Regional Subproject Implementation Plan
(27 September 2006)

1. Introduction

1.1. Principles of the SWFDP

Numerical Weather Prediction (NWP) systems have become increasingly relevant and indeed essential to the severe weather forecasting process, with a growing number and variety of sophisticated outputs, currently available from NWP producing centres, which could be beneficial to severe weather forecasting to many National Meteorological and Hydrological Services (NMHS). The Severe Weather Forecasting Demonstration Project (SWFDP) was being organized as potentially a series of regional subprojects whose scope is to explore and test the usefulness of the products currently available from NWP centres, or products which could be readily made available from current NWP systems of global and regional meteorological centres, with the goal to improving severe weather forecasting services in countries where sophisticated model outputs are not currently used. The principal focus of the project is on the phenomena of heavy precipitation that could cause serious flooding, and strong destructive winds. Such a demonstration project would use a cascading (forecasting) approach to provide greater lead-time for severe weather and would at the same time contribute to capacity building and improving links with Disaster Management and Civil Protection Authorities (DMCPA).

According to the recommendations of the CBS-XIII (2005), the goals of the SWFDP are the following:

- to improve the ability of NMCs to forecast severe weather events;
- to improve the lead time of alerting of theses events;
- to improve interaction of NMCs with DMCPA before and during events;
- to identify gaps and areas for improvements to improve the skill of products from GDPFS Centres through feedback from NMCs.

1.2. The cascading process

In the framework of the general organization of the Global Data-Processing and Forecasting System (GDPFS), the SWFDP implies a co-ordinated functioning among three types of GDPFS centres. Conceptually, it should involve one global centre, one regional centre and a small number of NMHSs located within the area of responsibility of the regional centre.

According to the conclusions of CBS-XIII, the proposed SWFDP is an excellent way to apply the cascading approach for forecasting severe weather in three levels, as follows:

- global NWP centres to provide available NWP products, including in the form of probabilities;
- regional centres to interpret information received from global NWP centres, run limited-area models to refine products, liaise with the participating NMCs;
- NMCs to issue alerts, advisories, severe weather warnings; to liaise with DMCPAs and to contribute to the evaluation of the project.

The SWFPD will implement a cascading forecasting process implying the participation of selected centres chosen within a geographical area affected by an agreed type of severe weather event. The cascading process aims to ensure the real-time distribution of the relevant available information produced by both a Global Centre(s) and a Regional Centre(s) to selected NMHSs. Moreover it is necessary to continue the cascade by making the final authoritative products of hazardous conditions (advisories or warnings) produced by the NMHSs available to the final users such as local Services in charge of hydrology and/or DMCPAs.
The cascading process concerns both short-range and medium-range products. In the framework of the Regional Subproject described hereafter short-range is defined as up and including day-2 while medium-

range is defined as day-3 up to and including day-5.

A near real-time evaluation will be conducted, based on observations of the meteorological parameters collected at local meteorological stations as well as information gathered on the impacts of the severe weather phenomena as reported by DMCPA Services. This evaluation of the performance of the cascading process will then be provided as feedback to the participating centres to further fine tune the process itself.

1.3. The framework of the Regional Suproject in RA I

CBS-XIII agreed that the DPFS programme should coordinate the implementation of the two types of projects; one that is aimed at improving the forecasting of the severe weather associated with Tropical Cyclones, and another project focusing on improving heavy precipitation/strong wind forecasts (not associated with Tropical Cyclones).

A Project Steering Group (PSG) was established to advise the Chair of the OPAG on DPFS on the planning of the SWFDP.

The SWFDP cab be divided into three phases as follows

- Phase I: Overall Project Planning. This phase includes the preparatory work necessary to prepare the project specifications and the work of the technical Project Steering Group (PSG) to identify the possible participating centres and to select suitable regional subprojects.

- Phase II: Regional Project Implementation Planning and Execution. This phase begins with the preparation of the detailed specifications allowing the representatives of the participating centres to develop a specific Regional Subproject Implementation Plan (RSIP), to manage its implementation and then to carry out the experimentation itself that is likely to last about one year.

