Satellite data in support of weather, water and climate services in the SADC region

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Outline

- SADC Climate Services Centre
- Projects
- Products and Services
- Outputs, Achievements and Impact
- Lessons learnt

SADC Climate Services Centre

- Established in 1990 as a Drought Monitoring Centre (DMC), Harare, Zimbabwe
- Since 2002, SADC CSC is under the aegis of SADC Secretariat, hosted by Botswana Department of Meteorological Services, Government of Botswana
- Develops and disseminates climate and weather information
- Provides regional operational services for monitoring and predicting extreme weather events and issues advisories to NMHSs of Member States

- **CSC mostly uses Satellite data to cater for limited access to ground observation data.**

- **Applications and products**
  - **SARCOF Statement** on seasonal forecast & SARCOF Seasonal Early Warning Bulletin;
  - **Advisories** – Heatwave/Cold Spells/ Heavy Rainfall/Drought/Wildfire/Flooding
  - **Regional climate diagnostic bulletins**

- **Users of CSC**
  - Climate Sensitive sectors such as Agriculture & Food Security, Water, Energy, DDR and Health
  - Decision makers; research institutions
  - Public at large

Projects

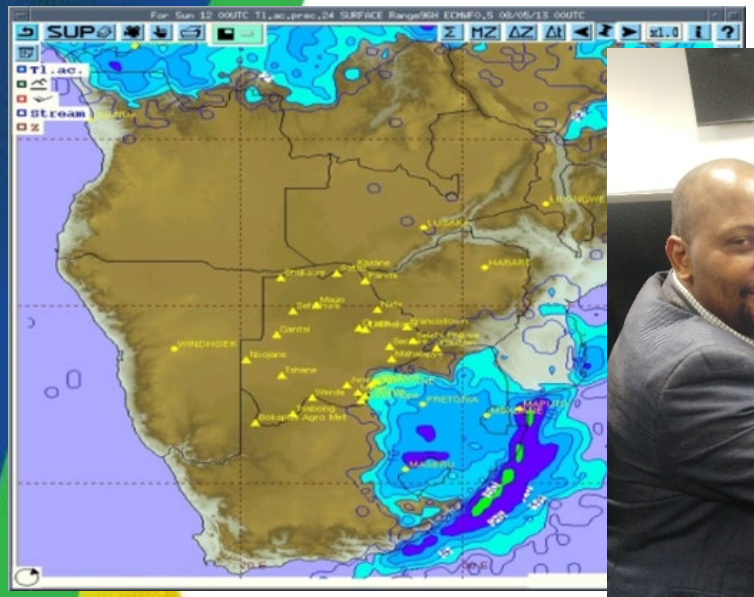
- The CSC, in partnership with other institutions and Donors, has implemented a number of Projects aimed at improving the capacity of the Centre to access and use earth observation data. Other Projects are also foreseen in the near future to further enhance the capacity of SADC CSC

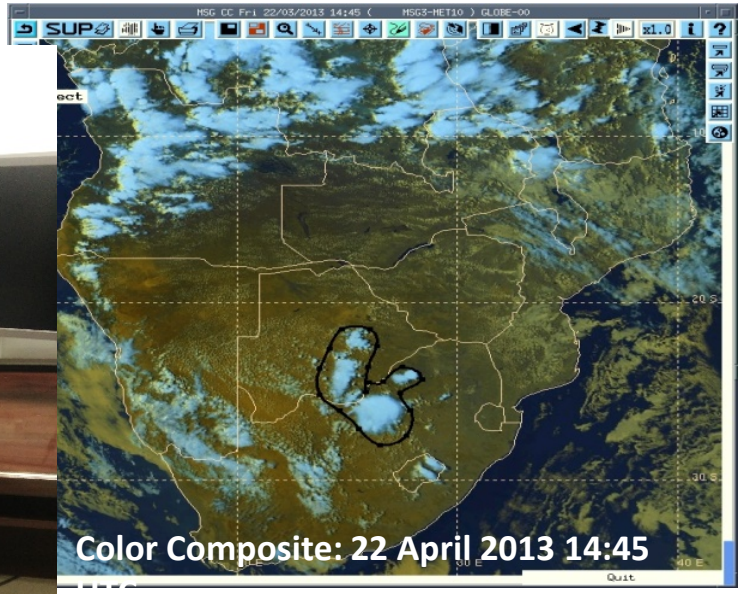
- Preparation for the Use of Meteosat in Africa (PUMA) Project, 2001 – 2006, reception and exploitation of MSG data in Africa
- Africa Monitoring of the Environment for Sustainable Development (AMESD), 2007 – 2013, earth observation data for agriculture, drought and wildfire monitoring
- Monitoring for Environment and Security in Africa (MESA), 2013 – 2017, earth observation data for agriculture, drought, wildfire and drought monitoring
- Institutional Support to African Climate Institutions Project (ISACIP), 2013 – 2016, strengthening capacities of RCCs to generate and disseminate climate information
- SAWIDRA SADC, Southern African Regional Climate Information Services for Disaster Reduction (SARCIS-DR), 2017 – 2020, improved weather and climate services to meet DRR needs
- Intra-ACP Climate Services and related Application Programme, 2019-2023, implementation GFCS in Africa, Caribbean and Pacific, and generation of climate services for the Water/Food/Energy nexus

