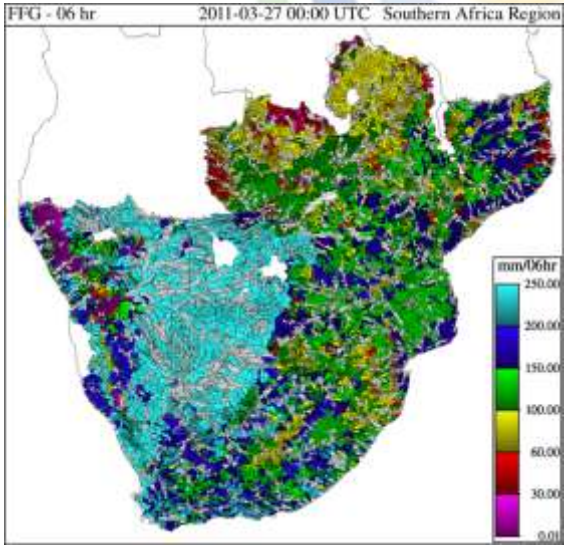
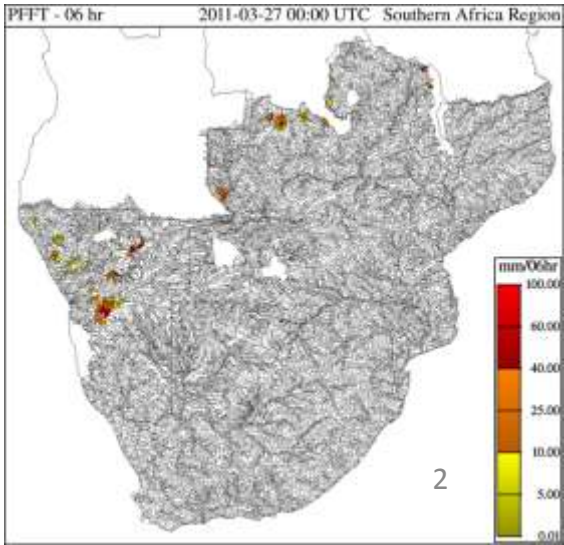
Regional Flash Flood Guidance System: Linking forecasters and Disaster managers

Eugene Poolman

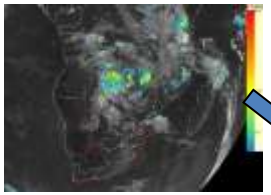
WMO Initiative on Implementing Regional Flash Flood Guidance Systems

- WMO aims to improve flash flood warnings in sub-region around the world
- The FFGS already in Central America and Mekong River Basin
- SARFFG covers basins in over 9 SADC countries
  - Developed by US Hydrologic Research Center in San Diego
  - Funded by USAID
  - Managed by WMO Hydrology Unit

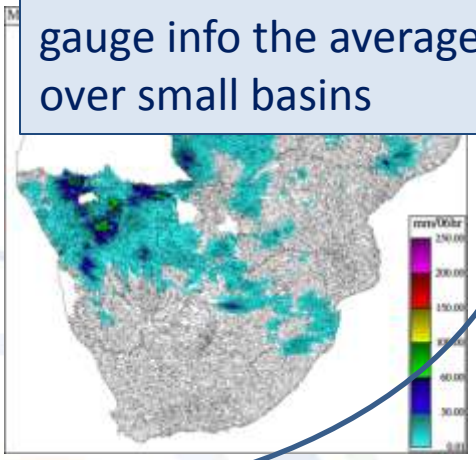


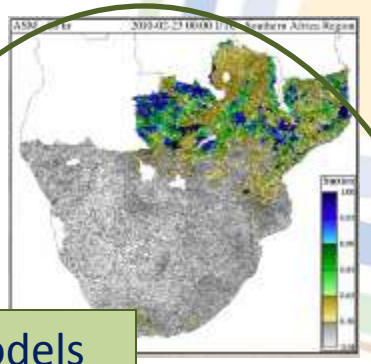


Flash Flood Guidance Process



Calculate from satellite & rain gauge info the averaged rainfall over small basins





Hydrologic models determine likely soil moisture and rainfall runoff for small basins

Determines potential for flash floods as guidance to forecasters

Warnings to Disaster Management and Public

South African Weather Service

Strengths and Weaknesses

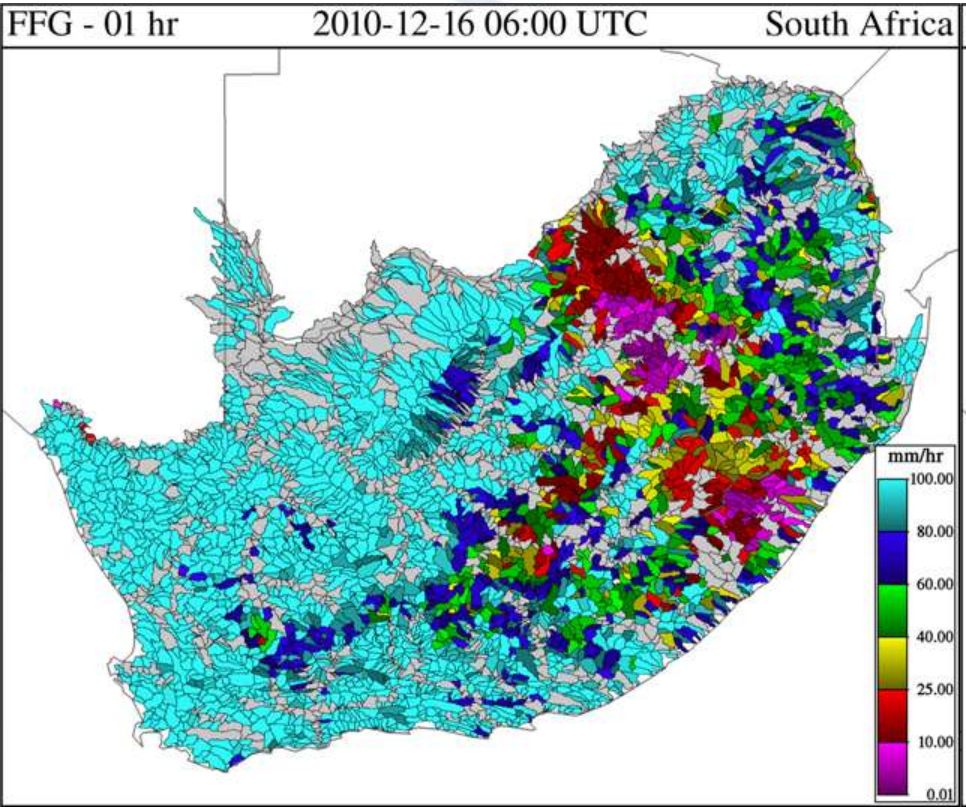
- SARFFG is based only on satellite rainfall estimation – HE
  - Will deal well with larger scale events (TCs, MCSs, etc)
  - Will struggle with smaller scale high intensity events (individual T/S)
  - Will struggle with heavy rain from stratiform clouds (however this is mostly a problem for southern and south-western coastal regions of South Africa)
- Deals not very well with urban flooding where water accumulate on tarred roads and parking areas, and into storm-water channels – it assumes a "naturalized" basin with little interference
  - Very small percentage of the basins in the system (<0.1%), but important
- However, SARFFG still provided very valuable guidance to forecasters of a hazard that we have no information on in the past

