Weather Forecasting in Flood Forecasting Activities

Eugene Poolman

South African Weather Service

Representing CBS

Pretoria

South Africa

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Main Activities of CBS

- *Development, implementation and operation* of integrated systems for *observing, data processing, data communication and data management*, and to the provision of *public weather services*, in response to requirements of all WMO Programmes and opportunities provided by technological developments.
- CBS is the lead Technical Commission for the overall
  - World Weather Watch Programme (WWW)
  - WMO Space Programme and
  - Public Weather Services Programme.

Open Programme Area Groups (OPAGs)

- On Integrated Observing System,
- on Information System and Services,
- on Data-Processing and Forecasting System and
- on Public Weather Services.

SEVERE WEATHER FORECAST DEMONSTRATION PROJECT (SWFDP)

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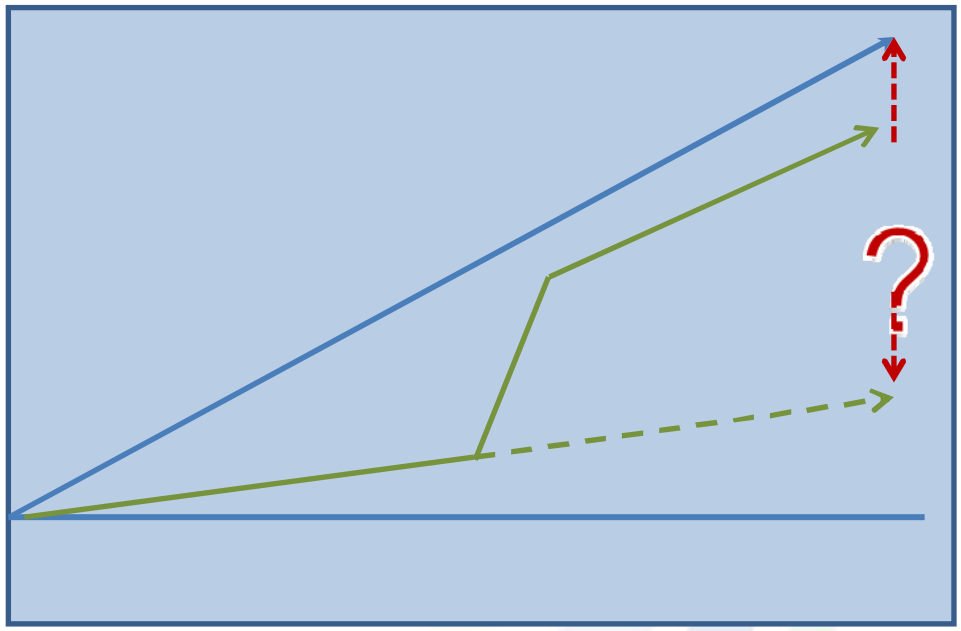
The Concept of SWFDP



- Dramatic developments in weather forecasting science over the past decades
- Increasing gap in developing countries of application of modern forecasting technology (NWP, EPS) in early warnings
- WMO initiated SWFDP concept to reduce this gap and improve early warnings in developing regions using existing technology;

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Aim of the WMO SWFDP Program

- To improve early warning systems in developing regions and interactions with Disaster Management Agencies
- To improve ability of National Meteorological Services (NMSs) in developing regions to forecast severe weather events for the next 5 days using existing technology – to close the technology gap
- SWFDP is about *enhancing delivery of warning services as adaptation against a likely increase of disasters due to climate change and socio-economic vulnerabilities*
- Capacity building through: workshops, roving training

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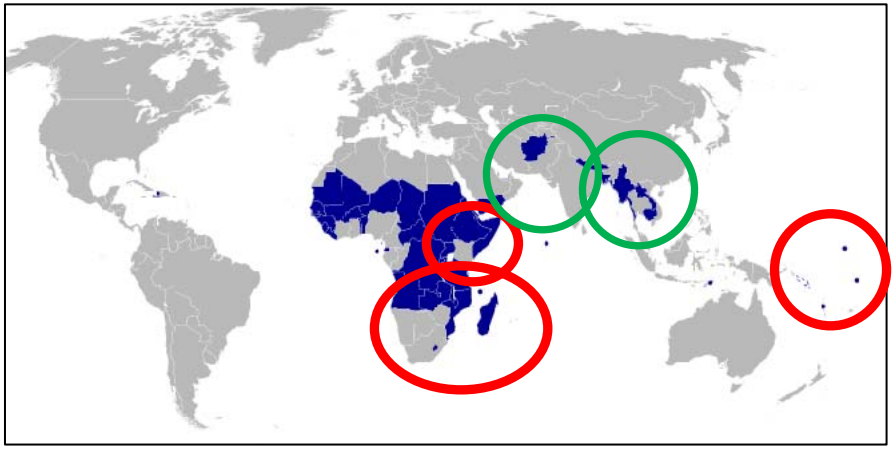
Perspective on SWFDP Sub-Projects