- Phase III: Regional Project Evaluation and Conclusion. This phase includes the analysis and the evaluation of the entire subproject as well as contributing to the evaluation of the overall SWFDP with respect to the goals proposed initially.

The Project Steering Group recommended the following regional subproject most suitable for implementation in 2006, which is envisaged to possibly involve the following participants:

- NMHSs: Botswana, Madagascar, Mozambique, Tanzania, Zimbabwe;
- Regional Centres: Pretoria, La Réunion, ACMAD;
- Global Centres: Exeter, Washington, ECMWF.

Given that the season when severe events are likely to occur in this part of southern Africa is from November to May, there should be sufficient time left for the preparation of the subproject, including the provision of essential preparatory training, in order to start the field phase in November 2006.

GDPFS and national centres to develop the specific subproject implementation plan and to manage its implementation and then to carry out the experimentation itself which is likely to last about one year.

2. The Regional Subproject Management Team

The Regional Subproject Management Team (RSMT) is set up with the aim of preparing the implementation of the project, managing and controlling its execution. The management of the Regional Subproject is the responsibility of the Management Team and within the activities of CBS. The main responsibilities of the RSMT are defined as follows:

- to prepare the Regional Subproject Implementation Plan;
- to manage the implementation of the regional subproject;
- to control the execution during the field phase;
- to report on a quarterly basis on status;
- to evaluate the system.

2.1. Members of the RSMT

The Regional Subproject Management Team is chaired by:

Mr Mnikeli Ndabambi assisted by Mr Eugen Poolman (RSMC Pretoria)

The proposed provisional list of the members of the RSMT belonging to the participating centres which has to be approved by the Permanent Representatives is the following:

Mr Othata Mmolotsi (NMHS Botswana)
Mr Helder Sueia (NMHS Mozambique)
Mr Philbert Tibaijuka (NMHS Tanzania)
Mr Leornard Unganai (NMHS Zimbabwe)
Mrs Sahondrarilaia Raveloarisoa (NMHS Madagascar)
Mr Yassine Kadri (RSMC La Réunion)
Mr Mumba Zilore (ACMAD)
Mr Ian David Lisk (Met Office UK)
Mr Horst Boettger (ECMWF)
To be determined (NCEP, USA) ?

The contact person of the Project Steering Group (PSG) is:

Mr William Nyakwada (Kenya).

2.2. Responsibilities of the Members of the RSMT

The RSMT is responsible for the elaboration of an implementation plan for the regional subproject. The Regional Subproject Implementation Plan (RSIP) must include the following actions with milestones:

- to gather the participants to develop the RSIP;
- to submit the RSIP to the PSG;
- to conduct preparatory training for the participants;
- to start of the field phase;
- to conduct mid-term project review;
- to submit the final report to PSG.

The tasks of the members of the management team, during the preparation phase of the SWFDP are as follows:

2.2.1. The Management Team lead by its Chairperson:

- to draft a detailed regional subproject implementation plan;
- to develop preparatory training requirements specifically for participating operational forecasters who will be involved in the demonstration project and to provide information to WMO Secretariat;
- to report on the Project.

2.2.2. The lead person for each participating centre (Member of Management Team):

- to coordinate all aspects of project implementation and execution at their respective centres;

- to evaluate possible data-processing developments (e.g. work required to adjust or tailor NWP products);
- to arrange for forecasters in the centres to receive or have access to the agreed products;
- to identify preparatory training requirements.

2.2.3. The contact person of the SWFDP Project Steering Group (PSG):

- to liase with the PSG on aspects of the regional subproject.

3. Requirements of NMHSs

3.1. Data and products issued from the Global Centres

3.1.1. Current Deterministic NWP fields

Up to 2 days at 6h Intervals (12h intervals after 2 days). The domain of the area of coverage is defined as follows : 10°W, 5°N, 65°E, 40°S. NWP forecasts should be updated every 12 hours. In addition to the daily production all the forecasts should be archived for a minimum of 7 days.

Products which are not routinely transmitted through the GTS should be provided in graphical form (Web pages) via Internet for rapid display and dissemination, and may also be made available by other methods (FTP).

