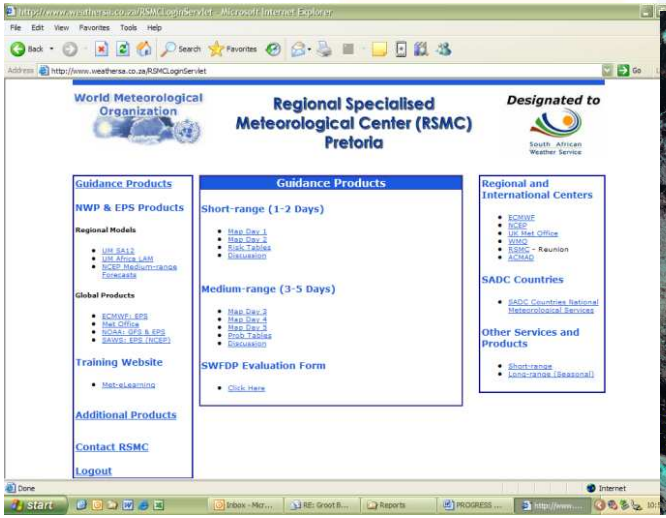
How does it work?

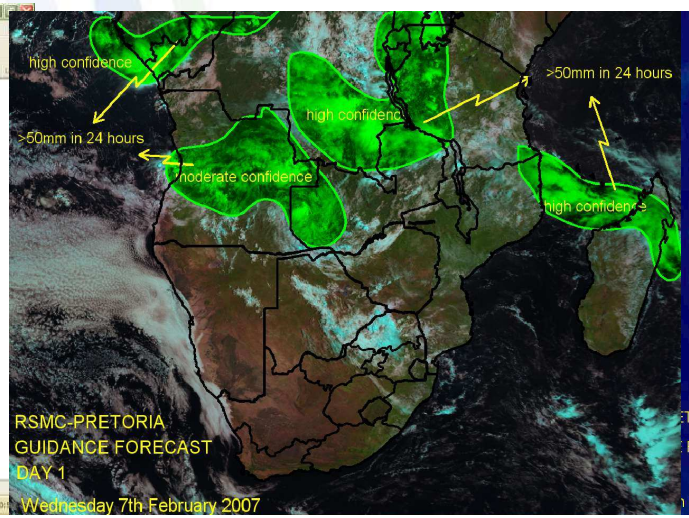
- End-to-end Cascading Process throughout Southern Africa:
  - *Global Forecast centres* provide daily available model products, including in the form of probabilities for the next 5 days;
  - *Regional centre* interpret information received from global centres, and prepare guidance forecasts for the next 5 days and disseminate to NMCs daily;
  - *NMCs* use guidance forecasts and other model products to issue warnings when appropriate to national disaster management authorities.

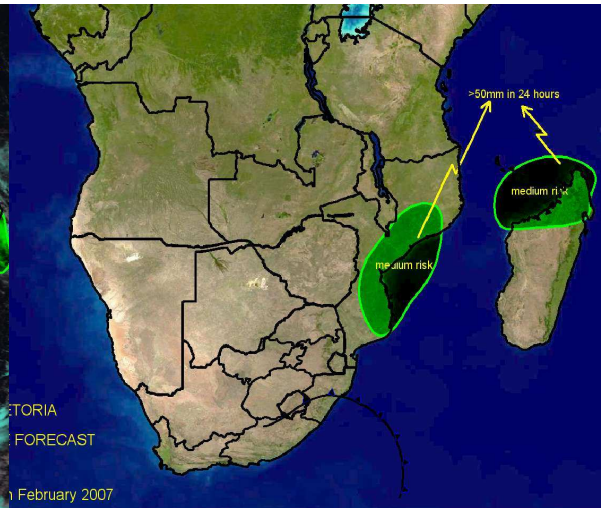


Outcome of SWFDP

- SWFDP was recognized a successful demonstration how developing countries can be assisted to reduce the technology gap in weather forecasting to support operational severe weather forecasting
- Southern African countries requested WMO to broaden the activities of SWFDP to all 16 countries in the region
- Special effort to improve cooperation with disaster management
- Same concept now replicated in other parts of the world