Current status of SWFDPs around the world – 3 active, 2 under development

1. Southern Africa
   - In Phase 4: continuous development phase
   - MASA now responsible for management
2. South Pacific islands
   - Phase 3: Operational implementation
3. Eastern Africa
   - Phase 2: Pilot Project 2012-2013
4. Under development –

Southeastern Asia and Bay of Bengal



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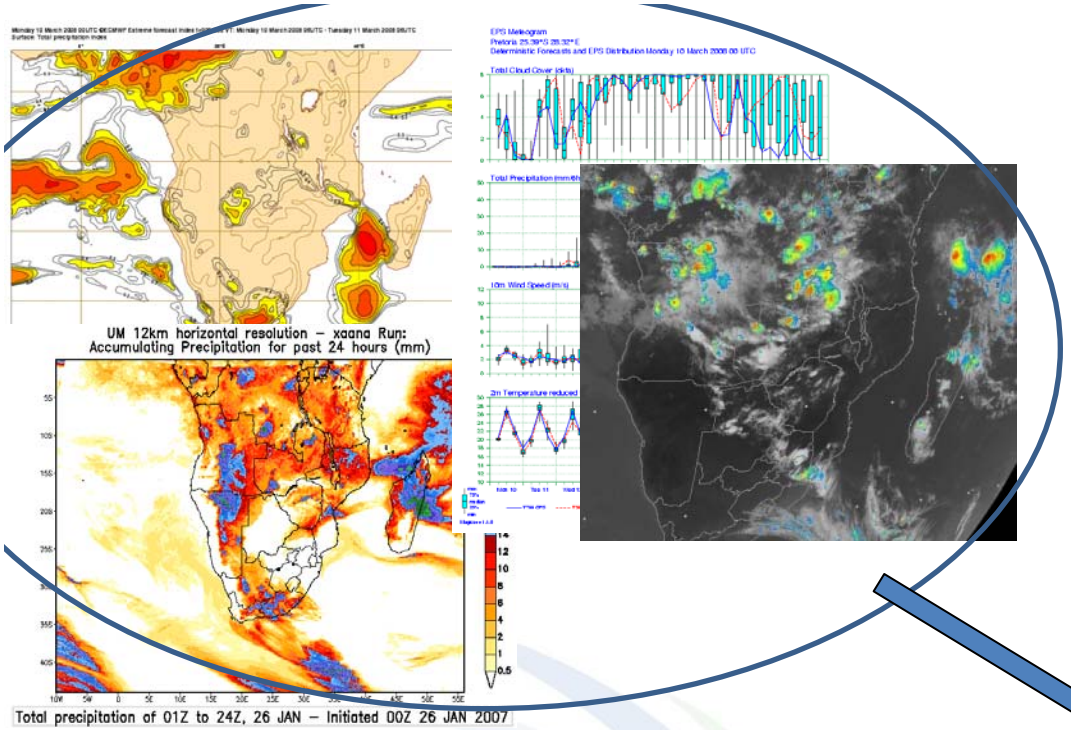
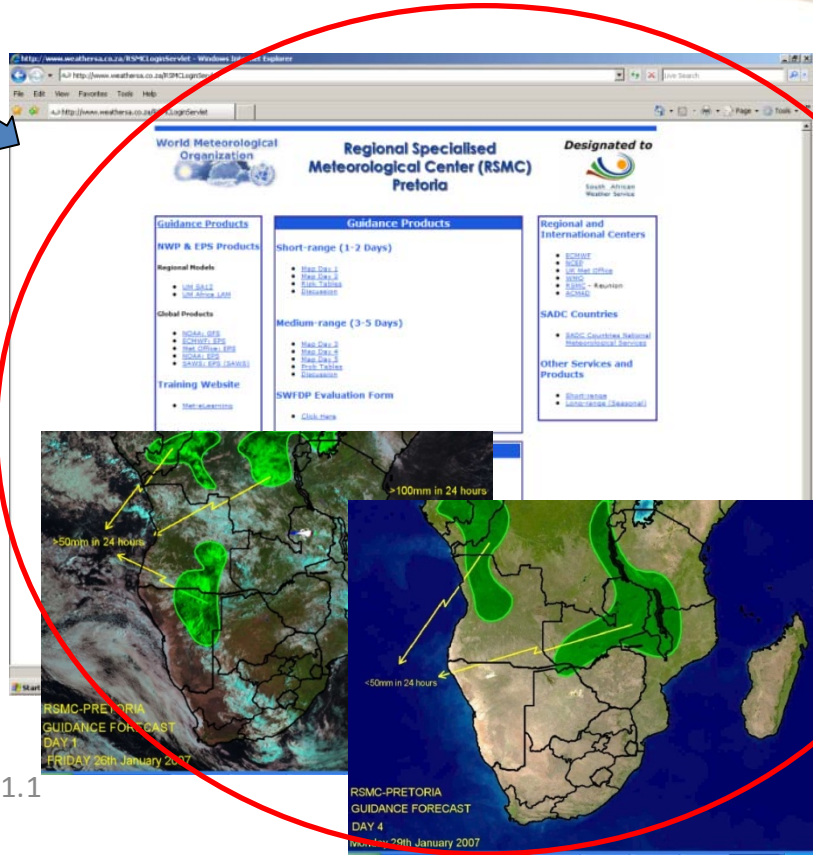
SWFDP Concept of Cascading of Information

