SAWS Experiences in Provision of Hazard Information for Risk Analysis

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OVERVIEW
• 95% of Natural Disasters in Southern Africa are weather related (from CRED/EMDAT)
• Most important disasters for Southern Africa is drought, floods, windstorms, epidemics
National Meteorological Services are at the forefront of disaster risk reduction

- Severe weather early warnings
- Climate information and data

Monitoring

Forecast and early warnings

Vulnerability analysis and risk assessment

Applications (agriculture, water resources, etc)
OBSERVING NETWORKS AND DATA
Various Weather Data Types observed by Weather Services as part of WMO GCOS

<table>
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<tr>
<th>DOMAIN</th>
<th>ESSENTIAL CLIMATE VARIABLES</th>
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| Atmospheric (over land, sea and ice) | **Surface**: Air temperature, Wind speed and direction, Water vapour, Pressure, Precipitation, Surface radiation budget.  
**Upper-air**: Temperature, Wind speed and direction, Water vapour, Cloud properties, Earth radiation budget (including solar irradiance).  
**Composition**: Carbon dioxide, Methane, and other long-lived greenhouse gases; Ozone and Aerosol, supported by their precursors |
| Oceanic           | **Surface**: Sea-surface temperature, Sea-surface salinity, Sea level, Sea state, Sea ice, Surface current, Ocean colour (for biological activity), Carbon dioxide partial pressure, Ocean acidity.  
**Sub-surface**: Temperature, Salinity, Current, Nutrients, Carbon dioxide partial pressure, Ocean acidity, Oxygen, Tracers, Phytoplankton; Marine biodiversity and habitat properties |
| Terrestrial       | River discharge, Water use, Ground water, Lakes, Snow cover, Glaciers and ice caps, Ice sheets, Permafrost, Albedo, Land cover (including vegetation type), Fraction of absorbed photosynthetically active radiation (fAPAR), Leaf area index (LAI), Above-ground biomass, Soil carbon, Fire disturbance, Soil moisture |
ECMWF Data Coverage (All obs DA) - Synop-Ship-Metar
27/Jun/2012; 12 UTC
Total number of obs = 36093
WMO Global Atmosphere Watch Stations
Observations are performed by NMHSs in countries but coordinated through the WMO system

SAWS Observation Network
- 20 Regional weather offices
- 130 Automatic Weather Stations
- 112 Climate Stations
- 1512 Rainfall Stations
- Radar network
- Lightning Detection Network
- Air Quality Monitoring (SAAQIS)
EARLY WARNING SYSTEMS
Regional Collaboration Activities between NMHSs, lead by WMO

Short-range EW: SWFDP- Severe Weather Forecasting Demonstration Projects

Seasonal: RCOF- Regional Climate Outlook Forums
COLLABORATION WITH USERS ON HAZARD AND RISK ASSESSMENTS AND MAPPING
Disaster Management Structures

• Collaboration at all levels between SAWS and Disaster Management Centres
• SAWS provides real-time Early Warning information to DMCs, JOCs, etc.
• SAWS provided reports, data and weather and climate related products for hazard- and risk assessments of various DM structures
• Maintain CAELUM weather events database from newspaper reports since 1900
CAELUM: Historical Events – Geographical Distribution

City of Cape Town
Nr Weather Related Hazard Events
1900 - 2009 (Caelum, SAWS)
Disaster Management & Water Sectors

Flash flood guidance information:
- Real time (hourly)
- "Climate"
Agriculture

- Various products are used by the Agriculture sector
- Seasonal forecasts to plan for coming seasons
- SPI maps as indicator of potential drought conditions
- Historical rain maps, etc.
Seasonal Forecast and historical products

Seasonal forecasts

Historical El Nino / La Nina thresholds of seasonal rainfall

El Nino / La Nina assessments
South African Climate Info
A 30-year comparison

Climate is the average condition of the atmosphere at a place or in a region as observed over a period of at least 30 years. This average condition, or the climate, is usually described in terms of temperature, precipitation and wind.

In conjunction with the South African Weather Service (SAWS), ST Group is able to provide the following climate data dating between 1961 & 1990:

- Average monthly and average annual hail days
- Average monthly and average annual rainfall
- Lightning ground flash density (2006 – 2010)
- Daily maximum rainfall

Rainfall monitoring and information is critical for municipalities and disaster management centres, agriculture, hydrology and insurance.

Equipment is designed and manufactured locally with South African knowledge and expertise for the African environment.
CONCLUSIONS

- NMHSs are at the forefront of weather related hazards
- Standards for observations, data exchange and climate databases are set by the WMO
- Weather information for risk assessments generated and maintained at national level
- Various weather and climate related information & products in support of risk assessments