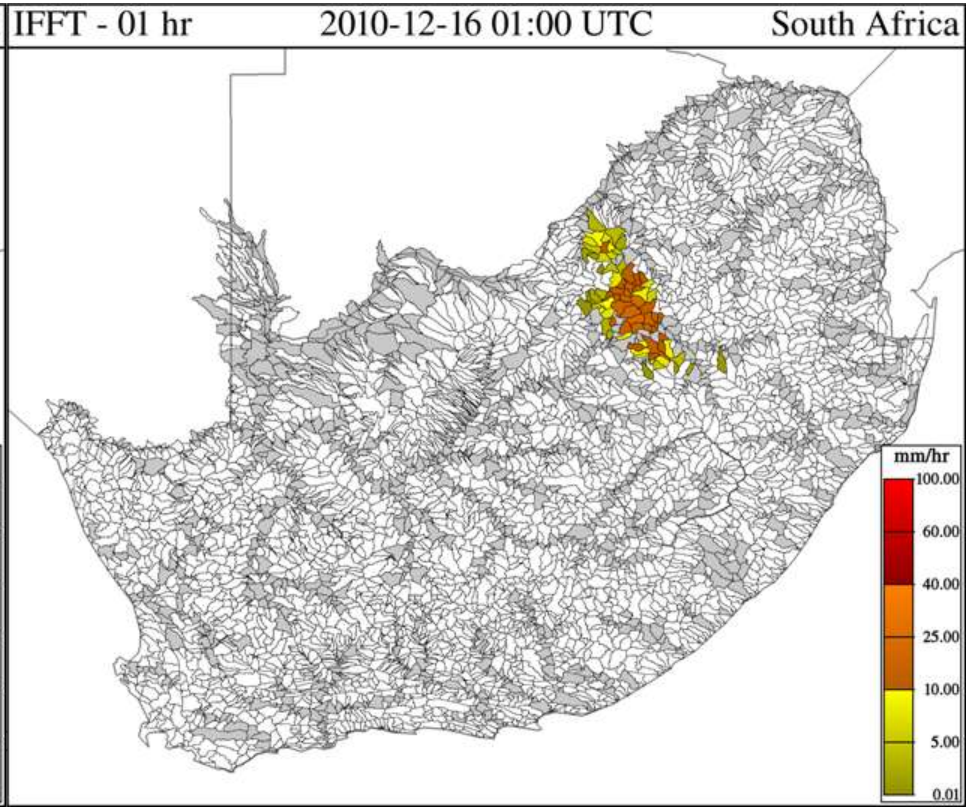
➢ Hydrological response of small streams to rain – flash flood potential

EXAMPLES

Case 1:
Flooding in Gauteng: 15-16 Dec 2010

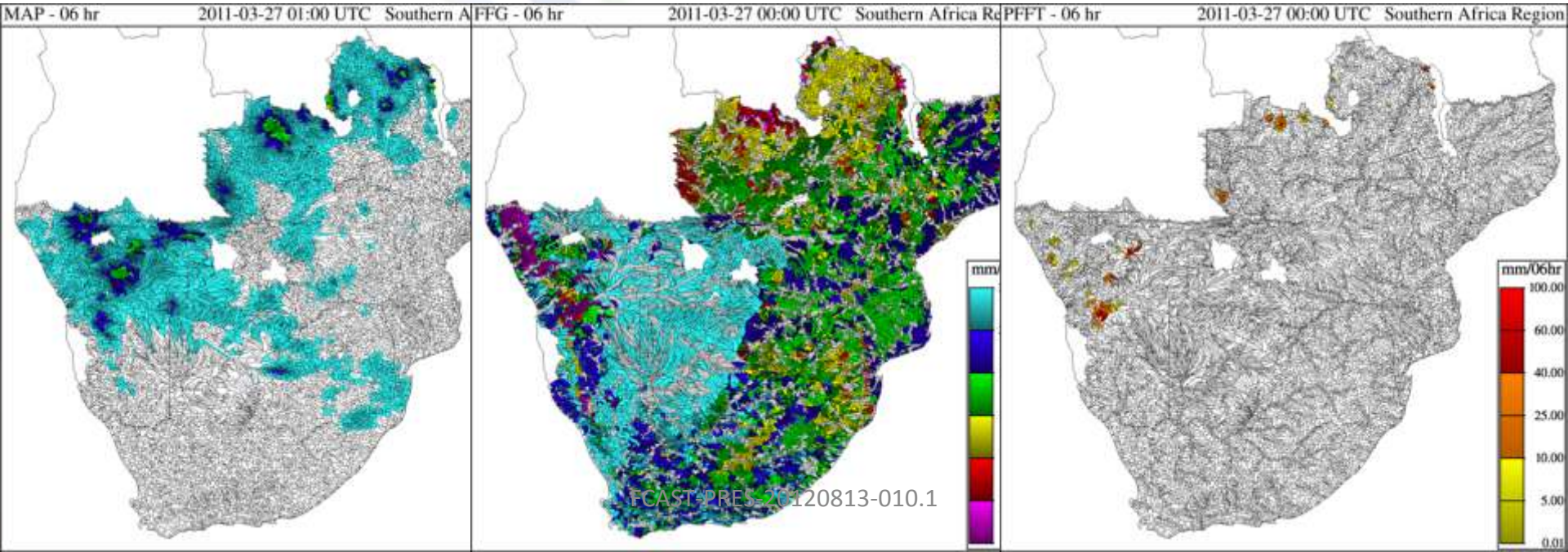
- Severe flash flooding occurred in various places with some fatalities, severe disruption and infrastructure damage
- SARFFG was able to capture this event successfully