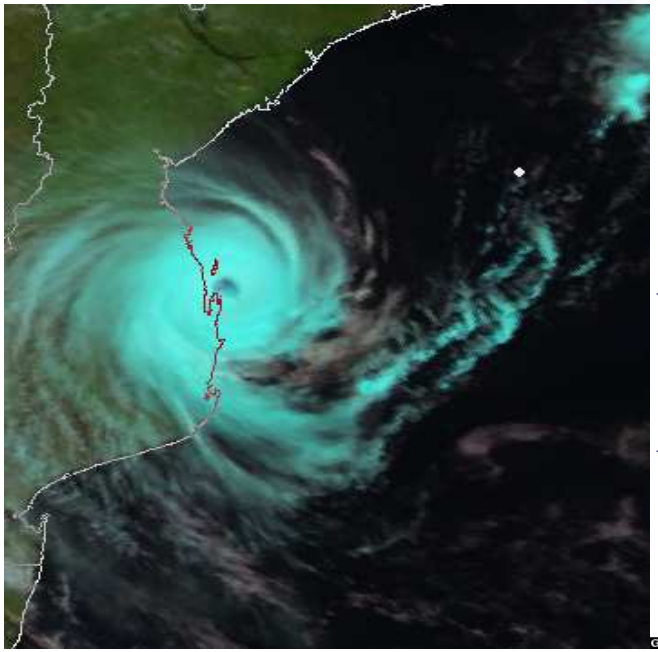


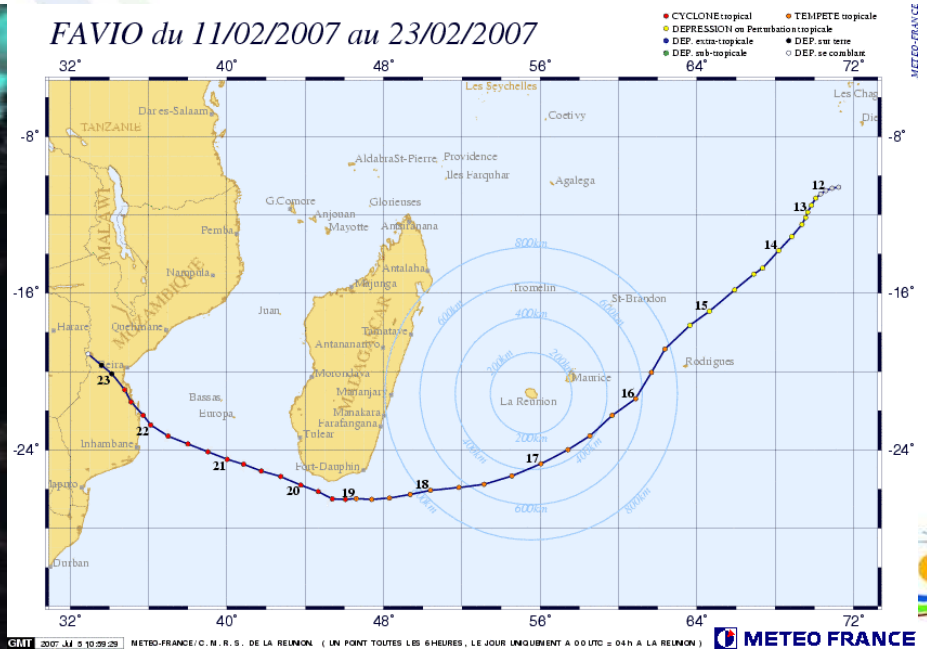




Example: Forecasting Tropical Cyclone Favio

- TC Favio caused widespread damage over Mozambique and Zimbabwe from 20-24 Feb 2007
- It provided the opportunity to test the SWFDP cascading process
- It contributed to the lessons learned in the demonstration period





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And?

- Using model products the regional center guidance correctly indicated
  - ✓ landfall in Mozambique 5 days in advance,
  - ✓ and movement towards Zimbabwe
- Both Mozambique and Zimbabwe's NMCs issued warnings 5 days in advance to disaster management departments
- Mozambique:
  - ✓ Provinces were put on alert levels 2 to 3 days in advance
  - ✓ The public responded well and major loss of live were prevented – though 9 people died
- Zimbabwe:
  - ✓ Public received early warnings by radio, TV and newspapers 5 days in advance
  - ❖ BUT… the public did not react until the first heavy downpours

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What does SWFDP really mean for early warning in Southern Africa?

- It is actually ground breaking…….:
- A new regional structure was developed for monitoring and issuing warnings, involving global, regional and national NMCs and national disaster management authorities
- Developing and least developed countries are enabled and supported to use previously unavailable forecasting technology to daily issue warnings or advisories up to 5 days in advance,
- Building links between forecasters and their national disaster management structures
- Yes, it is not perfect, and success varies in countries, but….
- Provides a platform for future developments:
  - Dissemination of warnings of other hazards
  - Improvement of collaboration with disaster management structures

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Working towards an Integrated approach – Multi-Hazard EWS