The recommended products include:

- charts to depict the large-scale flow (MSLP, 950/850/700/300/200 hPa wind, geopotential height, temperature and humidity);
- charts of vorticity at 500/300 hPa, vertical velocity at 700/300 hPa, 850 hPa wet bulb temperature, 100-500 hPa thickness;
- surface weather elements : 6-hour accumulated precipitation, 10m wind-speed, 2m minimum and maximum temperatures, relative humidity;
- atmospheric column characteristics: precipitable water, CAPE, theta-e, Lifted Index, K index, total totals, CIN;
- Thermodynamic diagrams e.g. tephigrams, skewT/logP issued from the model at several locations.

3.1.2. Probabilistic Forecast Products based on EPS

- Probability charts of severe weather events such as precipitation and wind higher than the following thresholds: 50mm/6h and 100mm/24h for precipitation and 20 knots and 30 knots for wind; these charts are required up to 5 days;
- “spaghetti” plots,: 500hPa geopotential height in extra-tropics, precipitation with threshold of 50mm/6h and with threshold of 20 knots and 30 knots at 6 h intervals;
- thumbnails of probability of accumulated precipitation in excess of 50mm/6 hours at 6 h intervals up to 5 days;
- EPSgrams for weather elements (2m temperature accumulated precipitation) at selected locations;
- Extreme Forecast Index (EFI) for heavy precipitation and strong wind.

3.1.3. Climatic anomaly analysis

- Daily 10 day running accumulative precipitation anomaly maps.

3.2. Data, products and services issued from Regional Centres

3.2.1. Current deterministic Limited Area Model

Up to 2 days at 6-hour intervals. The requested fields are the same as those proposed for the outputs from global models, where available.

Products which are not routinely transmitted through the GTS should be provided in graphical form (Web page) via Internet for rapid display and dissemination, and may also be made available by other methods (e.g. FTP).

3.2.2. Interpretation with respect to severe weather occurrence

Interpretation of fields available from global and regional centres synthesized in the form of two daily guidance bulletins:

- a short range (48 h) guidance mainly based on the interpretation of NWP models, issued during the morning.
- a medium range (up to 5 days) guidance mainly based on the interpretation of EPS products, issued during the afternoon.

3.2.3. Training required

The training which is requested by the NMHSs will deal mainly with the interpretation of NWP deterministic, probabilistic and EPS products for forecasting severe weather.

The NMHSs were requested to assess the current capacity in the use of NWP products and provide information to Met-Office UK to assist in the development of the preparatory training.

4. Products to be provided

4.1. Products which will be provided by the Global Centres

Global NWP Products which can be made available by the three global centres ECMWF, NCEP, Met-Office UK, should be cut and formatted to fit the project area (as required by the NMHSs in the framework of the project). The table of the Annex A below gives the comprehensive list of the products and indicates which centre(s) will provide the NMHSs with; the list comprises mainly:

- deterministic Forecasts:6-hourly up to 48 hours, then 12-hourly up to 120 hours;
- ensemble forecasts:12-hourly up to 120 hours;
- meteograms at selected locations whose list is given in Annex B.

4.2 Products which will be provided by the Regional Centre(s)

4.2.1 RSMC Pretoria:

- fields given by the Limited Area Model (LAM) running at RSMC Pretoria. This model will take its lateral boundary conditions from the Met Office Unified Model;
- guidance for short range and medium range as requested by the NMHSs (An example of the content of the guidance bulletins is given in the Annex C). This daily guidance has to be archived.
- archives of all products relevant to the project on case-to case basis (when severe weather event is either observed or forecast).

4.2.2 RSMC La Réunion:

(Presently produced)

- fields given by the LA Model running for RSMC La Réunion covering the responsibility area for tropical cyclones in the western part of the Indian Ocean;
- an interpretation of numerical model fields in form of a graphical guidance for analysis and short range forecasts on the same area as mentioned before;
- tropical cyclone warnings issued in the framework of the current activity of the RSMC La Réunion.

4.2.3 ACMAD:

(Presently produced)

- short-range interpretation of NWP output synthetic analysis and forecast in graphical form with accompanying texts;
- medium-range guidance in graphical form with text summary.
- archives of all products relevant to the project on case-to case basis (when severe weather event is either observed or forecast).