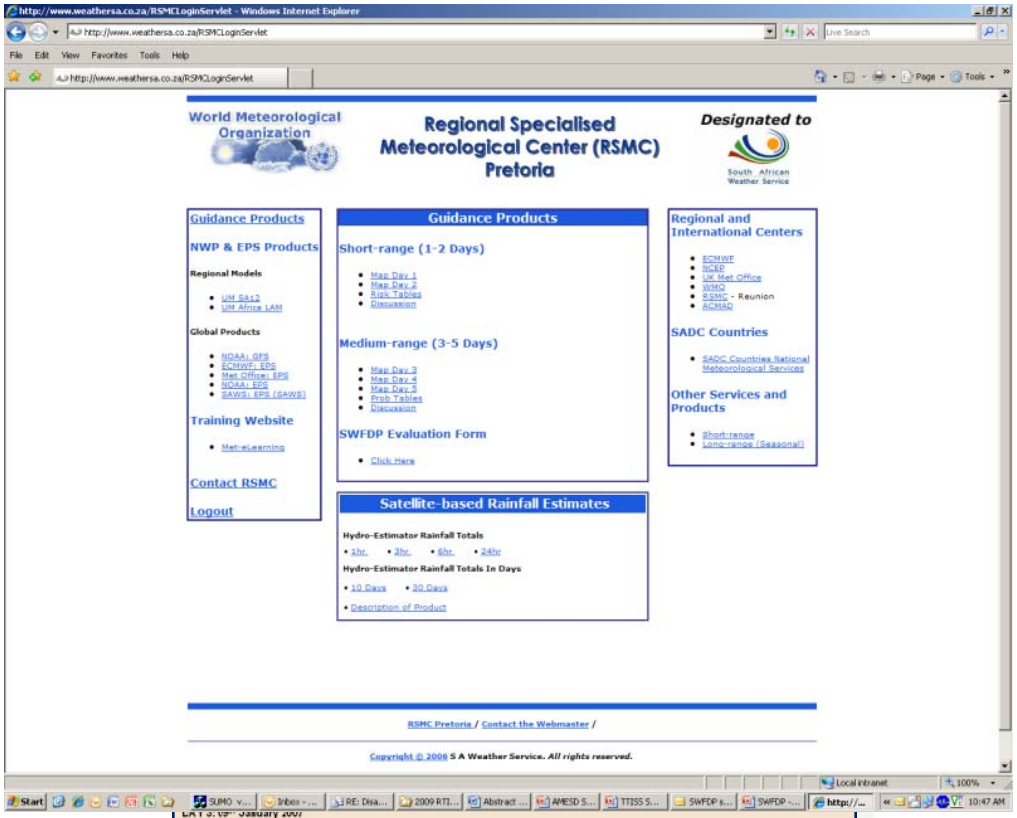
SWFDP Guidance Products from Global Centers and RSMCs

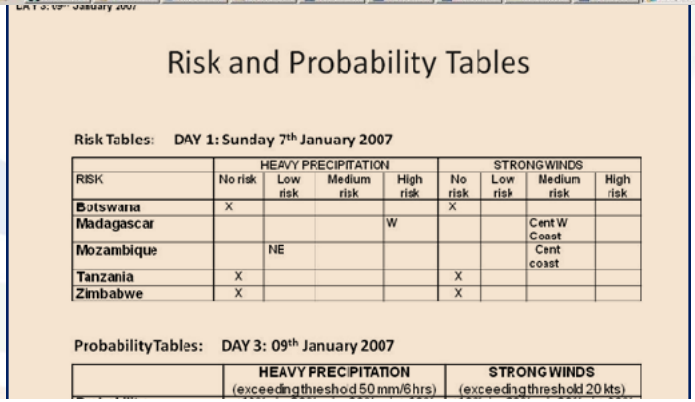


- Global centres provide NWP and EPS products focussed on relevant region to RSMC
- RSMC analyse forecast information, prepares guidance every day for the next 5 days
- RSMC also provide products of its own limited area NWP, and satellite nowcasting products
- All products and guidance info made available through webpage to NMCs – no complex system implemented



