



World Meteorological Organization

Weather • Climate • Water

The WMO Severe Weather Forecasting Demonstration Project – bringing the benefits of leading NWP to developing countries

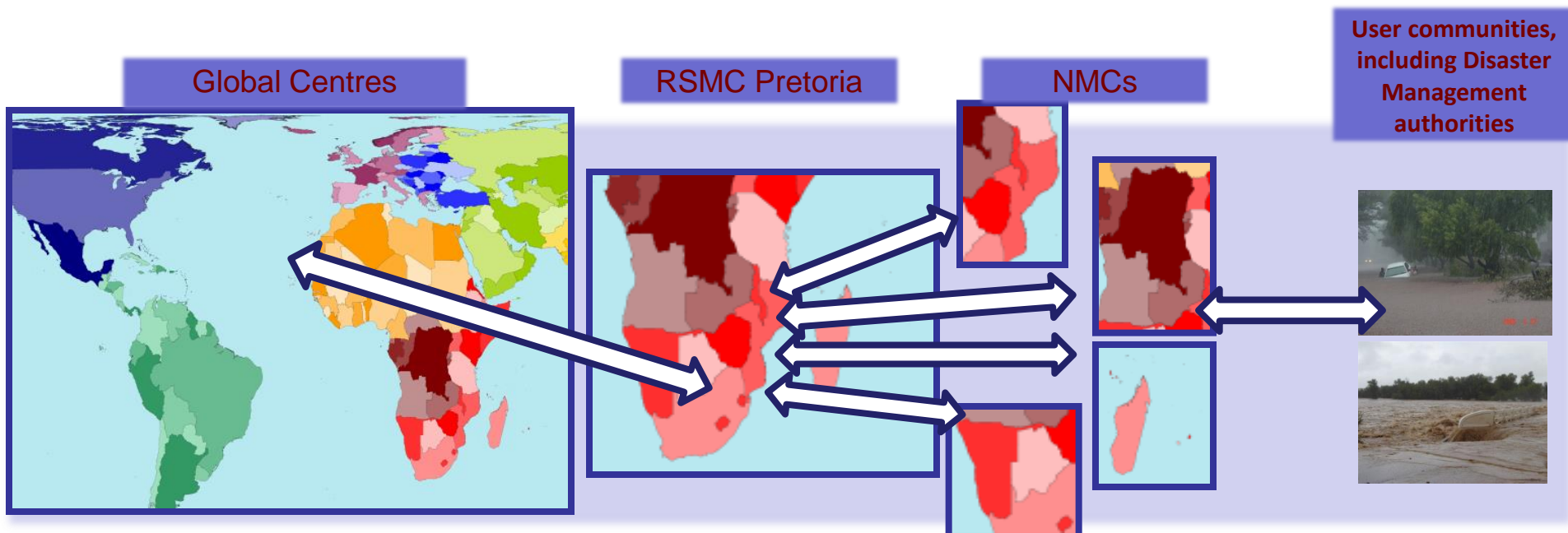
Ken Mylne

Chair DPFS (Data-processing and Forecasting Systems) & Chair SWFDP SG

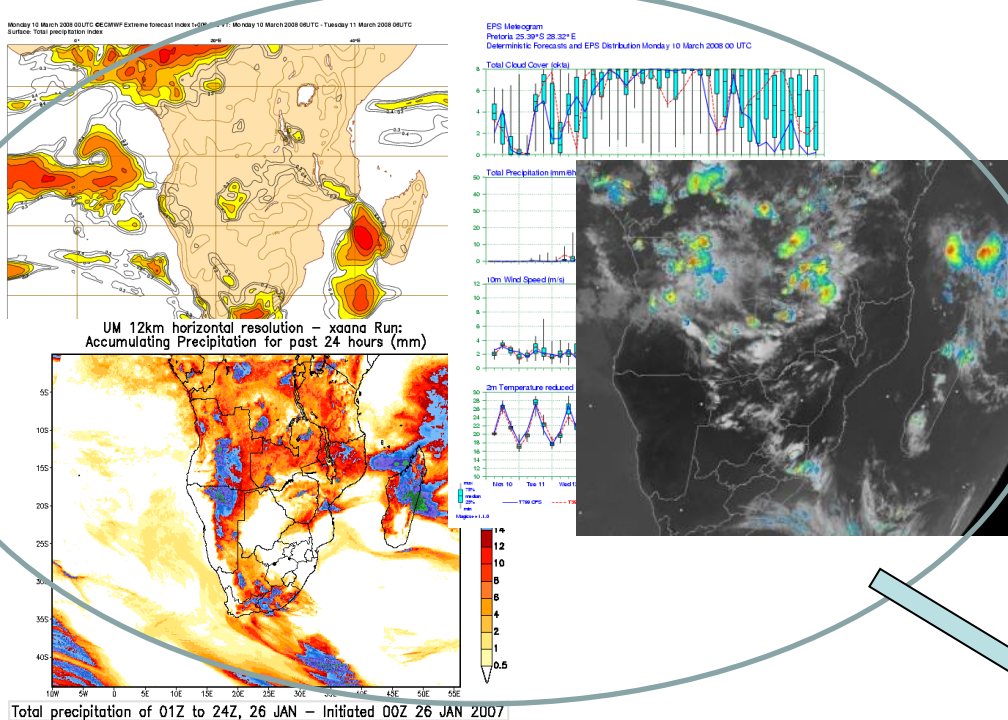
Thanks to Alice Soares (WMO), Caroline Bain and Bob Turner (Met Office), Eugene Poolman (S. Africa) and James Lunny (NZ)

SWFDP Cascading Forecasting Process

- Global NWP centres to provide available NWP/EPS and sat-based products, including in the form of probabilities, cut to the project window frame;
- Regional centres to interpret information received from global centres, prepare daily guidance products (out to day-5) for NMCs, run limited-area model to refine products, maintain RSMC Web site, liaise with the participating NMCs;
- NMCs to issue alerts, advisories, severe weather warnings; to liaise with user communities, and to contribute feedback and evaluation of the project;
- NMCs have access to all products, and maintained responsibility and authority over national warnings and services.



SWFDP Guidance Products from RSMC Pretoria



- RSMC analysis forecast information
- Guidance every day for the next 5 days
- Hazards: heavy rain, strong wind, high seas and swell, severe winter weather
- Guidance info made available through dedicated Webpage to NMCs
- Links to RSMC La Réunion TC forecasting

http://www.met.sarva.co.za/RSMCLoginServlet - Windows Internet Explorer

World Meteorological Organization
 Regional Specialised Meteorological Center (RSMC) Pretoria
 Designated to South African Weather Service

Guidance Products

NWP & EPS Products

Regional Models

- Met SADC
- Met SADC alert

Global Products

- NWP/eps
- NWP/eps
- NWP/eps
- NWP/eps
- NWP/eps
- NWP/eps

Training Website

- Met-sarva

Guidance Products

Short-range (1-2 Days)

- Day Day 1
- Day Day 2
- Day Day 3
- Day Day 4
- Day Day 5

Medium-range (3-5 Days)