5. Preparatory Training

5.1. Overview

Training will be delivered in the use of NWP and EPS products just prior to the demonstration phase of the project. The training course will be hosted by the SAWS training centre in RSMC Pretoria. An NWP training module, being developed by ACMAD and the Met-Office will incorporate the results of a training needs analysis of the staff at the participating NMHSs. The aim of the training is, 'To position operational forecasters in the participating NMHSs to take optimum advantage of the state of the art NWP model output'. The Met Office UK, ECMWF and NCEP as well as RSMC Pretoria and ACMAD will be contributing to the course development.

5.2. Training topics for the course

- Overview of the different types of atmospheric models e.g. climate, limited area, global;
- overview on how NWP and EPS models work;
- general characteristics, strengths and weaknesses and biases of the different atmospheric models e.g. ECMWF, UKMO, GFS etc…;
- formulating best practice techniques for the interpretation of NWP and EPS products;
- how to use probabilities in the preparation of weather forecasts;
- understanding and interpretation of specialized NWP products for forecasting severe weather events:
  - K index,
  - total totals index,
  - lifted index,
  - vertical velocity,
  - CAPE,
  - precipitable water,
  - Theta-e
  - CIN;
- model verification as part of the forecast process;
- interpretation of RSMC Pretoria guidance products;
- guidance on the completion of the SWFDP evaluation form;
- constructing a case-study.

5.3. ACMAD involvement in training

ACMAD is exploring ways of getting forecasters from eastern and southern Africa on project-related work at the Centre, subject to NMHSs making their personnel available.

6. Implementation

6.1. Implementation at the Global Centres (work and duties)

- To provide the products, according to the lists given in Annex A and Annex B, to enrich the guidance assessed by RSMC Pretoria;
- to examine the requirements of the regional centres and to propose a way to make the requested products available (e.g. tailored windows);
- to evaluate the time necessary to be able to complete this work;
- to indicate its level of participation in the preparatory training (essentially for medium range products, including EPS).

6.2. Implementation at the Regional Centres (work and duties)

- To list duties and procedures for operational forecasters and systems staff (e.g. access to global centres' products, daily production of guidance coordination among participating centres, develop the daily short-range and medium-range guidance products, develop archiving procedures;
- to participate in providing preparatory training

6.3. Implementation at the NMHSs (work and duties)

- To ensure necessary telecommunication is in place (e.g. Internet access, operational e-mail);
- to list of duties and procedures for operational forecaster (e.g. evaluation, acknowledgement of receipt of guidance from Regional centre);
- to develop suitable warning bulletins for DMCPA services (if not already implemented) and to agree with them on the feedback procedure.
- to be ready for archive of relevant products and information when severe weather event is either forecast or observed, as per local/national needs.

7. Evaluation

The purpose of the evaluation is:

- to verify the efficiency of the forecast issued from the NMHS (comparison between the forecast and the reality each time a severe weather event occurs (occurrence and intensity, lead-time, false alarm ratio, probability of detection)
- to assess the guidance issued by the Regional Centres
- to provide feedback from DMCPA services, e.g. impacts of the severe event, usefulness of warnings/ bulletins

To achieve this an evaluation bulletin will be filled in by the NMHS and transmitted to the RSMC Pretoria. A template of such an evaluation bulletin is given in the Annex E (final form will be produced by RSMC Pretoria as soon as possible). The evaluation bulletin will need to be formatted in a convenient form (Excel file) in order to simplify the processing and archiving of the data. The products which have been used in the production of severe weather forecasts must also be archived for use in future case studies.

8. Timetable of implementation and execution of the Regional Subproject

- Preparatory work,
- Training (4 days, week beginning 30th of October at RSMC Pretoria),
- Starting the field phase (6th November 2006),
- Continuous control of the cascading process, with quarterly reporting (31st of December 2006)
- Mid-term review (February 2007),
- Continuing the field phase, next quarterly report 31st March 2007)
- Final evaluation and proposals for to continue or to make operational the cascading process (October 2007).

9. Evaluation of the costs

For the purpose of evaluating the total cost of the regional subproject, participating centres are required to estimate all additional costs associated with the SWFDP. This should include human costs (equivalent person-months) as well as expenditures of funds if any directly related to the project.