Examples of SWFDP Guidance Products from RSMC Pretoria





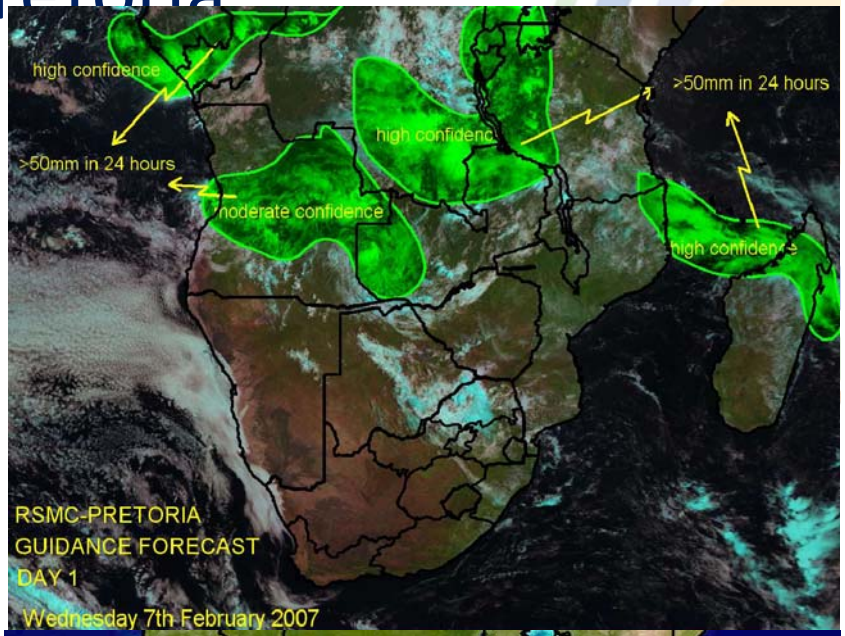
Risk and Probability Tables

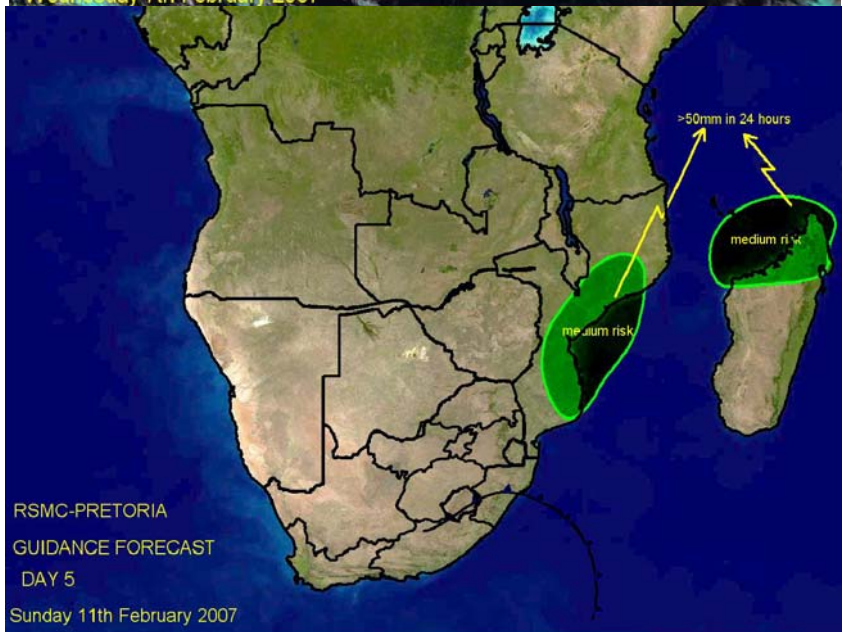
Risk Tables: DAY 1: Sunday 7th January 2007

RISK	HEAVY PRECIPITATION				STRONG WINDS			
	No risk	Low risk	Medium risk	High risk	No risk	Low risk	Medium risk	High risk
Botswana	X				X			
Madagascar				W			Cent W Coast	
Mozambique		NE					Cent coast	
Tanzania	X				X			
Zimbabwe	X				X			