- Day Day 3
- Day Day 4
- Day Day 5
- Day Day 6
- Day Day 7
- Day Day 8

SWFDP Evaluation Form

- Click here

Regional and International Centers

- Europe
- Africa
- US West office
- US East office
- France - Reunion
- Mexico

SADC Countries

- SADC Countries National Meteorological Services

Other Services and Products

- South coast
- East coast

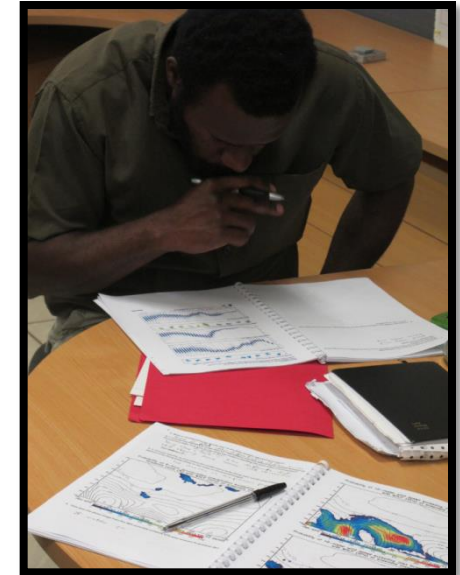
RSMC-PRETORIA
 GUIDANCE FORECAST
 DAY 1
 FRI DAY 26th January 2007

RSMC-PRETORIA
 GUIDANCE FORECAST
 DAY 4
 MON DAY 29th January 2007



Training

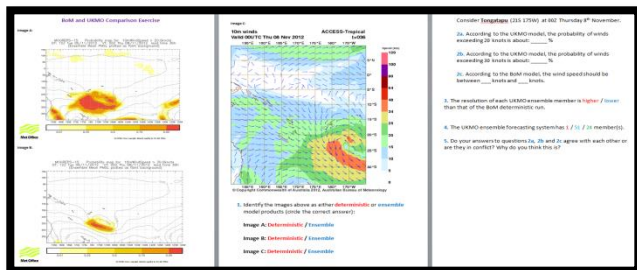
Funded by NZ Ministry for the Environment



Tropical meteorology and climatology, “why do we need ensembles?”, how to interpret NWP from different centres. 3-5 days per country.

Aimed at a broad base of forecasters. No equations. More time spent on exercises than on lectures.

“DRR Day” – practical exercises involving outside agencies.



SWFDDP and Tropical Meteorology Quick Quiz

For multiple choice questions, circle the **correct** / **incorrect** answer.


- 1) The SWFDDP is focussed on weather at the **planetary / meso / synoptic** scale.
- 2) At the surface, the main SPCZ rainband usually matches up with: **convergence in streamlines / pressure trough / ridge**
- 3) Streamlines are always the same thing as trajectories. **True / false**
- 4) There are four actions listed below. Two are **proactive** and two are **reactive**. Identify them with a **P** or **R**.
 - a) Wearing long trousers, closed shoes and mosquito spray when dining out in the tropics.
 - b) Swatting mosquitoes when you feel them biting you.
 - c) Issuing a heavy rain warning 12 hours before the rain begins.
 - d) Issuing a heavy rain warning 2 hours after the rain begins.

SWFDP Regional Projects

- Southern Africa (ongoing; 16 countries; RSMC Pretoria, RSMC-TC La Réunion)
- Southwest Pacific Islands (ongoing; 9 Island States; RSMC Wellington, RSMC-TC Fiji)
- Eastern Africa (ongoing, 6 countries; RSMC Nairobi, RFSC Dar)
- Southeast Asia (in development, 5 countries; RFSC Hanoi)
- Bay of Bengal (in development, 6 countries; RSMC-TC New Delhi)
 - WMO global and regional operational centres (e.g. RSMCs)
 - 42 NMHSs of developing countries (29 of which are LDCs/SIDSs)
 - Several WMO programmes (i.e. GDPFS, PWS, TCP, DRR, MMO, AgM, SP, ETR, CD, LDC, RP, and WWRP) and technical commissions (i.e. CBS, CAgM, CHy, JCOMM, and CAS)




SWFDP East Africa



Regional Specialised Meteorological Center (RSMC)