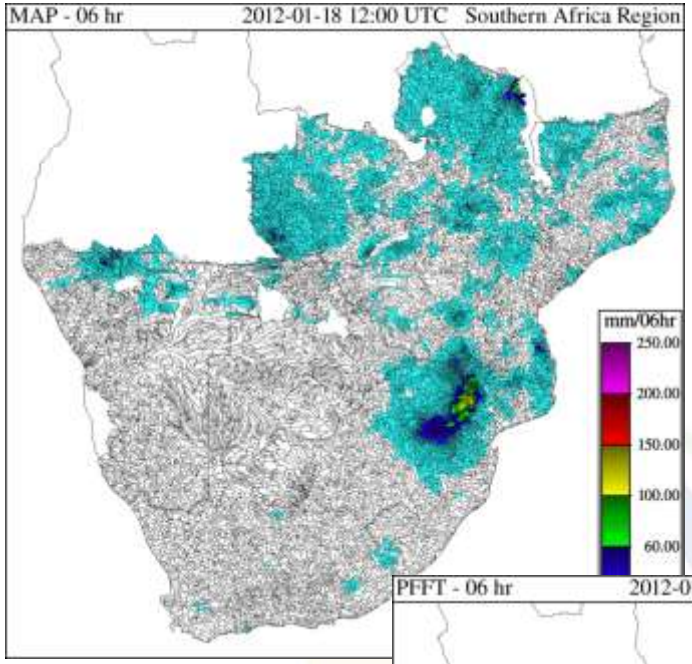


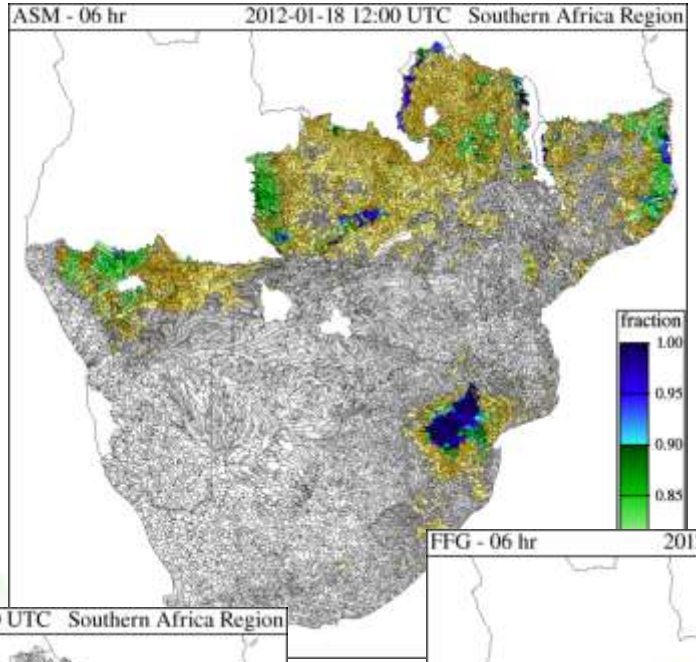
Case 2:
Flash flood events in Namibia: 2011/3/27

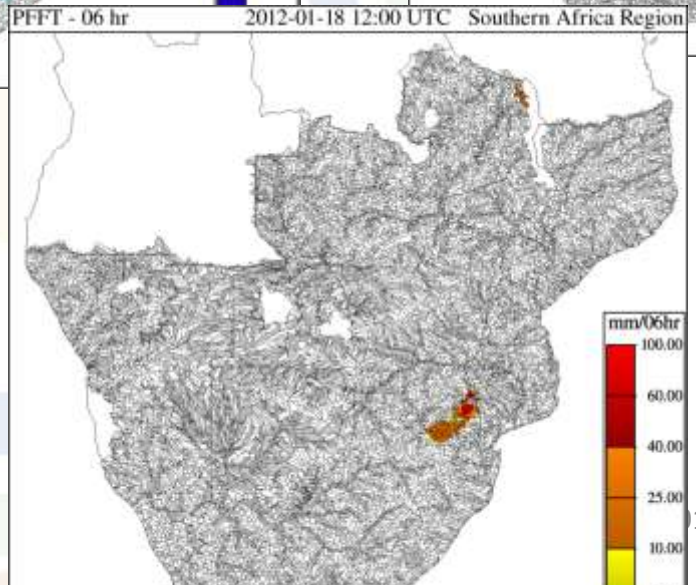
- Captured flash flooding in central Namibia quite well
- Also provided useful info to hydrologists in Namibia's river flood dilemma in early 2011

