

# STATUS OF THE REGIONAL SUBPROJECT

**PERIOD:** 6 November 2006 – 28 February 2007

**NMS:** ZIMBABWE

## 1. HIGHLIGHTS OVER THE PERIOD

The first quarter of the SWFDP was characterised by a significant number of severe weather events (more than 30) mainly in the form of heavy precipitation events (see Annex V1.1). The most notable event occurred at New Year's Day with precipitation amounts exceeding 100 mm in 24 hours for some stations. It is most pleasing to note that this event was well forecast by most models some 7 days in advance such that there was adequate lead-time for alerts and advisories to be communicated to the press and disaster management and civil protection authorities. The risk of flooding was reduced by the fact that this event was preceded by an extended period of dry weather lasting up to two weeks and therefore the soils were dry and the river flows very low in low altitude and flood prone areas. However, there were localised floods associated with this event in some areas and some villagers were reported in the local press to have been marooned on an island.

Another significant event was that associated with Tropical Cyclone Favio which affected the country about the 22<sup>nd</sup> February 2007. Although the cyclone had been forecast to dump heavy rains across much of northern Zimbabwe, it weakened significantly in Mozambique before reaching Zimbabwe. However, there were still considerable amounts of rainfall received in the eastern border areas of Zimbabwe and associated damage to property.

The guidance products that are available have been most useful with regards heavy precipitation events since the wind regime over Zimbabwe is generally weak throughout the year except in rare cases of Tropical Cyclones and severe storms.

## 2. OVERVIEW OF PRODUCTS

### a. Usefulness of RSMC-Pretoria guidance

In addition to the numerical guidance products that Zimbabwe Meteorological Services had, the new range of products that were made available by the SWFDP has proven very useful for a number of purposes some of which are outside the scope of SWFDP.

The South African Weather Service (SAWS) Regional Specialised Meteorological Center (RSMC) severe weather guidance has been very good for the most part. RSMC Pretoria synthesises the guidance products and produces a map of likely areas to be affected by heavy precipitation and/or strong winds. There are few cases however, when the guidance has been late for the forecast process as in the case of Tropical Cyclone Favio.

The guidance from RSMC La Reunion on Tropical Cyclones intensity and track has been very useful. The new products on the SWFDP also give more

confidence on cyclone tracks. Previously, forecasters relied more on persistence and there was low confidence in the forecast track such that civil protection and disaster management authorities did not get adequate information on which areas would be most affected by a cyclone or a storm.

- b. Usefulness of SWFDP NWP/EPS Products received from each global centre and RSMC UM-SA12

Zimbabwe Meteorological Services also note that most models available on the SWFDP are on a number of occasions unable to pick localised heavy precipitation events (i.e. events with > 50 mm of rainfall in 24 hours). The models underestimate precipitation nearly all the time. This may be attributed to the coarse horizontal resolution of the global models as well as the convective nature and therefore high variability of tropical precipitation. A significant number of heavy precipitation events occurred due to localised convection.

The NCEP model exhibits the least skill with precipitation amounts whilst ECMWF products have proven the most reliable for Zimbabwe and as a result the most trusted and most used in the forecast process. ECMWF EPSgrams provide very good guidance for onset and cessation of a severe weather event and are normally consistent. The EPSgrams are one of the most useful tools of the SWFDP.

There are several unfortunate cases when the guidance has ‘broken down’ with 1 or 2 days to the severe weather event, just when they are needed most. In such cases the global models have not only differed considerably, they have also changed the predictions significantly. It is then that the local experience of forecasters has been very relevant. A chart discussion is held every day at 11am to discuss the observations and model guidance and a consensus forecast is issued. The forecasters also account for the climatology and local factors such as orographic effects. A combination of the various guidance and local experience has proven formidable.

On the whole, despite the limitations of some of the products, the Meteorological Department of Zimbabwe notes a great leap forward in terms of severe weather forecasting and weather forecasting in general.

### 3. PROJECT EVALUATION AGAINST SWFDP GOALS

SWFDP GOAL	IMPACT
To improve the ability of NMCs to forecast severe weather events	A great improvement is noted by Zimbabwe in this regard. There is even increased confidence in storm/cyclone tracks.
To improve the lead time of alerting these events	The forecast lead time has improved remarkably. Lead to increased lead time and Tropical Cyclone Favio is a classic example.