NAIROBI



NWP Models	GUIDANCE PRODUCTS	Regional and International Centers
Regional Products	Short Range Forecasts (1-2 days)	<ul style="list-style-type: none"> » ECMWF » NOAA NCEP African Desk » UK MET Office » DWD » RSMC- Pretoria
<ul style="list-style-type: none"> » COSMO_00 » COSMO_12 » WRF_00 » WRF_12 » Lake Victoria Products » Aladin La Reunion » Indian Ocean Waves » UK MET LAM » Met Office: EPS 	<ul style="list-style-type: none"> » Day 1 » Day 2 » Risk Table » Discussion 	Long Range Forecast Centers
Global Products	Medium Range Forecasts (3-5 days)	<ul style="list-style-type: none"> » ACMAD » KMA » ICPAC
<ul style="list-style-type: none"> » NOAA EA Products » ECMWF Products » UK MET Products » TIGGE-GIFS East Africa products 	<ul style="list-style-type: none"> » Day 3 » Day 4 » Day 5 » Risk Table » Discussion 	National Met Services
Others	Agrometeorology Products	<ul style="list-style-type: none"> » Kenya » Ethiopia » Rwanda » Tanzania » Uganda » Burundi
<ul style="list-style-type: none"> » RSMC Guidance Archive 	<ul style="list-style-type: none"> » NDVI and Anomalies (10-day Composite) » Rainfall Estimate (RFE) Dekadal » Rainfall Estimate (RFE) Anomaly (Dekadal) 	AgroMet Centers
Training Website Links	SWFDP Evaluation	<ul style="list-style-type: none"> » AgrhyMet
<ul style="list-style-type: none"> » Met E-Learning » WMO Project Website 	<ul style="list-style-type: none"> » Quarterly Report Template » Event Table 	Satellite Products
<p style="text-align: center;">Contact RSMC</p> <p style="text-align: center;">Logout</p>	UNDER CONSTRUCTION	

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- 6 countries
- RSMC Nairobi
- RFSC Dar (Lake Victoria)



TANZANIA METEOROLOGICAL AGENCY

REGIONAL FORECASTING SUPPORT CENTRE (RFSC)

LAKE VICTORIA BASIN



LAKE VICTORIA PRODUCTS		
<ul style="list-style-type: none"> • TMA met Products • Uk met office forecast link 	<i>Short-range (1-2 Days)- GUIDELINES</i>	
	Forecast	Verification
	<ul style="list-style-type: none"> • Map Day 1 • Map Day 2 	<ul style="list-style-type: none"> • Day 2 • Tropical Rainfall Measuring Mission (TRMM)
	Risk Table	
	Discussion	
Agrometeorology Products <ul style="list-style-type: none"> • 2 Days • Dekadal 	Real Time Radar and Satellite Imagery <ul style="list-style-type: none"> • RADAR • SATELLITE 	

Regional Forecasting Support Center (RFSC) @ [By Tanzania Meteorological Agency](#)



Forecasting and nowcasting tools

Satellite and remote sensing

Numerical Prediction Models

Forecaster guidance

Regional Specialised Meteorological Center (RSMC) NAIROBI

World Meteorological Organization

NWP Models	GUIDANCE PRODUCTS	Regional and International Centers
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→ COSMO_06 → COSMO_12 → WRF_06 → WRF_12 → Lake Victoria Products → Aladin La Reunion → Indian Ocean Waves → UK NET LAN → Met Office: EPS	→ Day 1 → Day 2 → Risk Table → Discussion	Long Range Forecast Centers
Global Products	Medium Range Forecasts (3-5 days)	→ ACHAD → KMA → ICPAC
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Contact RSMC	SWFDP Evaluation	→ AgroMet
Logout	→ Quarterly Report Template → Event Table	
	Satellite Products	
	UNDER CONSTRUCTION	