Product and services

Now-casting_1

The CSC uses 15 minute satellite imagery from EUMETSAT (MSG) for monitoring current weather patterns, e.g. tracking the development of storms and other phenomena. This data is also used extensively in member states for now-casting (through PUMA Stations), especially during the active season of September to April.





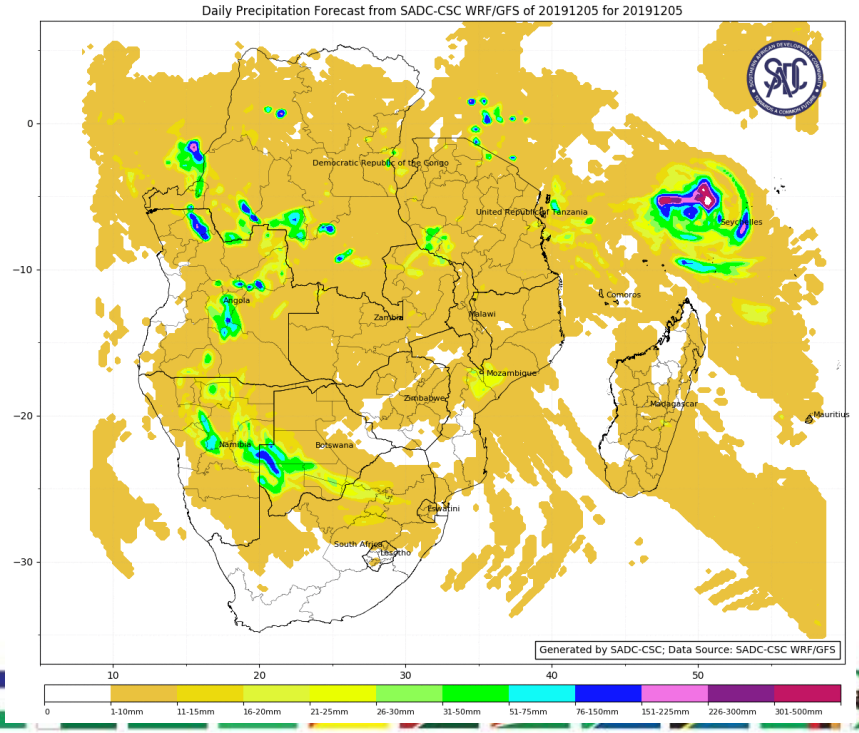
Numerical Weather Prediction and Hydrological Modelling_2

The CSC runs an operational Numerical Weather Prediction model (WRF), for modelling various weather parameters for up to 7 days in order to detect extreme weather events.

SADC-CSC WRF/GFS
7-Day Forecast (3 hour time steps) [sadc15k]
Forecast Run: 200915 0000hrs

SURFACE VARIABLES	
Precipitation	MSLP

PRESSURE LEVEL VARIABLES						
Variables/Levs	925hpa	850hpa	700hpa	500hpa	300hpa	200hpa
Winds						
Temperature						
Heights						
Rel.Humidity						
Rel.Vorticity						
Vert.Velocity						

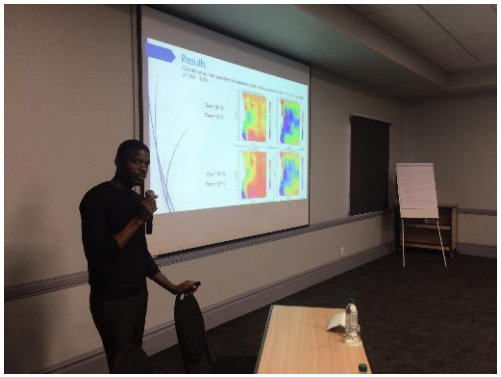


Numerical Weather Prediction and Hydrological Modelling_3

High Performance Computing Server infrastructure has been delivered to 14 NMHSs under SAWIDRA Project to support Member States on Numerical Weather Prediction for early warning