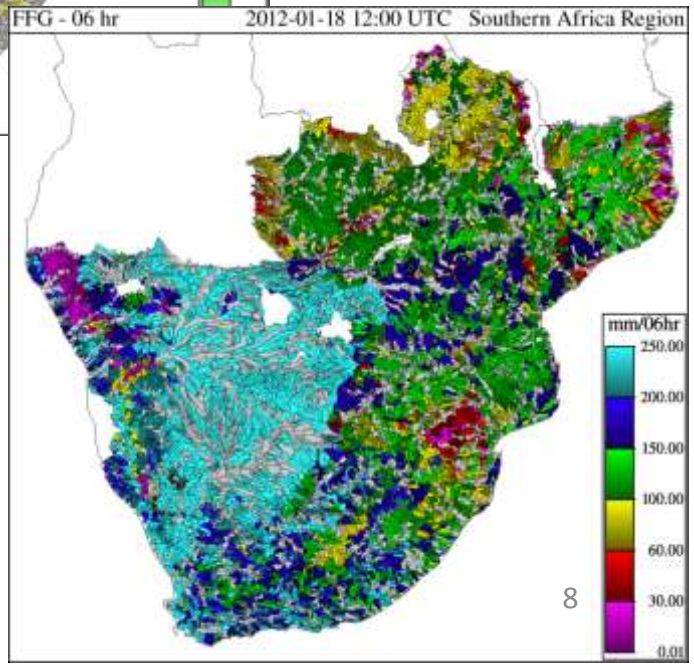


Case 3:
Tropical Cyclone Dando - 18 Jan 2012



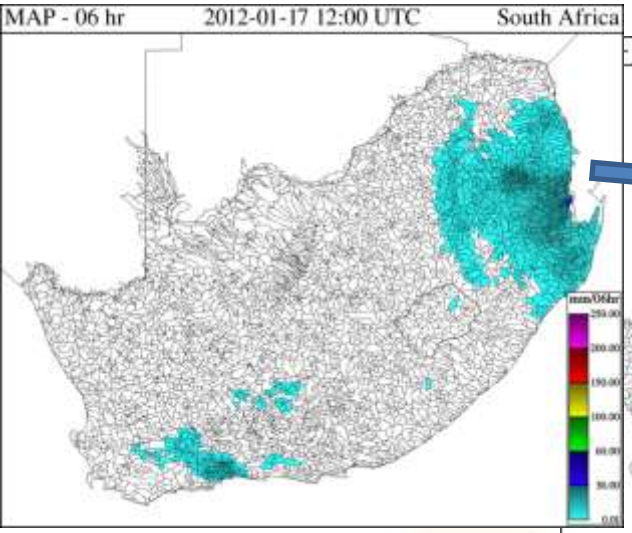


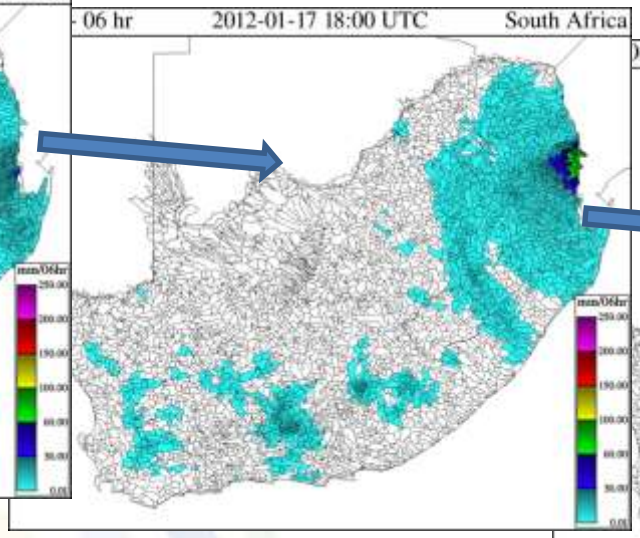


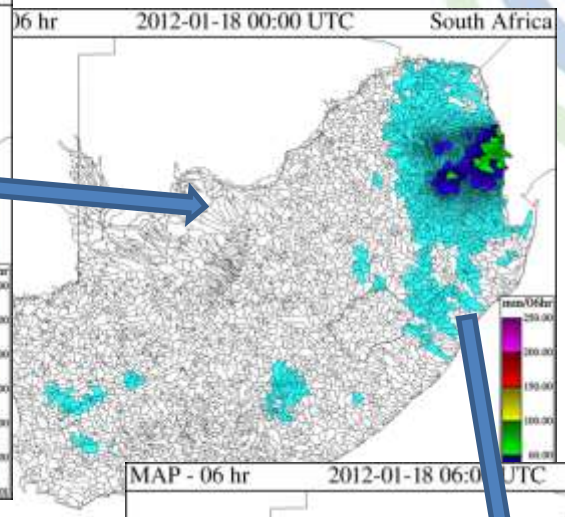


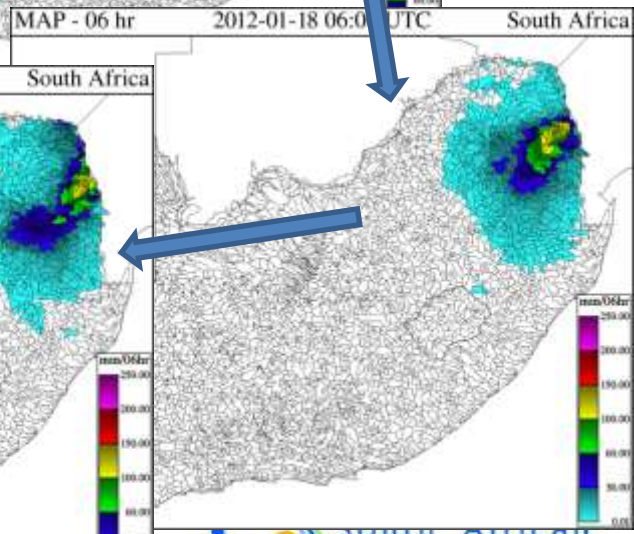
SARFFG 06hr Products for 18 Jan 2012 12:00 UTC

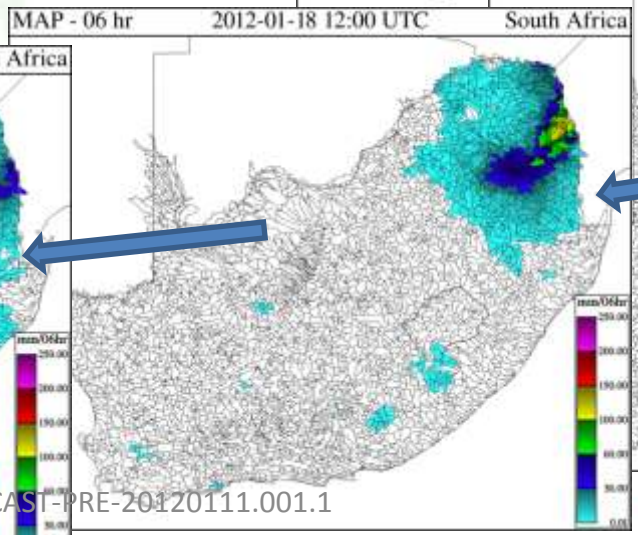
Sequence of 06 hour rainfall measured from 17th 12:00 till 18th 18:00