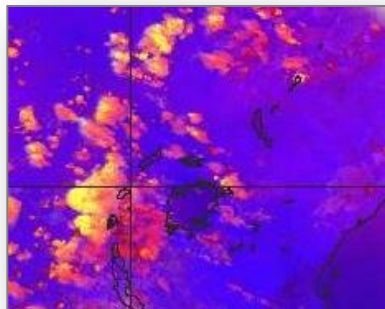
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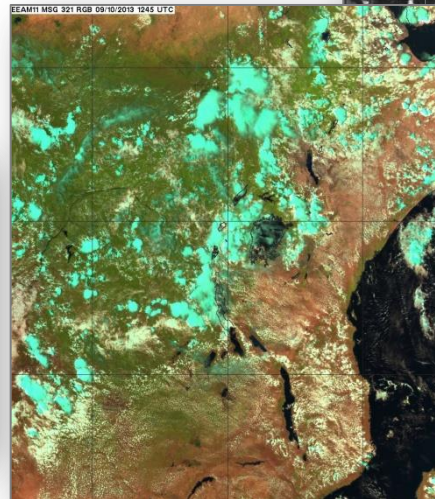
Forecasting and nowcasting tools

Satellite and remote sensing

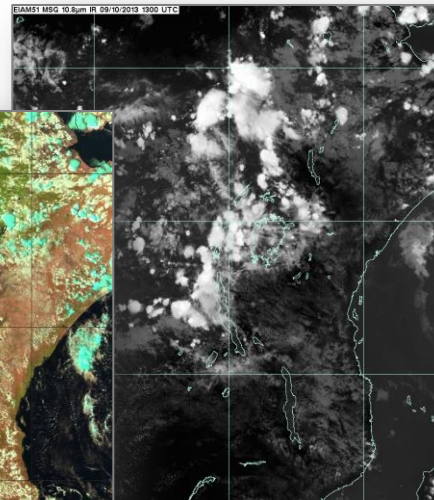
(under construction on the website but access through EUMETSAT/ PUMA system)



Severe Convection



RGB

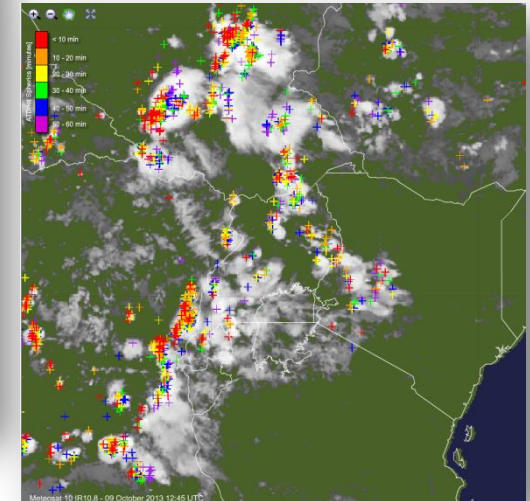


IR

Numerical Prediction Models

Forecaster guidance

Lightning



Daily Teleconferencing between forecasters

SWFDP Eastern Africa Global Guidance
Eastern Africa Regional Guidance, including Lake Victoria.
RSMC Nairobi and RFSC Dar es Salaam