In the final evaluation of the regional subproject, a qualitative assessment will be made of the success of the SWFDP related to the specific benefits of the Project and in particular the measurable improvements that have been noted in the warning services that are provided to the national DMCPAs.

10. List of the Annexes

- Annex A: Availability of Minimum Required NWP Products from Global Centres.
- Annex B: List of the stations where EPSgrams are required by the participating NMHSs.
- Annex C and Annex D: Example of the guidance on short-range and medium-range forecasts to be provided by RSMC Pretoria in the framework of the SWFDP (to be finalized).
- Annex E: Example of the evaluation form of the guidance provided by RSMC Pretoria (in form of an Excel file).

Availability of Minimum Required NWP Products from Global Centers

For the Southeastern Africa SWDFP

Note that tbd means : to be determined

Deterministic Forecasts: 6-hourly out to 72 hours, then 12-hourly up to 144 hours	Availability ECMWF	UK Met	NCEP
Levels: sfc, 925mb, 850mb, 700mb, 500mb, 300mb, 200mb Parameters: wind (streamlines and speed/direction), temperature, geopotential height, humidity Purpose: General forecasting parameters to gain a perspective on the overall atmosphere. For determination of frontal system and pressure maxima locations.	tbd	yes	yes
Level: 500mb, 300mb Parameter: vorticity Purpose: Determination of frontal and low pressure system locations. Crucial in locating potential severe weather outbreak locations. Can be used in determination of severe weather type.	tbd	no	yes
Level: 850mb, 700mb, 300mb Parameter: vertical velocity Purpose: Determination of mesoscale patterns of rising and sinking air masses (convective updrafts)	tbd	no	yes
Level: 850mb Parameter: 850mb wet bulb potential temperature Purpose: Frontal position diagnosis and change in airmass	tbd	yes	yes
Level: sfc Parameters: instantaneous and accumulated precipitation, minimum temperature, maximum temperature, sea level pressure, relative humidity Purpose: General forecasting parameters.	tbd	yes	yes
Level: partial atmospheric column Parameter: 1000-500mb thickness Purpose: Freezing level determination and air mass distinguishing	tbd	yes	yes
Level: atmospheric column Parameter: precipitable water Purpose: Determination of total liquid water in the atmosphere and thus potential rainfall	tbd	no	yes

Level: atmospheric column	tbd	no	yes
Parameter: convective available potential energy (CAPE), Theta-E Purpose: Amount of energy available in the atmosphere for storm production			
Level: stability index	tbd	no	yes
Parameter: lifted index, K index, total totals index Purpose: Pre-calculated indices to generalize severe weather potential			
Level: stability index	tbd	no	yes
Parameter: convective inhibition (CIN) Purpose: Strength of force preventing convective initiation. The amount of energy (frontal forcing or daytime heating) that is needed to begin convection.			

Ensemble Forecasts:	**Availability**		
12-hourly out to 144 hours	**ECMWF**	**UK Met**	**NCEP**
Probability of 6-hour accumulated precipitation exceeding 50mm and 100mm threshold value	tbd	yes-T+72	yes
Probability of 24-hour accumulated precipitation exceeding 100mm threshold value	tbd	yes-T+72	yes
Probability of 10-meter wind speed exceeding 20kts and 30kts threshold value	tbd	yes-T+72	yes
Ensemble Prediction System meteograms for specified locations (ECMWF-5 to 10 per country & UK MOGREPS-10 total)	yes	yes-T+72	no
Spaghetti diagrams for 500mb geopotential height	tbd	yes-T+72	yes
Spaguetti diagrams for isolines corresponding to accumulated precipitation greater than 50mm/6h at 6 hours intervals	tbd	tbd	tbd
Spaguetti diagrams for winds greater than 20 knots and 30 knots at 6 hours intervals	tbd	tbd	tbd
Thumbnails of probability of precipitation in excess of threshold of 50mm/6h at 6 hours intervals	tbd	tbd	tbd
ECMWF Extreme Forecast Index for precipitation and wind	yes		no

Other Forecasts / Analyses:	Availability ECMWF	UK Met	NCEP
10-Day running daily accumulated precipitation (total, anomaly, percent normal, mean) from the CPC Africa Rainfall Climatology (ARC)			yes