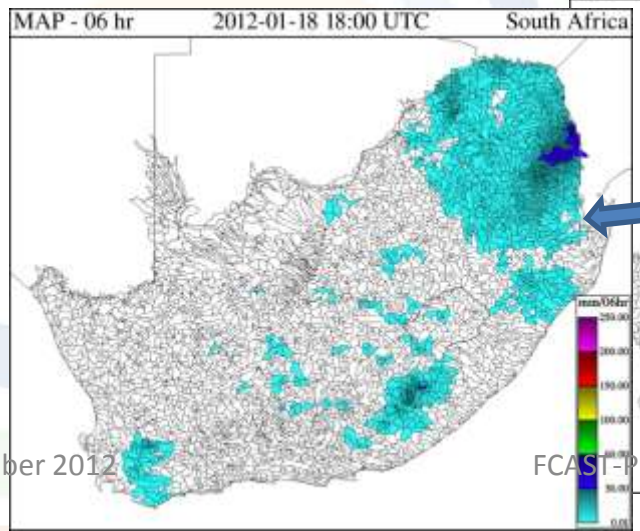




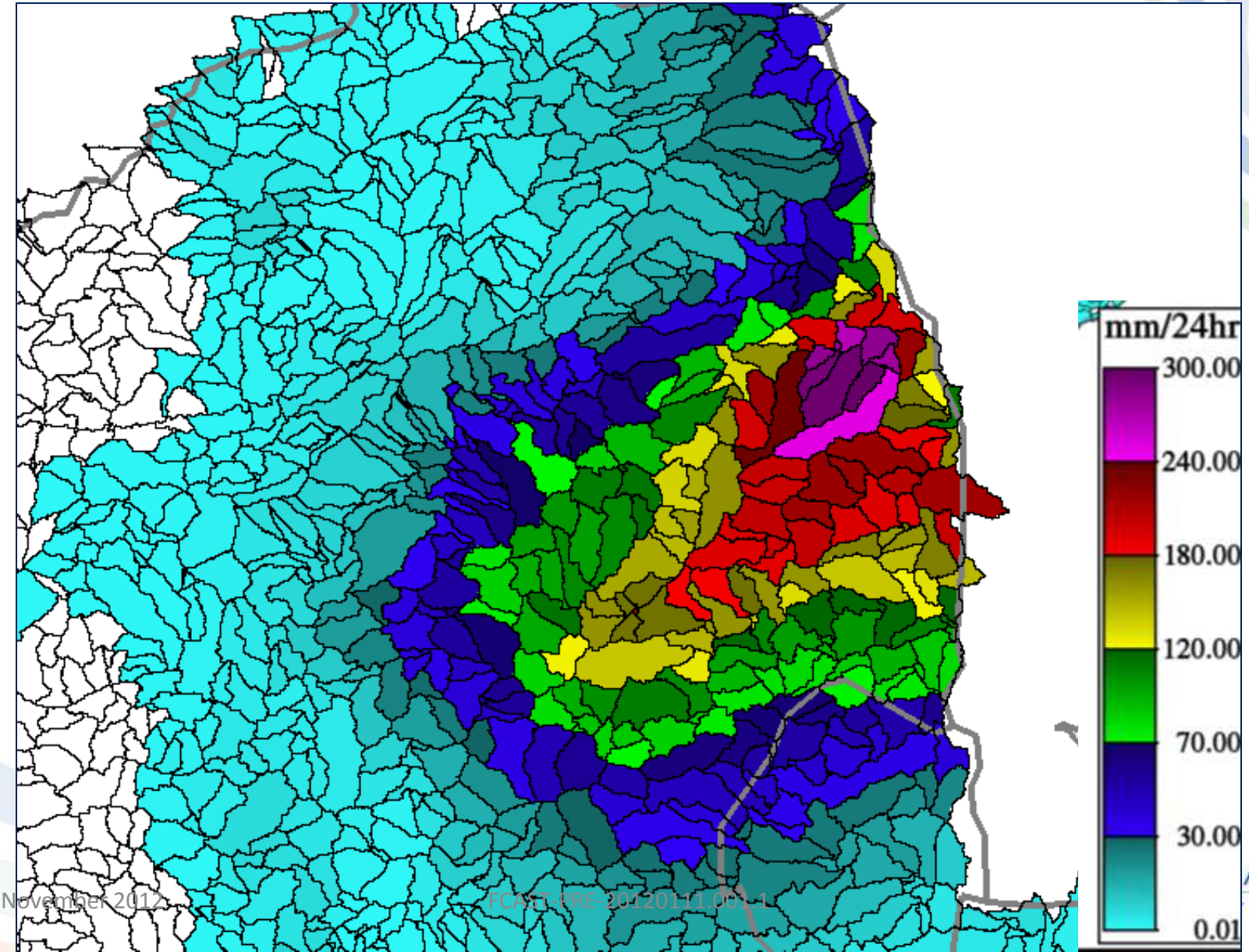




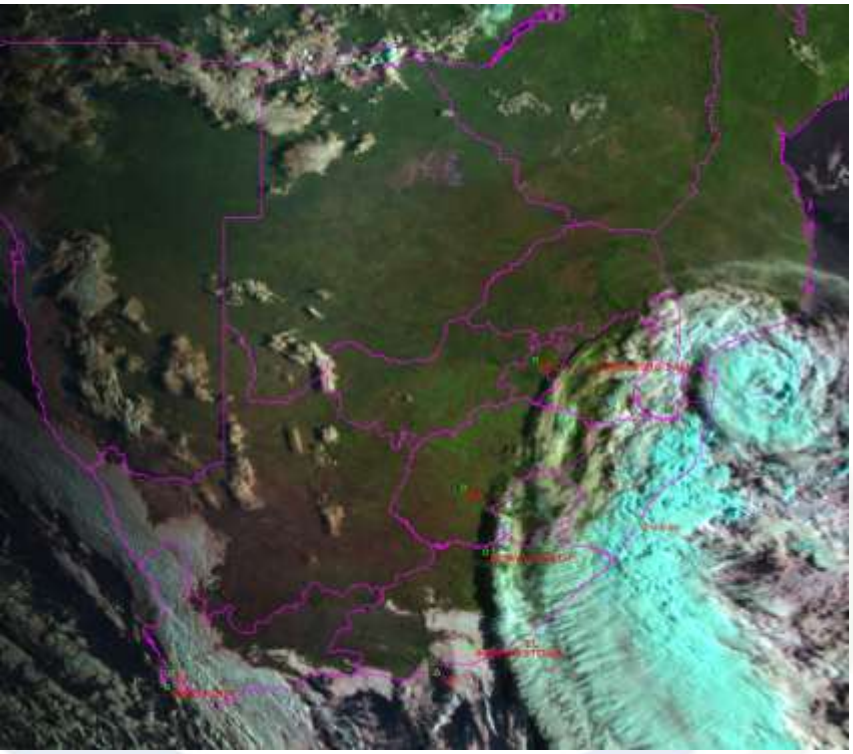


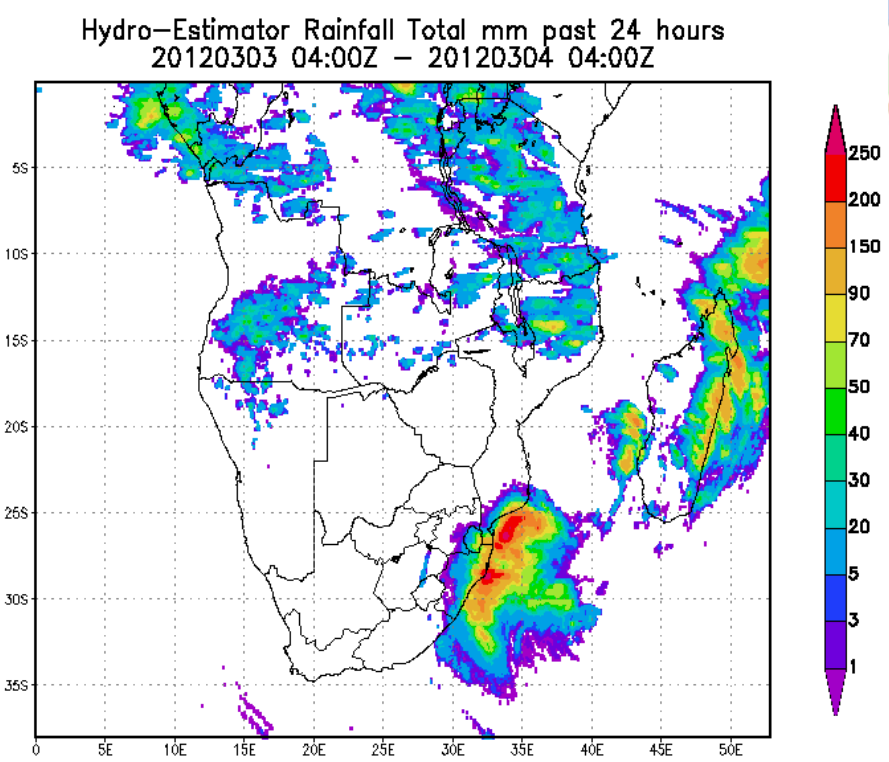


Past 24 Hour Basin Average Rainfall on 18th 12:00 UTC as Measured by Satellite

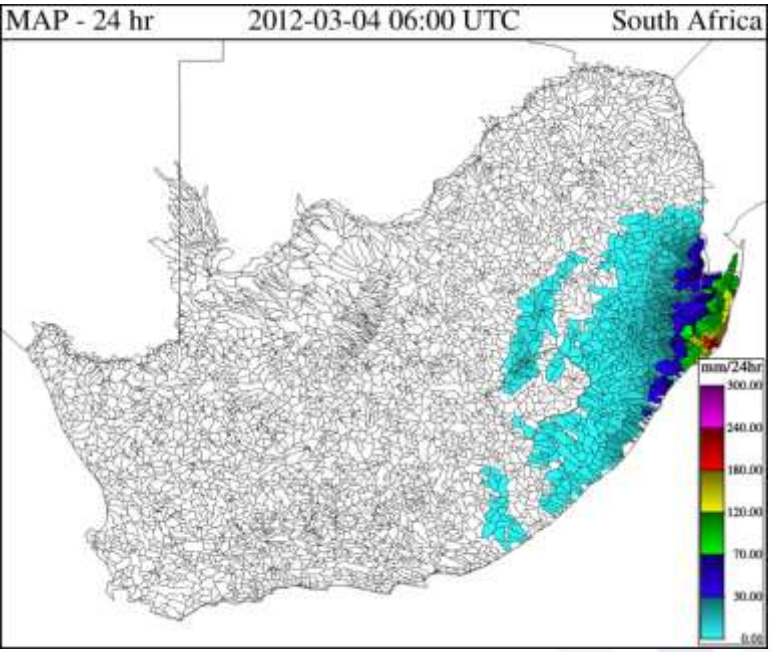


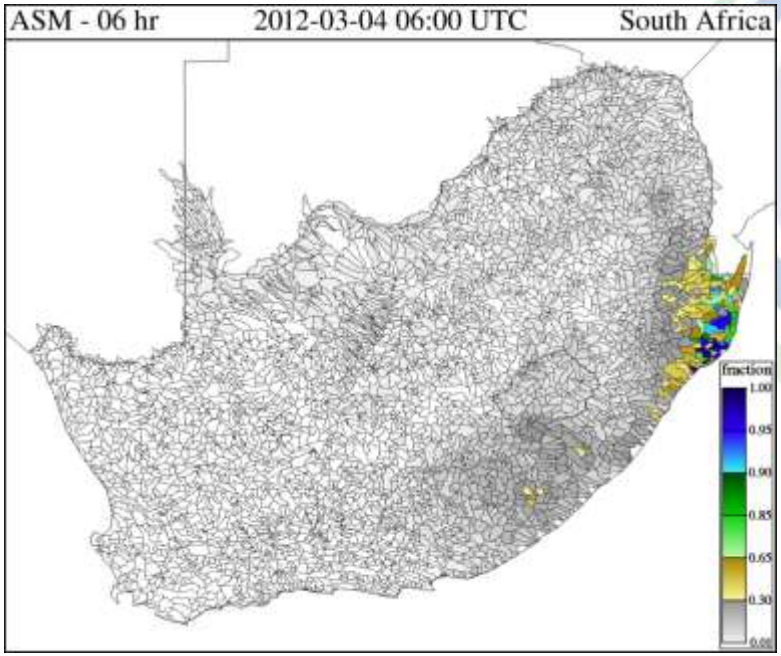
CASE 4:
Tropical Cyclone IRINA- KZN: 4 March 2012