Probability Tables: DAY 3: 09th January 2007

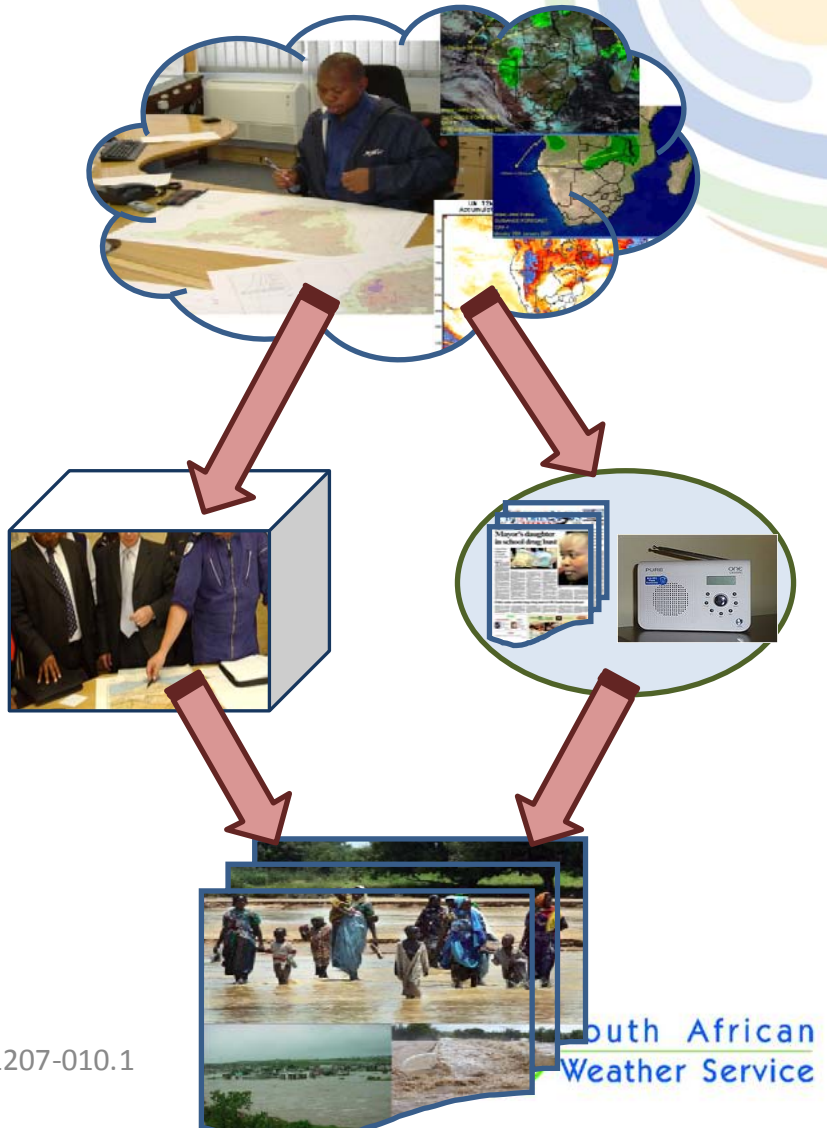
	HEAVY PRECIPITATION (exceeding threshod 50 mm/6hrs)	STRONG WINDS (exceeding threshold 20 kts)





Warnings from National Meteorological Services

- Each NMS evaluate model products supported by RSMC guidance products
- Issue warnings if needed against their own in-country criteria for severe weather
- Provide disaster management with up to 5 days lead-time of expected major hazards
- Coordinate with media for end-user dissemination



Successes and Challenges of SWFDP

- SWFDP was successful in building the forecasting capacity and improving warnings services in countries
  - Comment from a disaster manager:

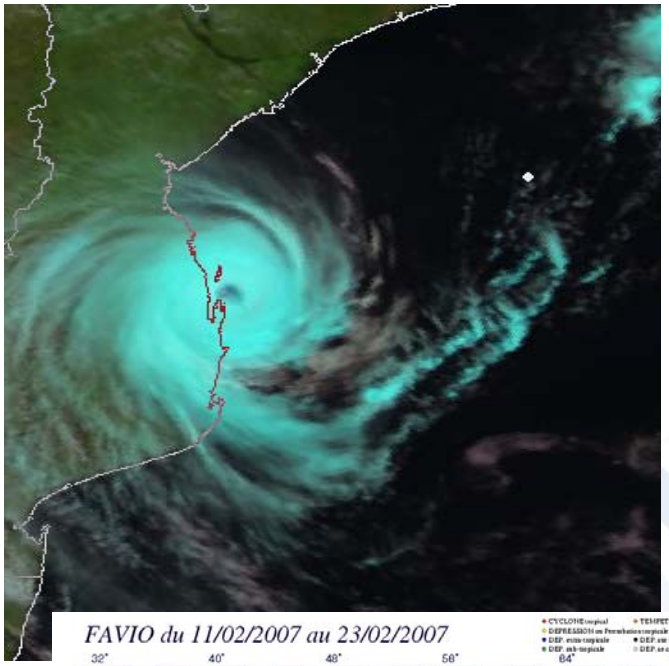
    "I can see the increase in confidence of the forecasters…"
- Increased the lead-time of warnings through use of ensemble products
- It opened channels between weather forecasters and disaster managers in countries where they did not exist in the past
- It highlighted the challenges in effective warning dissemination to end-users
- Highlighted the need for enhancing in-country public responsiveness through public awareness campaigns