To improve the interaction of NMCs with Disaster Management and Civil Protection authorities before, during and after severe weather events	Improved interaction with the Civil protection unit, Zimbabwe national water authority as well as the print and electronic media. The center has received positive feedback from these
To identify gaps and areas for improvements	A number of areas that need improvement have been identified and efforts are being made to improve them. This process is ongoing.
To improve the skill of products from Global Centres through feedback from NMCs	Feedback is being provided regularly through the evaluation forms and email postings to the project website. Most notably, models are underestimating tropical convective precipitation. This process is ongoing.

**4. EVALUATION OF WEATHER WARNINGS** (feedback from customer?, standardized questions to disaster authorities?)

Whilst the Meteorological Services Department of Zimbabwe has a good contemporary record of severe weather forecasting, there has been a marked improvement in severe weather information and products provided by the Service since the commencement of the SWFDP in November 2006.

The most critical requirement is early notification of civil protection authorities ahead of the severe weather event to allow for proactive disaster management. Adequate lead time is necessary for mobilisation of resources and especially in cases where resettlement is necessary. Resettlement is mostly done in cases when tropical cyclones are affecting the country. A typical example is the massive evacuation and resettlement exercise undertaken with the assistance of the Air Force of Zimbabwe in February 2000 when the country was overwhelmed by heavy precipitation and strong destructive winds associated with Tropical Cyclone Eline. The timing of meteorological warnings and alerts was impeccable.

This Civil Protection authorities of Zimbabwe have noted an improvement in severe weather forecasts in terms of

- the timeliness of severe weather information
- the relevance of the severe weather information for disaster management
- the salience of the information
- the credibility of the information, and
- the interaction between the Meteorological Services Department and the Department of Civil Protection

However, the Civil Protection authorities have also noted that there is still need for more detail and specifics in the forecasts with regards which actual locations that would be hit by severe weather. It is difficult to mobilise resources for a whole province when the event may only occur, for example, in a small district. This has been attributed to the rather coarse horizontal resolution of the forecast guidance products provided by the global centers.

It cannot be overstated that disaster management operations are very costly and often unbudgeted for such that its critical for the Meteorological

Department of Zimbabwe to provide accurate forecasts of severe weather events as false alarms can result in significant losses of Government resources in addition to causing unnecessary panic and confusion.

## **5. SUMMARY (general comments, challenges, etc, details in Annex 1)**

Whilst cognizant of the fact that the commitment of the global meteorological centers is only up to the end of the SWFDP in November 2007, there are quite a number of products which the Meteorological Service of Zimbabwe would appreciate if they were made available to Forecasters beyond the demonstration project. EPSgrams and 6-hourly time steps are definitely very important, and as indicated above, the most useful products of the SWFDP. Model outputs of meteorological parameters at 6-hourly time steps have transformed forecasting allowing Forecasters to give the precise timing of expected weather to within hours, something which was not possible earlier.

It is also hoped that the guidance of the regional centers RSMC Pretoria and RSMC La Reunion would continue. The short and medium range maps, risk tables and discussions of RSMC Pretoria are very useful.

One significant challenge that remains is in the dissemination of alerts, advisories or warnings by either the Meteorological Services Department or the Civil Protection Unit. Often, some sections of the media exaggerate alerts and advisories with the result of causing unnecessary panic among communities. Such journalism also damages the image of the meteorological service with regards credibility of the institution on severe weather forecasting. A plan is there for interactive workshops with media people to appraise them of the potential damage which can result from irresponsible journalism.

Despite the foregoing, the positive feedback that the Meteorological Department of Zimbabwe has received from various stakeholders including Government, Civil Protection authorities and the public can only be attributed to the Department's participation in the SWFDP.

It must be noted that the period of the first quarter covers the period of most significant weather with regards severe weather events. Fewer severe weather events are likely during the long dry season from May to September which is generally characterised by very little precipitation and a weak wind regime.