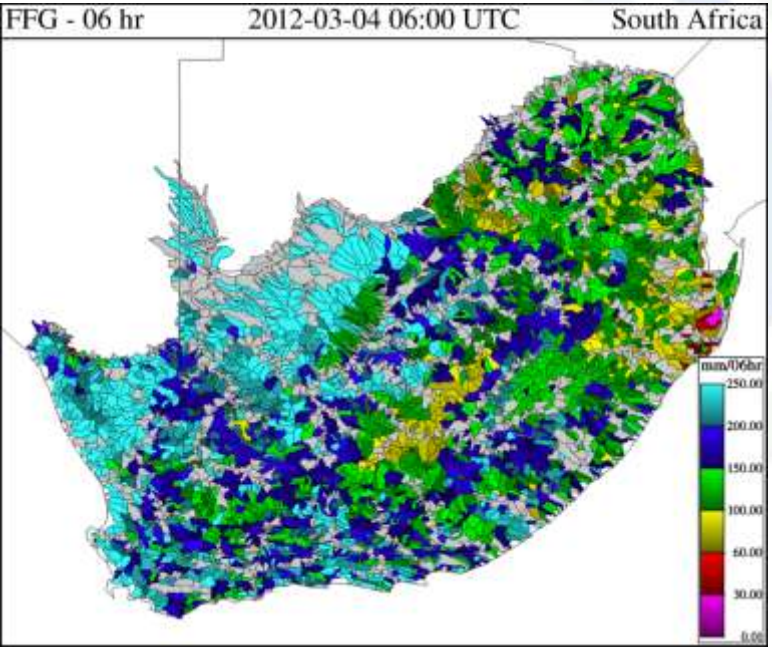


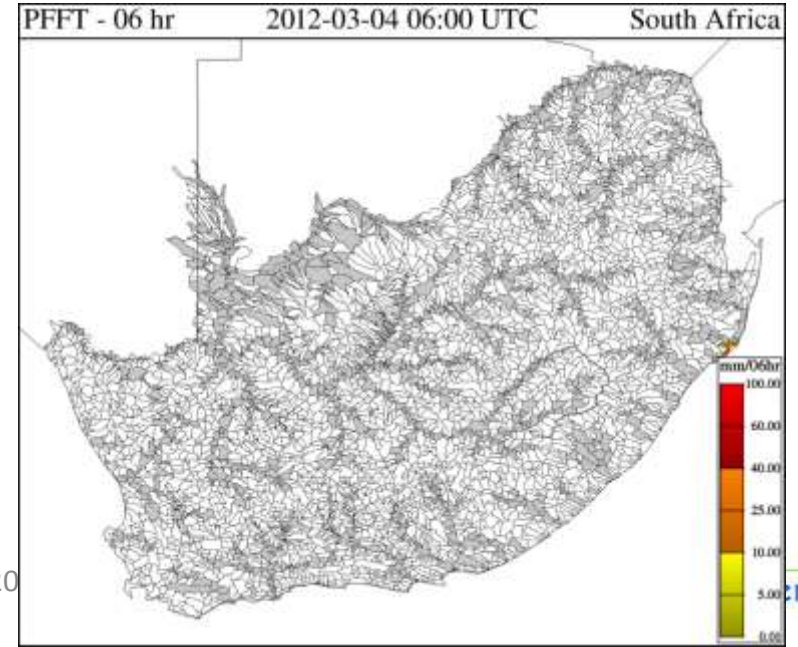


Flash Flood Guidance System









Implementation of SARFFG

- Beta-system already running on at HRC in San Diego for a year
- Case studies has demonstrated its potential for flash flood guidance, and hydrologists in Namibia found it useful even in river flood situations
- Operational implementation scheduled for 2013 in the RSMC Pretoria at SAWS
- NMCs in countries will have internet access to the system for their own countries
- Training events will be conducted for forecasters and hydrologists of these countries

Forecaster Experience

- Forecasters make decisions under pressure, and is therefore inherently reluctant to adopt complex new technology unless they are convinced it is providing useful information, and is "forecaster friendly" – it is difficult to change their habits
- In times of severe weather, there is not time to make adjustments to rainfall fields to test potential scenarios, unless it is quick and easy
- It was extremely hard to find time to train forecasters due to the operational environment and shifts that have to be covered.
- Some forecasters showed more interest than others, and it has been found if they don't use the system daily they 'loose' the skills that has been transferred to them. Forecasters that do understand the FFG system, have used it successfully to assess potential flash flood threats
- Those with more long term specialized training, have an greater advantage above other forecasters when using the system, and as a result many have the attitude that this system is their responsibility.

Forecaster Experience

- SAFFG is new specialized technology and therefore forecasters need special training to utilize it effectively
- SAFFG does, and SARFFG will, provide important guidance to forecasters that they never had access to on a critical hazard
- For FFG to be used successfully in a country, it needs to be embraced by a champion who understand it and use it successfully
- Forecasters in training need to be exposed to the SAFFG and/or SARFFG before they enter the operational working environment.