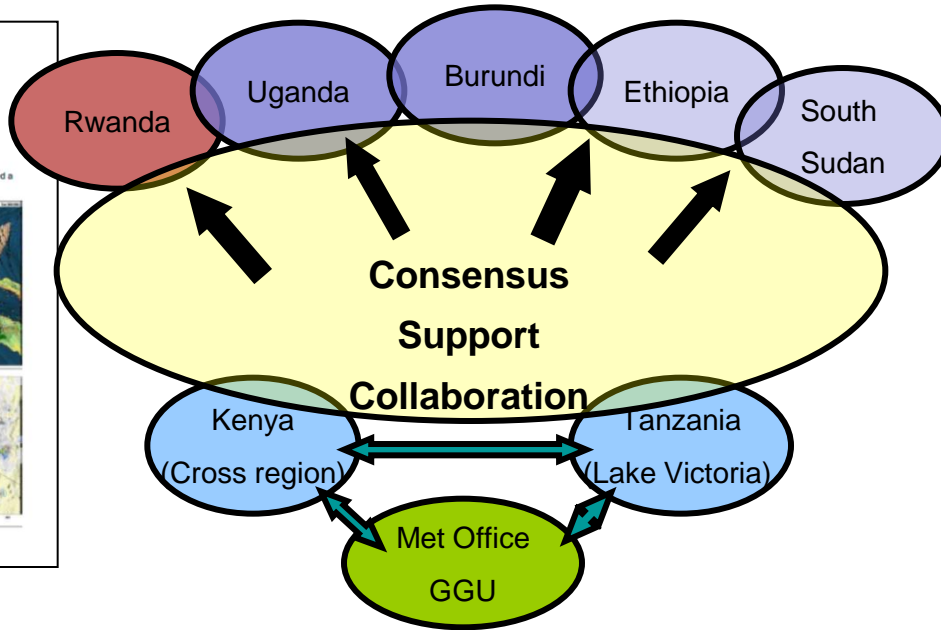
Issued at: 300400 Z Forecaster: Nick Weight Hazard Centre, Met Office

NWP comparison to imagery
Fig 1: The 4KM Lake Victoria model failed to capture the initial developments over the Lake and this has continued to the present time. The Africa LAM (using convergence of streamlines as a marker) is considered a better guide.



3003Z IR image (below left), with 2516Z Africa LAM T+9 ppn and 700hPa humidity fields (above right), and Lake Victoria 4KM model valid at 3003Z (lower right)

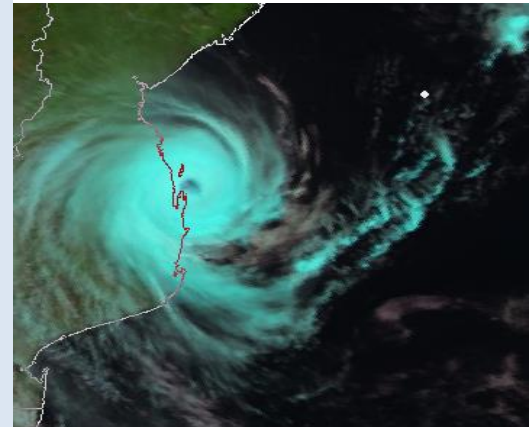
The 4km model failed to capture the initial development over Lake Victoria and this has continued with the signal at 03Z, verifying poorly with imagery. The Africa LAM is considered a better guide.



Consider Tropical Cyclones Eline (2000) and Favio (2007)

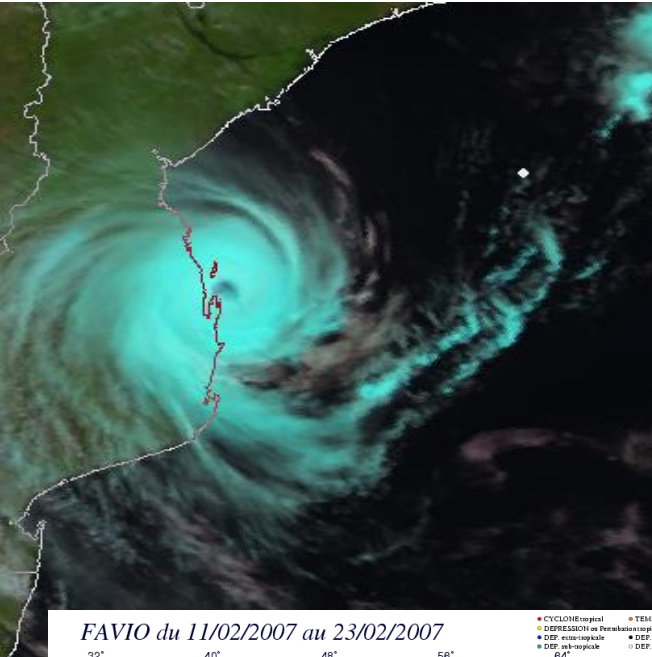
(both equivalent to Cat 4 hurricanes ~220 km/h winds)