Comments on the outcomes of SWFDP

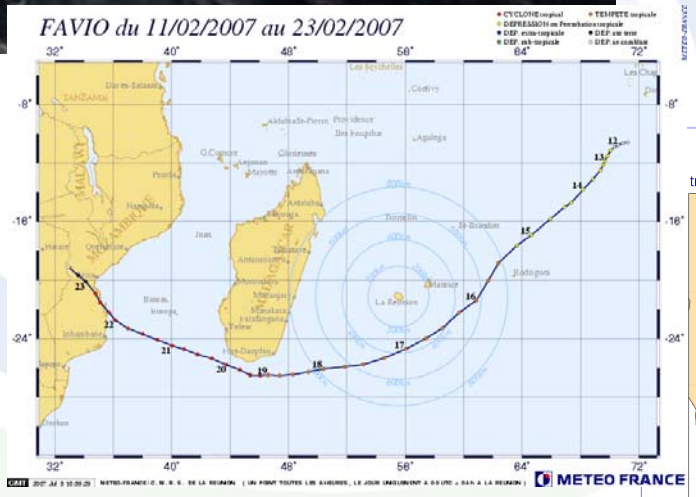
- SWFDP strengths are:
  - ✓ Its simplicity, few hazards, no complex equipment - NMSs only needed internet
  - ✓ Highly operational focus – support NMSs exactly where they need it for improved services
  - ✓ It took the autonomy of countries in Southern Africa into account – nothing was imposed, they issued warnings according to their own criteria
  - ✓ It had direct benefit and participation of each role-player
  - ✓ It built capacity that could be immediately used in an operational environment by all countries involved
  - ✓ It provided direct benefit to the users – disaster management, media and public
- The focused aim on only a few hazards and few countries helped to establish the framework for the region that can be expanded on later

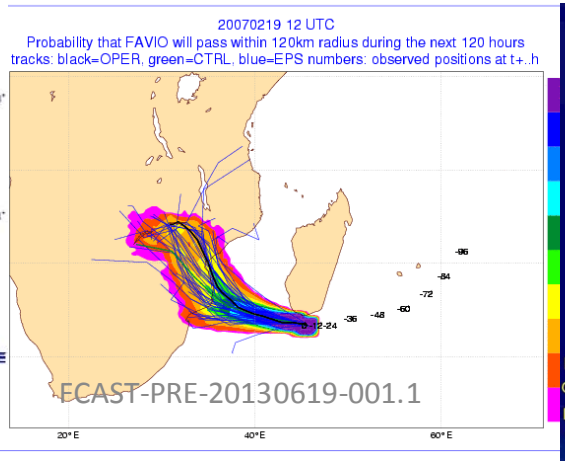
SOME EXAMPLES

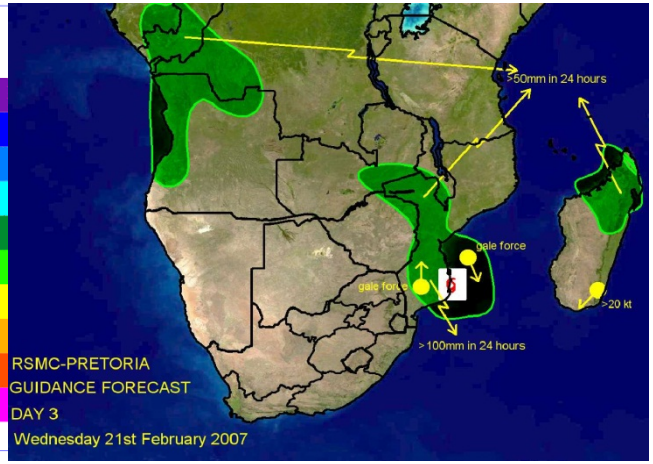
Case Study: Tropical Cyclone Favio 20-24 Feb 2007



- 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 live were prevented
- In Zimbabwe:
  - Public received early warnings by radio, TV and newspapers 5 days in advance

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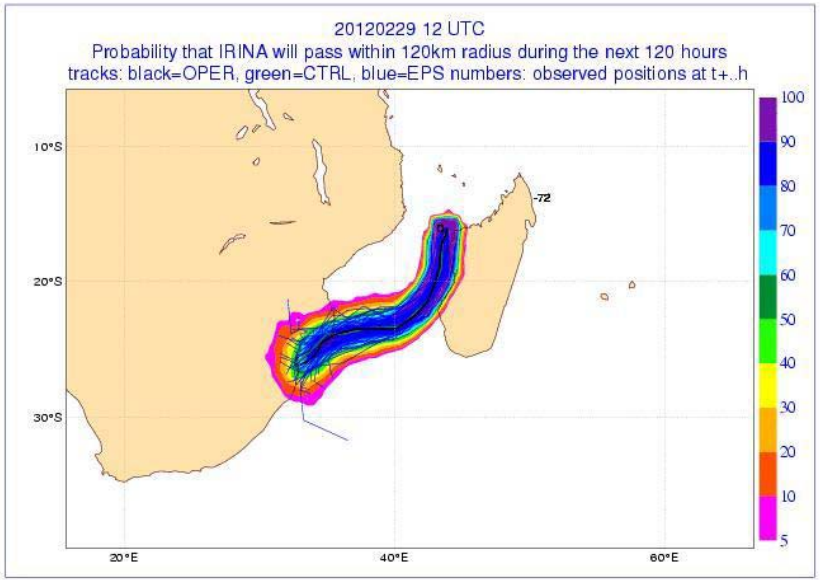
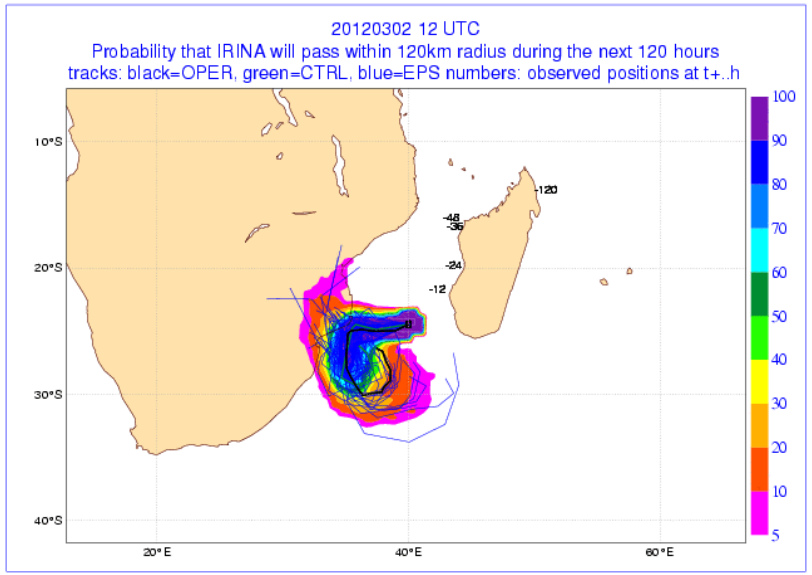
Case Study: Tropical Cyclone IRINA 4 March 2012