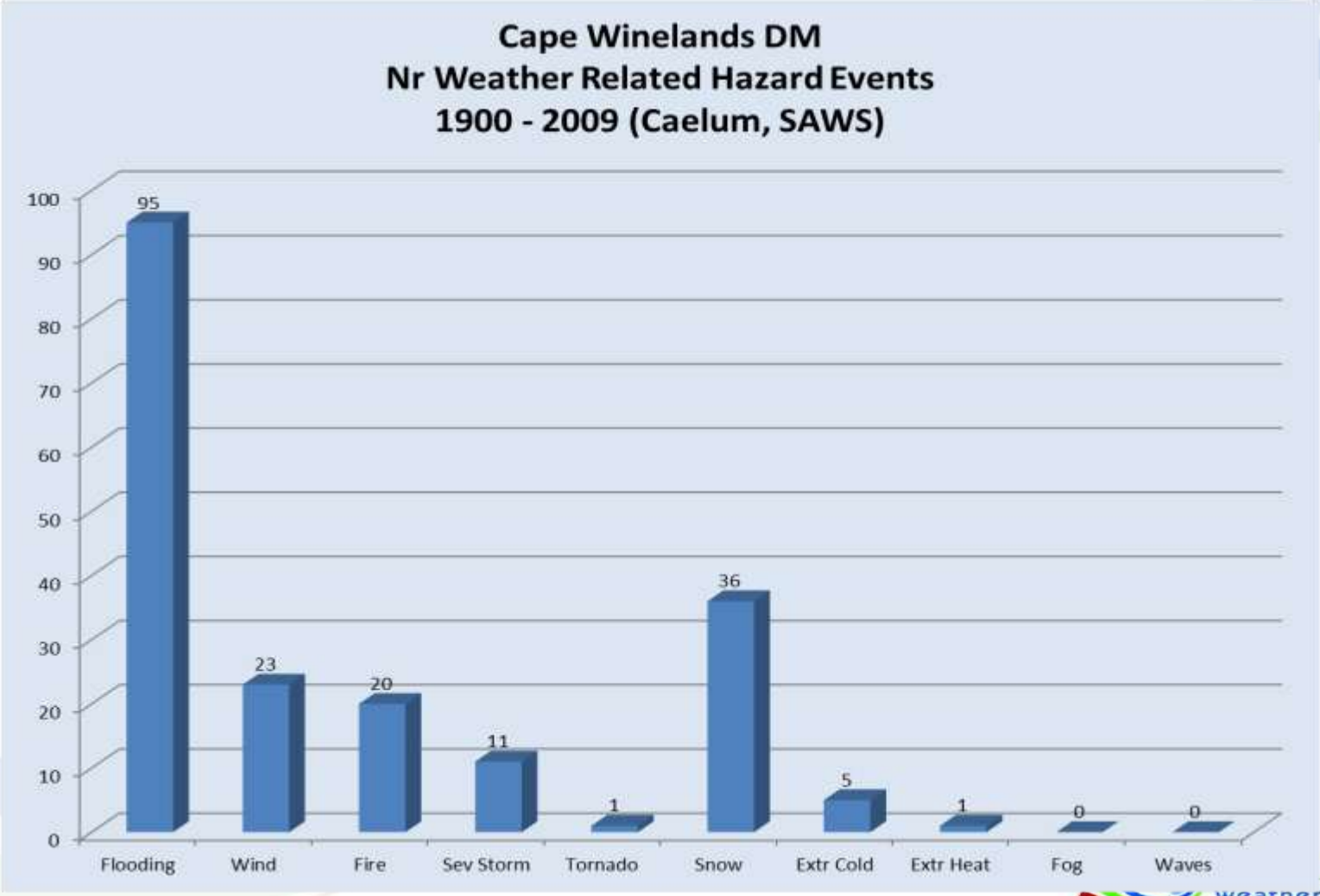
Experiences with disaster management

- The SAFFG forms part of the integrated national (multi-hazard) early warning system for South Africa – new warning
- During events a close collaboration exist between forecasters and disaster managers, particularly in more disaster prone regions of SA
- This is due to the significant effort that is made by SAWS to build these relationships, and the enthusiastic response by disaster management
- Training was given to disaster management on the interpretation of the products that they would receive. There was a positive response by the DMA's however it is clear that follow up training needs to be done
- They found the graphics that was sent to them to be very useful.

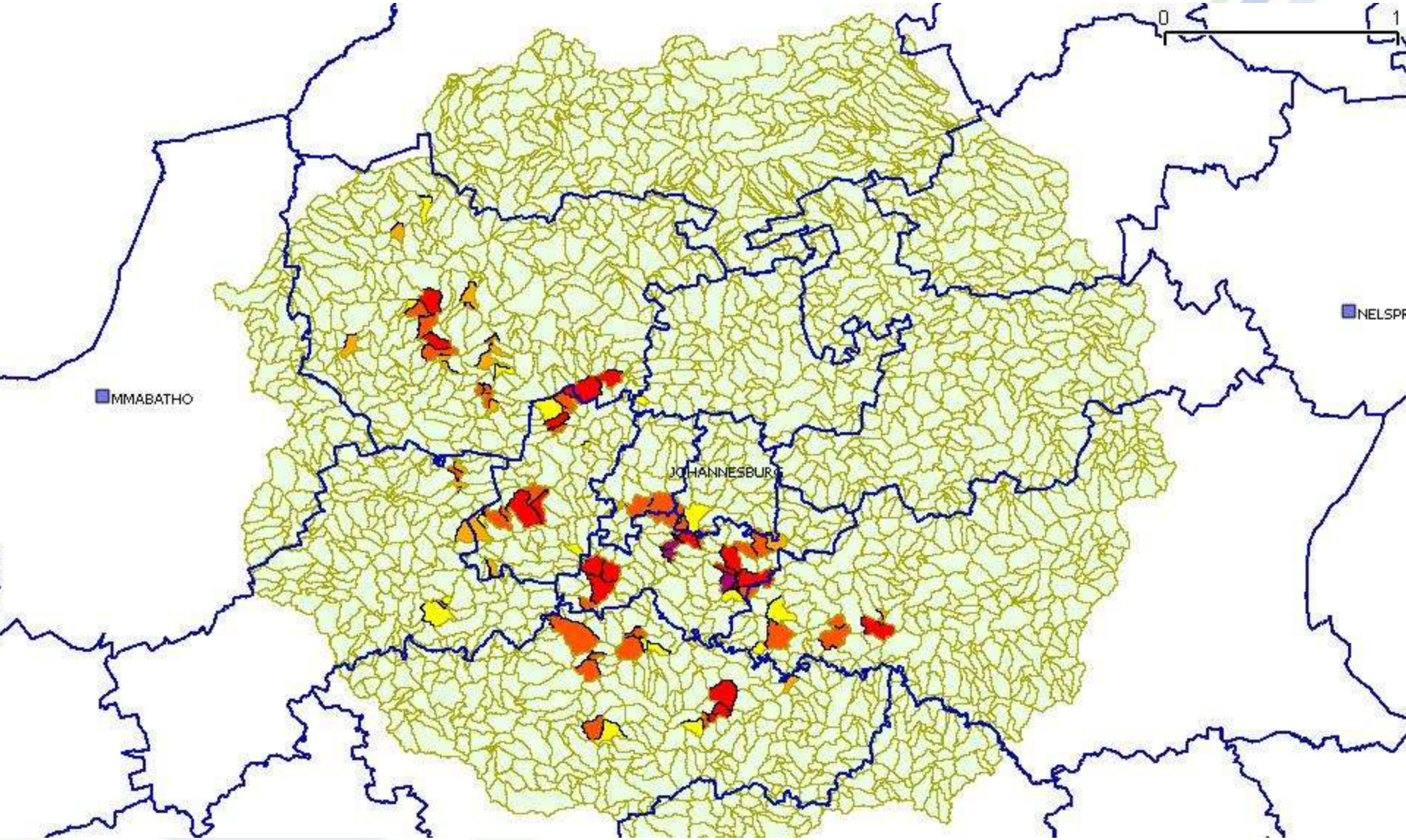
Experiences with disaster management

- Very close relationship between forecasters and disaster managers is essential for effectiveness of flash flood warnings system – end-to-end
- Disaster managers needs to be coached to understand how this tool support the forecaster, and even in using some relevant FFG products effectively in their particular decision making
- They have to trust the forecaster's judgment in using the system to decide on potential flash flood threats, based on expected rainfall scenarios