- TC Eline 2000 Mozambique:
 - 700 deaths, 4.5 million affected
 - Mozambique was not prepared from a DRR perspective
 - Massive international rescue and support
- TC Favio 2007 Mozambique:
 - 29 deaths, 285000 affected
 - Warnings issued days in advance
 - Disaster management infrastructure mobilized
 - Communities prepared in prior training were successfully evacuated within 2 days
- How did improved EWS through SWFDP contribute to this success for TC Favio?

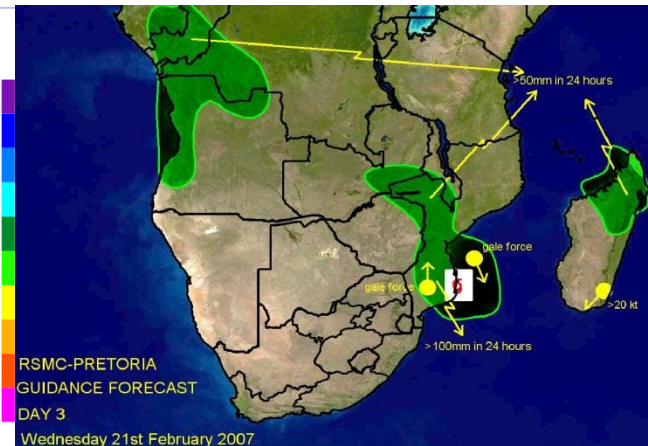
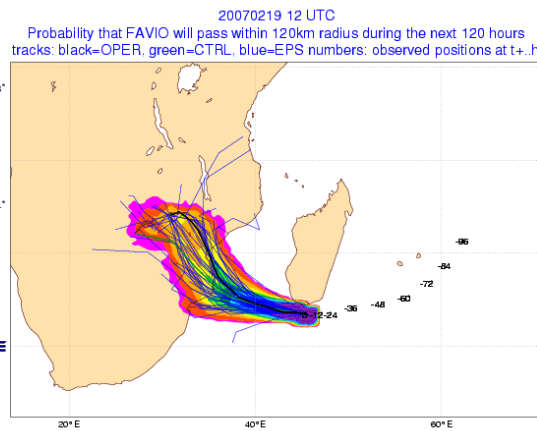
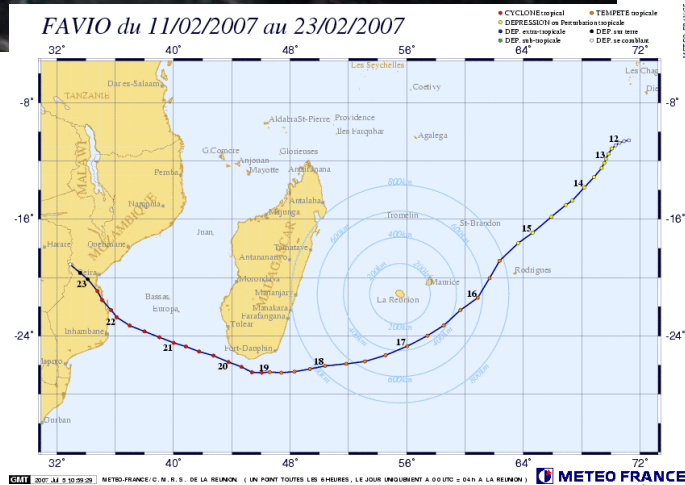


Case Study: Tropical Cyclone Favio

20-24 Feb 2007



- TC Favio caused widespread damage over Mozambique and Zimbabwe
- The consistency of model forecasts provided confidence to RSMC Pretoria to issue guidance to NMCs on potential landfall and movement 5 days in advance
- The model forecast proved to be quite accurate with landfall at Vilancoulos, moving to Eastern Zimbabwe