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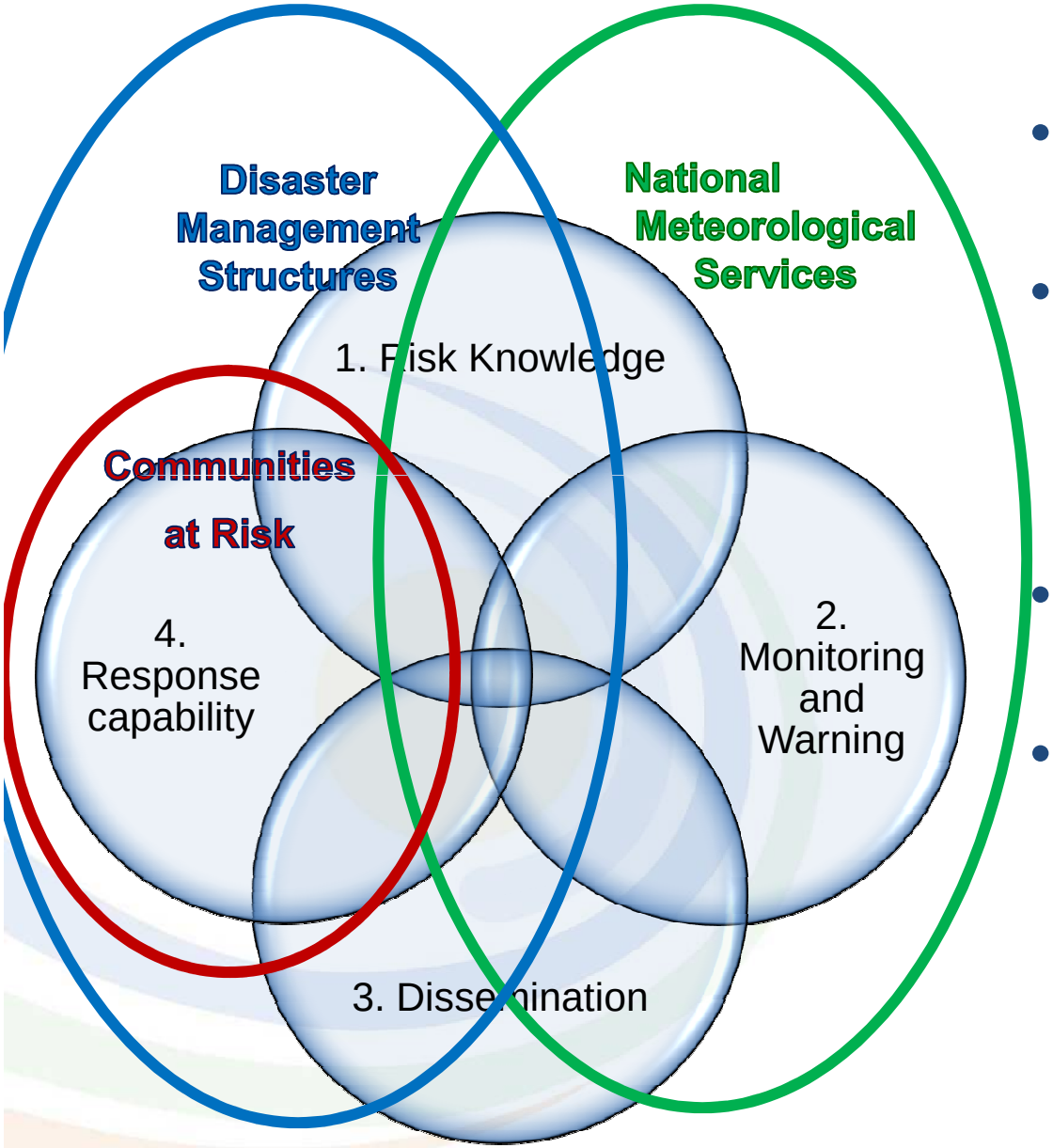
WMO View – Need for Multi-Hazard Early Warning Systems



- Dealing with all 4 phases effectively
- Addressing various natural hazards, in an integrated manner by all role-players
- Special initiatives are needed
- Failure in any one element can mean failure of the whole system

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Building on the structure developed in the SWFDP:

- Launch a follow-up demonstration project, focusing on:
- *Multi Hazards*, for example:
  - ✓ Integrated flood forecasting systems, involving meteorology, hydrology, disaster management, relief organizations, communities
  - ✓ Ocean wave and storm surge forecasting, involving meteorologists, oceanographers, disaster managers, etc.
- *Multi Sectors*, involving:
  - ✓ Integrated collaboration between forecasters and disaster management structures and relief organizations
  - ✓ Understandable and useful warnings reaching the general public and communities in time
  - ✓ Effective response by the general public
  - ✓ Public awareness campaigns
- Typical examples: Shanghai, French Vigilance, Cuban hurricane warnings, Bangladesh TCP