## ANNEX VI.1

Evaluation Table

DATE	SWFDP Evaluation Form Event Nr (If Applicable)	Weather Type	Location	Observed amount (rainfall or wind speed)	RSMC Guidance		Which NWP/EPS forecast product(s) used by NMC	Local Warnings issued	Impact
Dd/mm/yy		Mesoscale rainfall or synoptic scale rainfall or strong winds (convective or synoptic)		(mm/24 hours	Amount predicted	Useful ness (1-4) 4 is best	List by centre		
14/11/06		Mesoscale rainfall	67881	69.4mm	20 to 40mm	3	NCEP	Yes	
18/11/06		Synoptic rainfall	67867 67965 67865	135.8mm 105.0mm 55.7mm	>30mm	3	ECMWF	Yes	
25/11/06		Mesoscale rainfall	67789	69.6mm	>20mm	3	RSMC (Pretoria)	Yes	
10/12/06		Synoptic rainfall	67871 67861 67975	82.0mm 63.7mm 50.1mm	20 to 40mm	4	UKMO	Yes	

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Dd/mm/yy		Mesoscale rainfall or synoptic scale rainfall or strong winds (convective or synoptic)		(mm/period or KTS)	Amount predicted	Usefulness (1-4) 4 is best	List by centre		
11/12/06		Mesoscale rainfall	67861 67871 67975	63.7mm 82.0mm 50.1mm	>20mm	4	NCEP  ECMWF  RSMC (Pretoria)  UKMO	Yes	12 villages ruined, one person struck by lightning, two cattle killed.
11/12/06 – 12/12/06		Mesoscale rainfall	67771 Ashdown park, Harare	59.0mm 92.4mm	10 to 20mm	4		Yes	Some houses flooded in Harare city.
17/12/06		Mesoscale rainfall	67775	57.5mm	<10mm	2		No	
19/12/06		Mesoscale rainfall	67961	52.1mm	<10mm	2		No	
25-26/12/06		Mesoscale rainfall	67755	65.7mm	<10mm	2		No	
28/12/06		Synoptic rainfall	67861 67775	84.9mm 56.0mm	>20mm	4		Yes	

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Dd/mm/yy		Mesoscale rainfall or synoptic scale rainfall or strong winds (convective or synoptic)		(mm/period or KTS)	Amount predicted	Usefulness (1-4) 4 is best	List by centre		
31/12/06		Synoptic rainfall	67961	111.7mm	>20mm	4	NCEP ECMWF RSMC (Pretoria)	Yes	
31/12/06 – 01/01/07		Synoptic rainfall	67755 67991 67861 67865 67975 67865	96.1mm 93.2mm 78.0mm 68.3mm 60.7mm 51.4mm	>50mm	4		Yes	
02/01/07		Mesoscale rainfall	67789 67843	61.4mm 58.2mm	>20mm	4		Yes	
16/01/07		Synoptic rainfall	67771	55.2mm	<20mm	2		No	
20/01/07 – 21/01/07		Mesoscale rainfall	67765 67761 67771	59.9mm 53.9mm 52.6mm	10 to 40mm	3	UKMO	Yes	

23/01/07		Mesoscale rainfall	67791	53.5mm	<20mm	2		No	
25/01/07		Mesoscale rainfall	67761	74.0mm	<20mm	2		No	
29/01/07		Mesoscale rainfall	67755	65.4mm	<20mm	3		No	

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Dd/mm/yy		Mesoscale rainfall or synoptic scale rainfall or strong winds (convective or synoptic)		(mm/period or KTS)	Amount predicted	Usefulness (1-4) 4 is best	List by centre		
30/01/07		Mesoscale rainfall	67781	107.3mm	40 to 50mm	3	NCEP ECMWF	No	
07/02/07		Synoptic rainfall	67869	59.9mm	<20mm	3		Yes	
17/02/07		Mesoscale rainfall	67895	61.7mm	>20mm	4		Yes	
18/02/07		Mesoscale rainfall	67895	127.6mm	>20mm	4		Yes	



19/02/07		Mesoscale rainfall	Mutare 67977 67979 67811	127.0mm 100.7mm 78.2mm 61.1mm	10 to 40mm	4	RSMC (Pretoria)  UKMO	Yes	Business disrupted in Mutare City. Electricity to several districts in Manicaland Province cut.
21/02/07		Mesoscale rainfall	67895 67773	100.2mm 58.1mm	>50mm	4		Yes	
22/02/07		Mesoscale rainfall	67895	206.2mm	>50mm	4		Yes	
23/02/07		Mesoscale rainfall	Mutare	85.0mm	>50mm	4		Yes	
25/02/07		Mesoscale rainfall	67977	64.6mm	>20mm	4		Yes	

Events on the 21<sup>st</sup> and 22<sup>nd</sup> February 2007 are associated with TC FAVIO.