Impact of Tropical Cyclone Favio



- In both Mozambique and Zimbabwe the NMCs agreed with the guidance products and issued warnings 5 days in advance to disaster management departments
- In Mozambique:
 - Provinces were put on alert levels 2 - 3 days in advance
 - The public responded well and major loss of life were prevented
- In Zimbabwe:
 - Public received early warnings by radio, TV and newspapers 5 days in advance

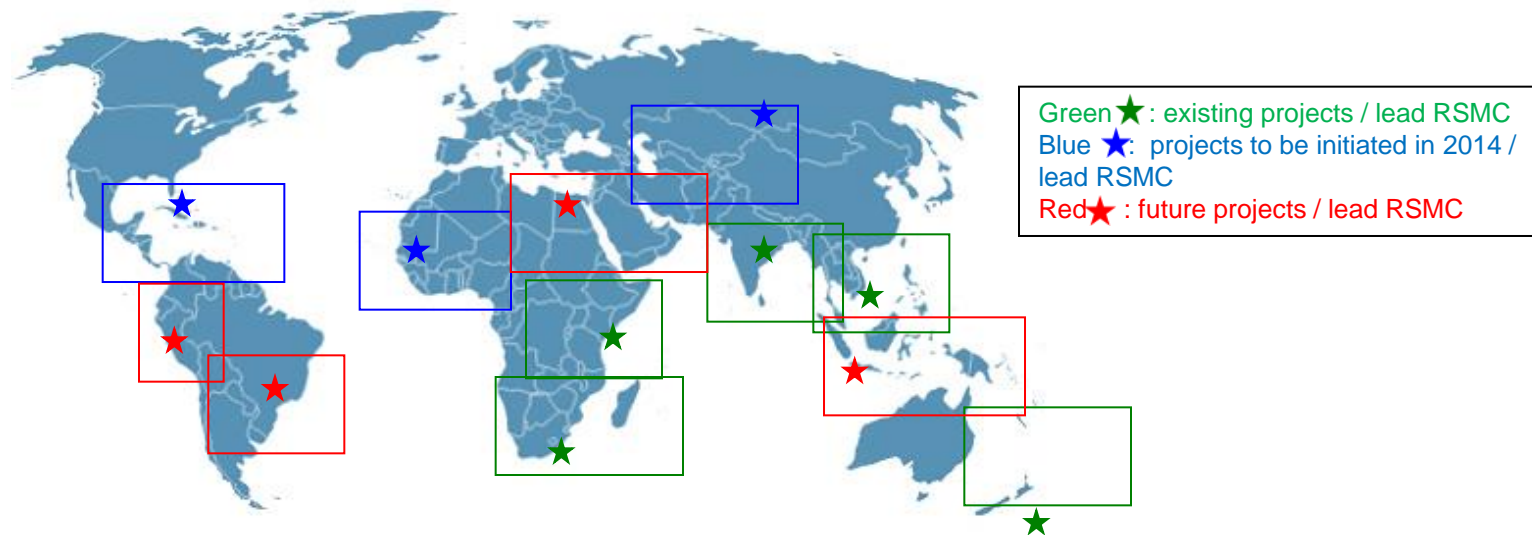


Evaluation

- Since Eline in 2000 there was a dramatic improvement in the entire DRR system in Mozambique
 - including EWS through SWFDP
- Question: How much of the savings of human lives can really be directly attributed to SWFDP?
 - SWFDP definitely lead to earlier warnings issued which resulted in earlier evacuations

The Future - Expansion of SWFDP to a global Programme to Strengthen Operational Centres

- Expansion of the SWFDP towards global coverage (3 development and demonstration phases)



- Transition to sustainable operations (phase 4)

It requires a programme office to support non-operational activities and development of new SWFDP regional projects





**World
Meteorological
Organization**

Weather • Climate • Water

Thank you for your attention

DISCUSSION