- On 1 March it was projected to hit southern Mozambique, NE parts of South Africa and Swaziland.
- These were the areas which were hit by “Dando” less than 2 months before with severe flooding.
- Highly unpredictable even by NWP, resulted in exemplar forecast coordination between the 3 countries
- 4 fishermen died at sea off Maputo, and 3 people in southern Mozambique, widespread damage

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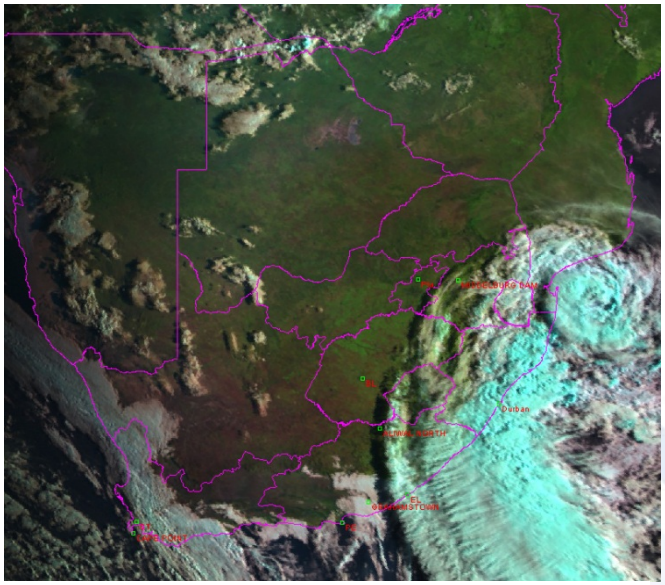
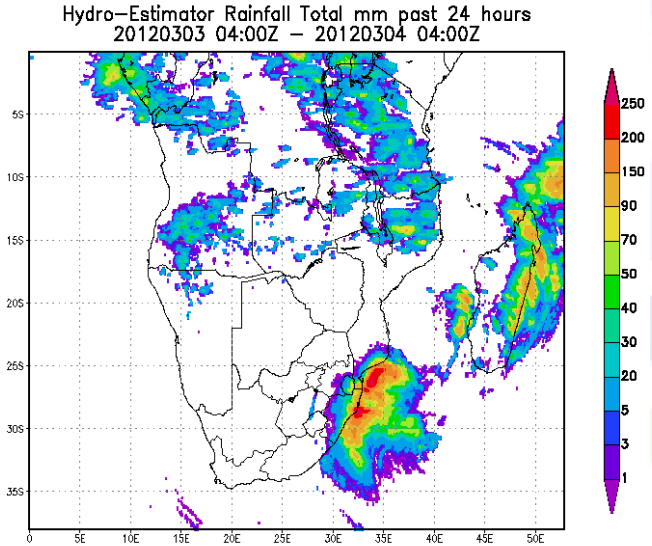
Irina continued…..





- The initial communication was by email from RSMC Pretoria on 01st March 2012 to both INAM and SWAZIMET
- Follow-up discussions followed over next few days between the 2 NMS's and RSMC Pretoria via emails and a number of telephone calls
- Disaster management authorities in all 3 countries were alerted by their NMSs
- Regular updates to Disaster Management and Media during Irina was crucial as the forecast track kept changing at short notice
- Excellent example of the successful functioning of regional early warning communication chain established through SWFDP

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Casestudy:
Tropical Cyclone Dando - 18 Jan 2012




BACKGROUND
-Dando caused significant flooding in Southern Africa particularly Mozambique and South Africa
-Kruger Game Reserve severely hit where the rest camps are on the river banks.