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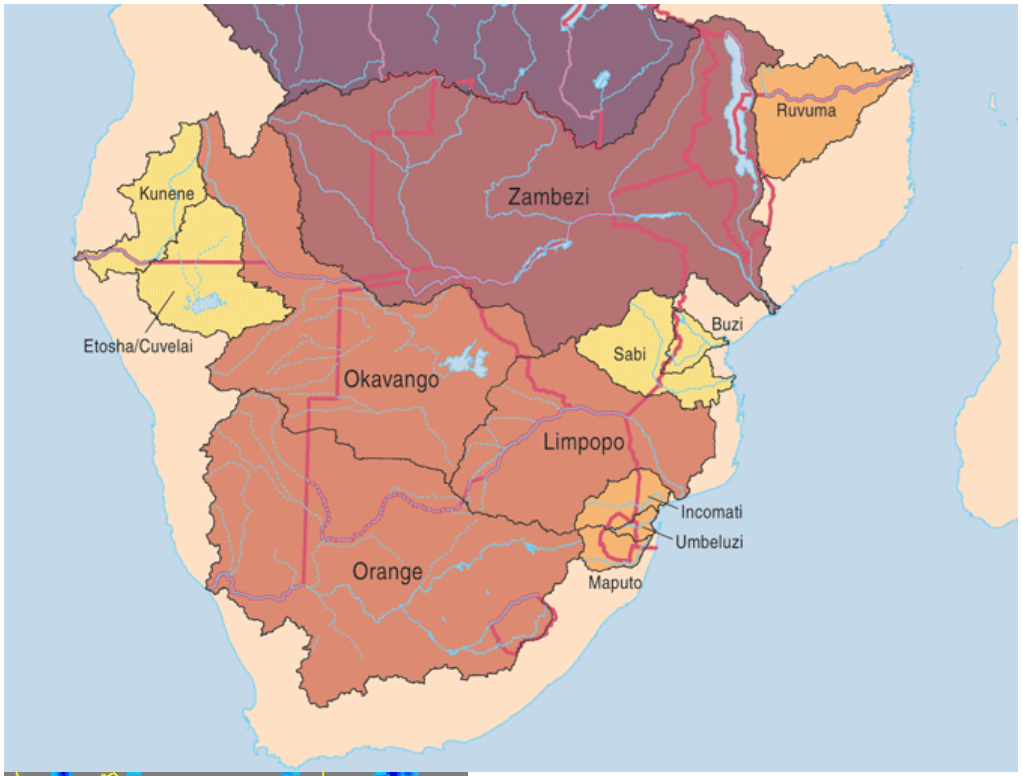
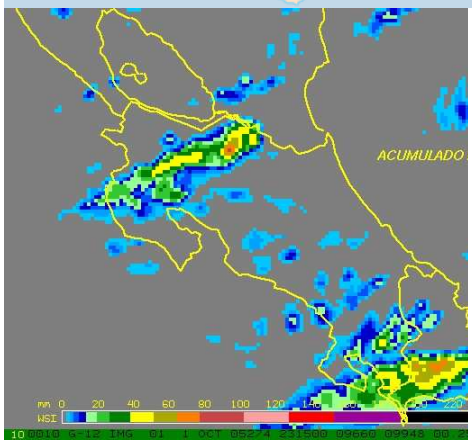
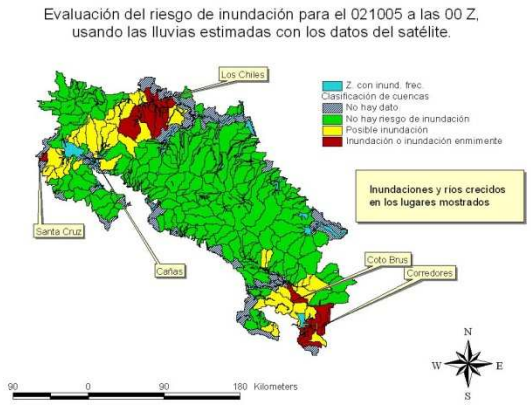
Dealing with Flash Floods







- WMO's planned Flash Flood Guidance System (FFGS)
- Based on the Central American system
- Covering the major shared basins in SADC
- Small river basins (200 sqkm on average)
- Satellite based rainfall estimation
- Development starts in 2009

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Summary

- Need to take advantage of the tremendous developments in science of forecasting
- SWFDP introduced a coordination system for Early Warning in Southern Africa
- Now need an integrated approach from all role-players to effectively deal with various weather related disasters, including catastrophic flood events like those in the Zambezi and Cuvelai river basins

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"Mankind will never be able to master natural hazards – they will continue to strike… But by being better prepared we will decrease the risk of hazards turning into disasters"

Jan Egeland,
Under Secretary General for Humanitarian Affairs,
United Nations

Thank You

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