Other REQUESTED Products:	Availability ECMWF	UK Met	NCEP
SKEW-T logarithmic forecast plots for selected grid points based on NWP output (out to 144 hours, 12-hourly)	tbd	tbd	rbd

Recommendations:	Availability ECMWF	UK Met	NCEP
Severe weather guidance bulletin from the regional center (SAWS) should be available through the internet and via email.			
Products not routinely transmitted on GTS network should be provided in graphical format vie web page and/or ftp server for rapid display and dissemination. As UKMet data is likely available only via ftp server, NCEP may be able to ingest their data and display via webpage.	tbd	tbd	yes
Domain of the area of coverage should be extended to cover from 5 degrees north to as far as practicable south.	tbd	yes	yes
NWP forecasts should be updated every 12 hours.	tbd	tbd	yes
All forecasts should be archived for a minimum of 7 days.	tbd	tbd	yes

List of the stations where Global Centres will provide EPSgrams in the framework of SWFDP

Note that station coordinates have to be verified and confirmed

I - Botswana

I.1 - List of stations for EPSgrams from ECMWF

N°	WMO id.	Station Name	Latitude (South)	Longitude (East)	Altitude (Metres)
1		Selibe Phikwe	22^0 03'	27^0 49'	982
2		Mahalapye	23^0 07'	26^0 50'	991
3		Sir Seretse Khama Airport	24^0 33'	25^0 60'	1000.5
4		Goodhope	25^0 27'	25^0 35'	1291
5		Jwaneng	24^0 36'	24^0 42'	1188.7
6		Ghanzi	21^0 42'	21^0 39'	1131
7		Francistown	21^0 09'	27^0 29``	1000.6
8		Letlhakane	21^0 25'	25^0 35'	984
9		Pandamatenga	17^0 49'	25^0 38'	1071
10		Tsabong	26^0 03'	22^0 27'	930

I.2 - List of stations for EPSgrams from Met-Office UK

N°	WMO id.	Station Name	Latitude (South)	Longitude (East)	Altitude (Metres)
1		Francistown	21^0 09``	27^0 29``	1000.6
2		Sir Seretse Khama Airport	24^0 33``	25^0 60``	1000.5

I.3 – Operational e-mail address of the Central Forecast office to b used during the Regional Subproject experimentation phase : Botswana National Meteorological Services (Weather Forecasting Division) **fforecasting@meteo.gov.bw**

II - Madagascar

II.1 - List of stations for EPSgrams from ECMWF

N°	WMO id.	Station Name	Latitude (South)	Longitude (East)	Altitude (Metres)
1		Antananarivo	18°54’	47°32’	
2		Morondava	20°17’	44°19’	
3		Mahajanga	15°40’	46°21’	
4		Farafangana	22°48’	47°50’	
5		Fianarantsoa	21°27’	47°06’	
6		Mahanoro	19°50’	48°48’	
7		Toamasina	18°07’	49°24’	
8		Taolagnaro	25°02’	46°57’	
9		Toliara	23°23’	43°44’	
10		Antsiranana	22°48’	47°50’	

II.2 - List of stations for EPSgrams from Met-Office UK

N°	WMO id.	Station Name	Latitude (South)	Longitude (East)	Altitude (Metres)
1		Antsirabe	19°47’	47°04’	
2		Maintirano	18°03’	44°02’	

II.3 – Operational e-mail address of the Central Forecast office to b used during the Regional Subproject experimentation phase : tbd

III - Mozambique

III.1 - List of stations for EPSgrams from ECMWF

N°	WMO id.	Station Name	Latitude (South)	Longitude (East)	Altitude (Metres)
1		Maputo Airport	25^0 55’	32^0 34’	39.0
2		Beira Airport	19^0 48’	34^0 54’	8.0
3		Chimoio	19^0 07’	32^0 28’	731.0
4		Lichinga	13^0 18’	35^0 14’	136.5
5		Pemba	12^0 59’	40^0 32’	101.0
6		Nampula	15^0 06’	39^0 17’	438.0
7		Quelimane	17^0 53’	36^0 53’	6.0
8		Mapulanguene	24^0 29’	32^0 05’	418.0
9		Inhambane	23^0 52’	35^0 23’	14.0
10		Tete	16^0 11’	33^0 35’	149.0