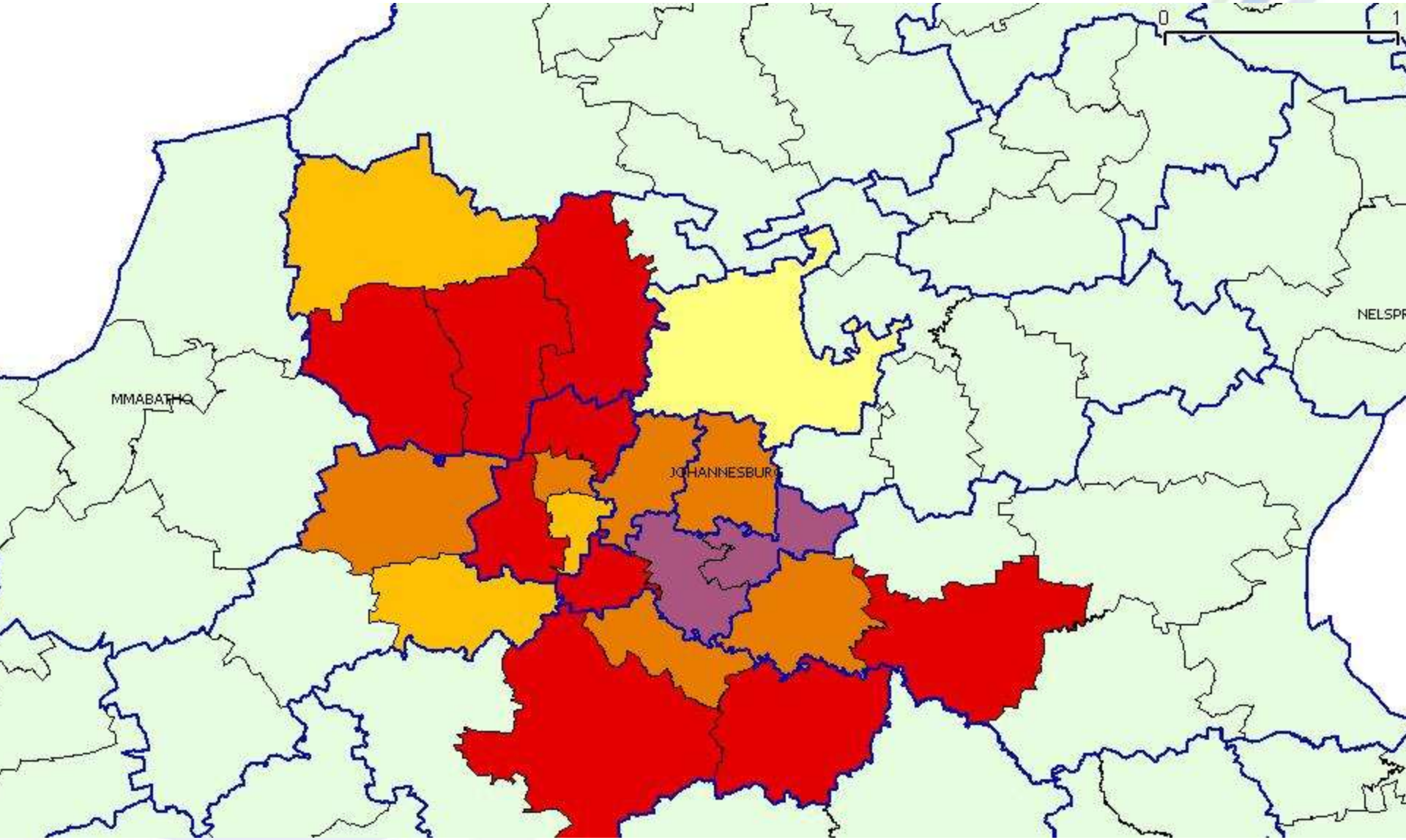
Cape Winelands District Municipality worksession



African weather Service



South African Weather Service



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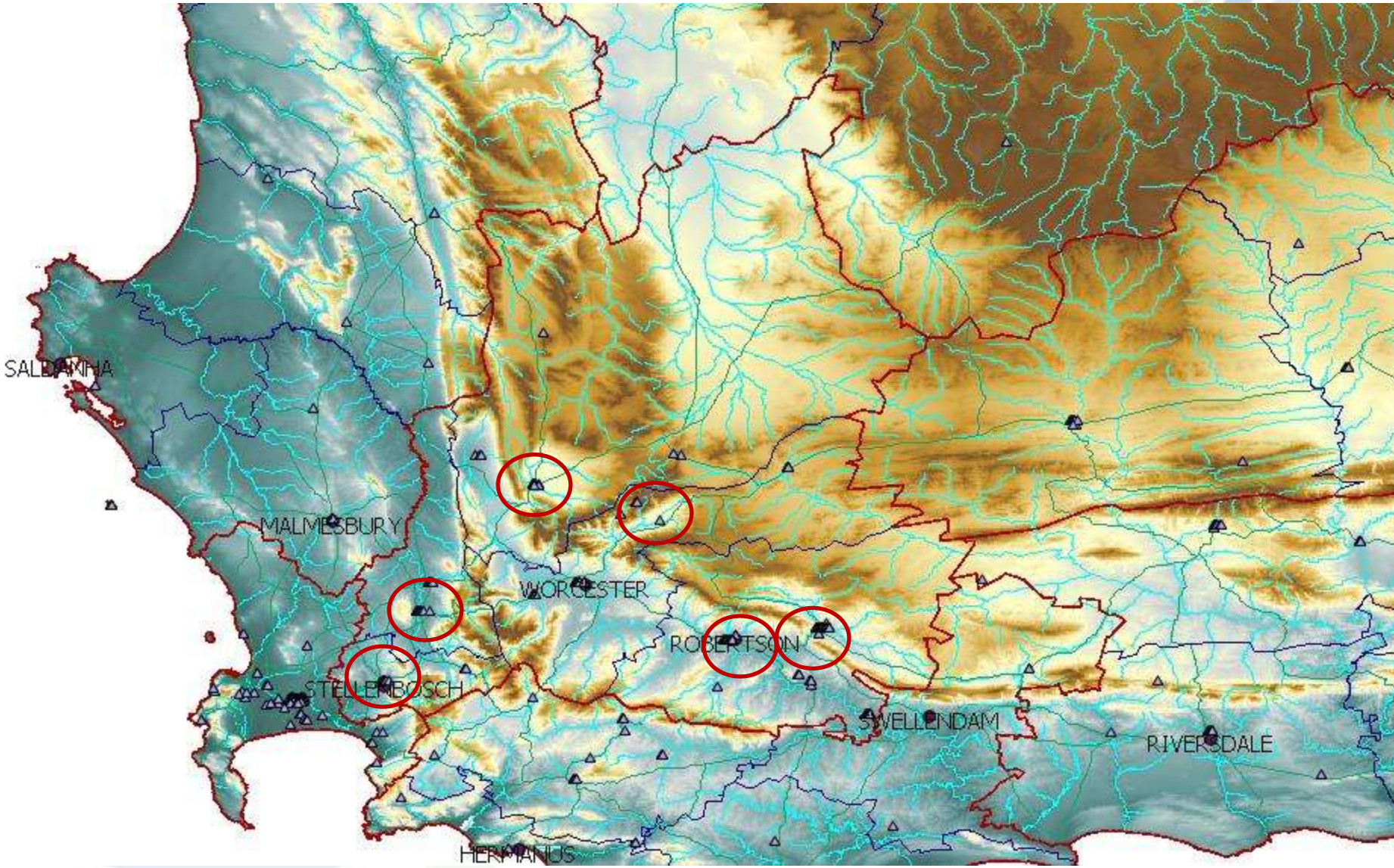

South African Weather Service

Thank you