Some enjoyed it, though!

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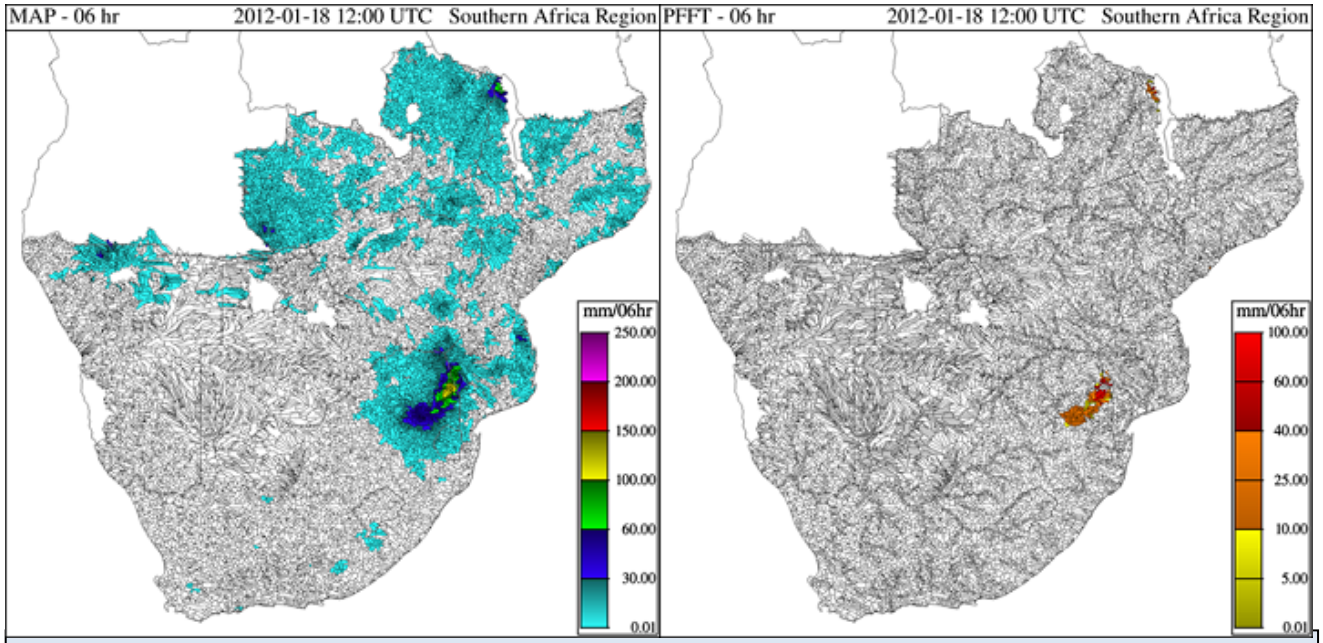
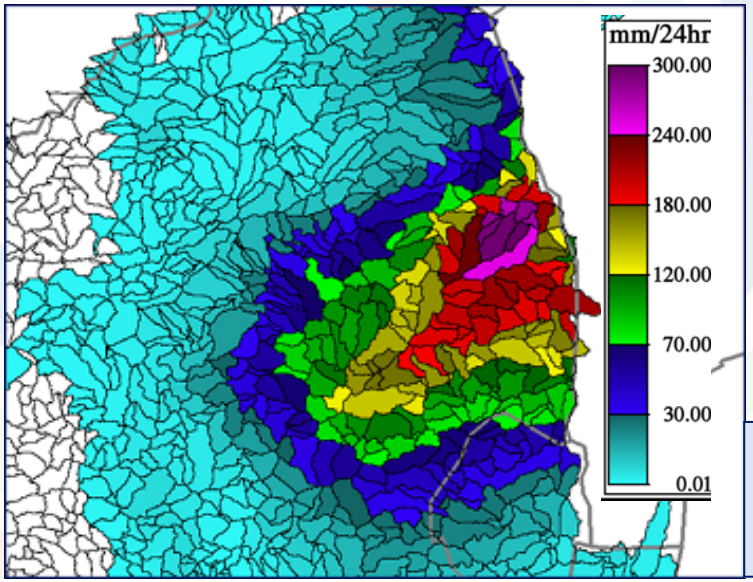
Dando continued…..



SARFFG 06hr Products for 18 Jan 2012 12:00 UTC

- Though not operational yet, SARFFG indicated excellent potential.
- Satellite based rainfall estimation proofed to be quite useful for large scale systems
- Based on other guidance general flood warnings were issued to Disaster Management in both Mozambique and South Africa



STATION NAME	TOTAL RAINFALL
Kruger Airport	215 mm
Nelspruit	142 mm
Skukuza	278 mm
Phalaborwa	141 mm

Basin average rainfall for the past 24 hours on 18th 12:00 UTC as measured by satellite

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Let me stop right here!
Thank you

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