III.2 - List of stations for EPSgrams from Met-Office UK

N°	WMO id.	Station Name	Latitude (South)	Longitude (East)	Altitude (Metres)
1		Maputo Airport	25°55’	32°34’	39.0
2		Chimoio	19°07’	32°28’	731.0

III.3 – Operational e-mail address of the Central Forecast office to b used during the Regional Subproject experimentation phase : **mozmet@inam.gov.ms**

IV - Tanzania

IV.1 - List of stations for EPSgrams from ECMWF

N°	WMO id.	Station Name	Latitude (South)	Longitude (East)	Altitude (Metres)
1	63756	Mwanza	2°47’	32°92’	
2	63789	Arusha	3°37’	36°63’	
3	63801	Kigoma	4°88’	29°67’	
4	63894	Dar es Salaam	6°87’	39°20’	
5	63862	Dodoma	6°17’	35°77’	
6	63832	Tabora	5°08’	32°83’	
7	63870	Zanzibar	6°22’	39°22’	
8	63932	Mbeya	8°93’	33°47’	
9	63962	Mahenge	8°75’	36°80’	
10	63971	Mtwara	10°35’	40°18’	

IV.2 - List of stations for EPSgrams from Met-Office UK

N°	WMO id.	Station Name	Latitude (South)	Longitude (East)	Altitude (Metres)
1	63894	Dar es Salaam	6°87’	39°20’	
2	63756	Mwanza	2°47’	32°92’	

IV.3 – Operational e-mail address of the Central Forecast office to b used during the Regional Subproject experimentation phase : **cfo@meteo.go.tz**

V - Zimbabwe

V.1 - List of stations for EPSgrams from ECMWF

N°	WMO id.	Station Name	Latitude (South)	Longitude (East)	Altitude (Metres)
1	67765	***Karoi***	16°51’	29°37’	
2	67779	Mount Darwin	16°47’	31°35’	
3	67775	Harare Airport	17°55’	31°08’	
4	67853	Hwange	18°38’	27°00’	
5	67881	Rusape	18°32’	32°08’	
6	67965	Bulawayo Airport	20°01’	29°37’	
7	67975	Masvingo	20°04’	30°52’	
8	67983	Chipinge	20°12’	32°37’	
9	67861	Gokwe	18°13’	28°55’	
10	67991	Beitbridge	22°13’	30°00’	

V.2 - List of stations for EPSgrams from Met-Office UK

N°	WMO id.	Station Name	Latitude (South)	Longitude (East)	Altitude (Metres)
1	67775	Harare Airport	17°55’	31°08’	
2	67965	Bulawayo Airport	20°01’	29°37’	

V.3 – Operational e-mail address of the Central Forecast office to b used during the Regional Subproject experimentation phase **:** **wforecast@weather.utande.co.zw** and **hamo_met@comone.co.zw**

GUIDANCE TO BE ISSUED BY THE RSMC PRETORIA TOWARD THE NMHSs FOR SHORT RANGE SEVERE WEATHER FORECASTING UP TO 48 H

The SW Short guidance comprises three parts :

- Part A: Text; depiction of the expected evolution of the weather up to 48 h and comments about the more representative short range products that are used with reference to figures included in the part B or to charts clearly identified (model, parameter, level, forecast range).

- Part B: Figures; charts or graphics coming essentially from deterministic models (global or LAM).

- Part C: The assessment of the degree of confidence of the forecast by the forecaster.

- Part D: Two tables (for 24 h and 48 h, respectively), summarizing the risk of severe weather as assessed by the RSMC Pretoria as proposed below. In order to provide more information about the geographical location of the severe event the following convention is adopted when filling in the cells : X for the whole country, N for the northern part, S for the southern part, W for the western part and E for the eastern part.

Country	No risk	Low risk	Medium risk	High risk
Botswana	**Heavy precip.**			
	Strong Winds		**N**	
Mozambique	**Heavy precip.**			
	Strong Winds	**X**		
Etc…				

This table is only an example and has to be definitively defined by the RSMC Pretoria. The separation of the evaluation of the risk into four categories (no risk, low risk, medium risk and high risk) is only given as an example.

- Part E: Two geographical maps (for 24 h and 48 h, respectively) including the boundaries of the countries with contours identifying the areas which are likely to be hit by the severe weather event.

Important : NMHS has to acknowledge the reception of this bulletin.

GUIDANCE TO BE ISSUED BY THE RSMC PRETORIA TOWARD THE NMHSs FOR MEDIUM RANGE SEVERE WEATHER OUTLOOK FOR DAYS D+3, D+4 and D+5

- Part A :Text; depiction of the expected evolution of the weather for days 3, day 4 and day 5 and comments about the more representative medium range products that are used with reference to figures included in the part B or to graphics clearly identified (EPS charts or meteograms).
-
- Part B: Figures; charts or graphics coming essentially Ensemble Prediction Systems (EPS).

- Part C: The assessment of the degree of confidence of the forecast by the forecaster.

- Part D: Three tables (for day 3, day 4 and day 5, respectively), summarizing the probabilities of precipitation and wind higher than a given threshold as proposed below. In order to provide more detailed information about the geographical location of probabilities the following convention is adopted when filling in the cells : X for the whole country, N for the northern part, S for the southern part, W for the western part and E for the eastern part.

Country	Probability	< XX%	> XX% and < YY%	> YY80%
Botswana	Prec.> 50mm/6h	N		
	Winds > 30 kt		N	
Mozambique	Prec.> 50mm/6h	X		
	Winds > 30 kt			X
Etc…				

This table is only an example and has to be definitively defined by the RSMC Pretoria(number of columns, lower and upper limits).

- Part E: Three geographical maps (for day 3, day 4 and day 5, respectively) including the boundaries of the countries with contours identifying the probabilities areas for the occurrence of the weather event.

Important : NMHS has to acknowledge the reception of this bulletin.

EVALUATION FORM (Page 1)
SEVERE WEATHER EVENT OBSERVED

Identification of the severe event

NMHS:		Alphabetic	
Region affected:		Alphabetic	
Event Number:		Numeric	
Type of event:		Numeric	(put the right number in the cell)

1: Heavy Precipitation
2: Strong wind
(indicate the most significant phenomenon, either heavy precipitation or strong wind)

Severe convection		Numeric	(put 1 if extreme phenomena are the consequence of severe convection or 0 otherwise)

Severe Weather Observed (to be filled even if no severe weather has been forecast)

Start of the event:				at			UTC
	JJ	MM	AA		HH	MM	
End of the event:				at			UTC
	JJ	MM	AA		HH	MM	

Max. observed value:			Unit
	Numeric	Alphabetic	

(According to the event: accumulated precipitation or gusts)

Information from the end-users

short text explaining the consequences and possibly some figures
(number of interventions, casualties, damages, usefulness of the warning)

EVALUATION FORM (Page 2)
SEVERE WEATHER FORECAST EVENT

Severe Weather Forecast / (to be filled even severe weather did not occur)

Time of the warning toward DMCPA | | | | at | | | UTC
JJ MM AA HH MM

Start of the event; forecaster assessment | | | | at | | | UTC
JJ MM AA HH MM

End of the event; forecaster assessment | | | | at | | | UTC
JJ MM AA HH MM

Max. observed value: | Numeric | Alphabetic | Unit

(According to the event: accumulated precipitation or gusts)
accumulated precipitation or gusts)

Level of risk as appreciated by RSMC (put 1 in the chosen cell)

Level of risk 1 day before: | | No | | Low | | Med. | | High

Level of risk 2 days before: | | No | | Low | | Med. | | High

Probabilities of medium range outlooks as appreciated by RSMC

Probability 3 days before: | | %

Probability 4 days before: | | %

Probability 5 days before: | | %

Mark for usefulness of regional centre severe weather forecast (put 1 in the chosen cell)

A = Very useful	(basis of the warning)	A	
B =Useful	(aided guidance confidence)	B	
C = Neutral	(not useful)	C	
D = Negative	(misleading)	D	

Comment including information on usefulness and applicability of used tools