Infrastructure

Capacity Building



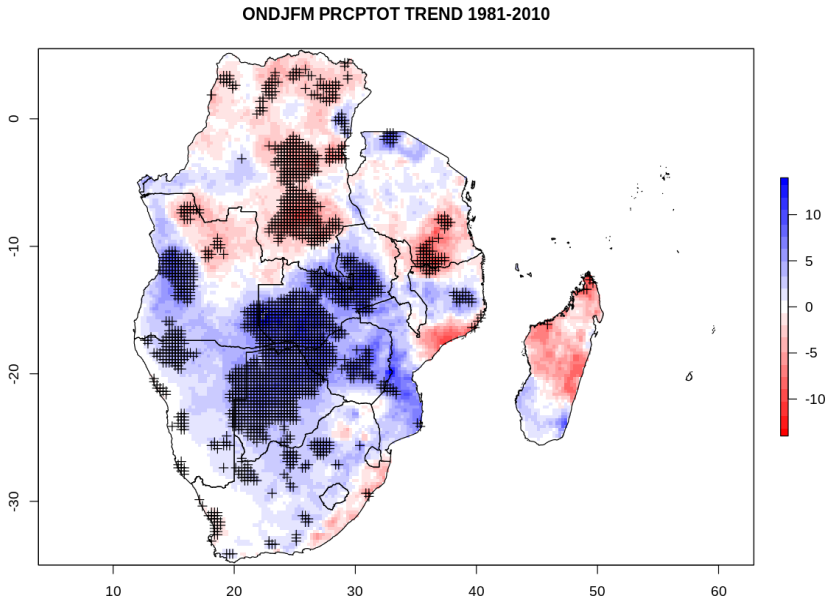
Experts from NMHSs were trained on the following

- High Performance Computing (HPC) System Administration Training (February 2019)
- Numerical Weather Prediction Training (July 2019)
- Regional Climate Modelling Training (June 2019)

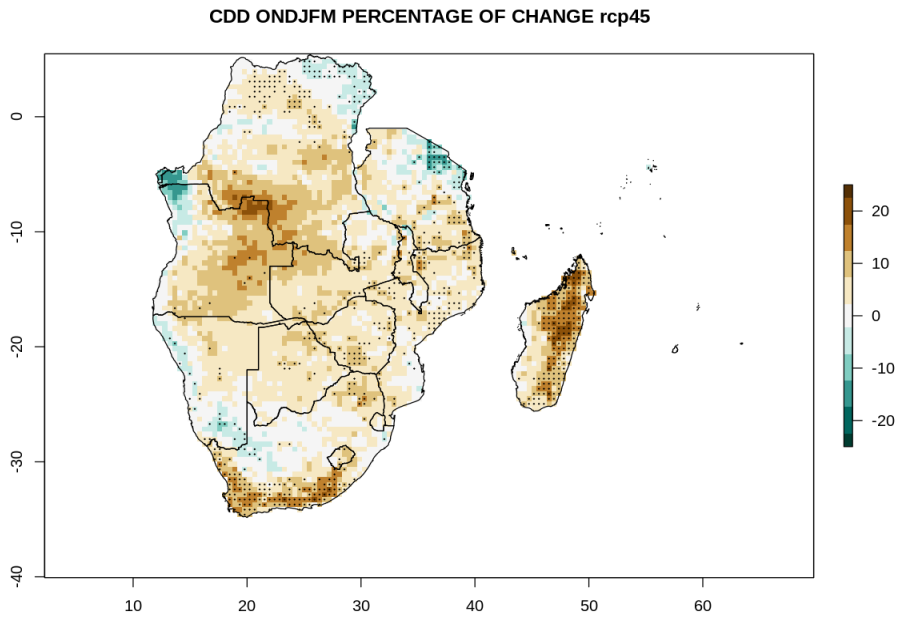
Season and Climate Monitoring_4

Rainfall estimates from satellite, blended with ground station data, are used at the CSC for season and climate monitoring. Rainfall products from CRU, CHIRPS, TAMSAT, and FEWSNET RFE are used, including in applications to downscale long range forecasts from Global Producing Centers.

Total precipitation



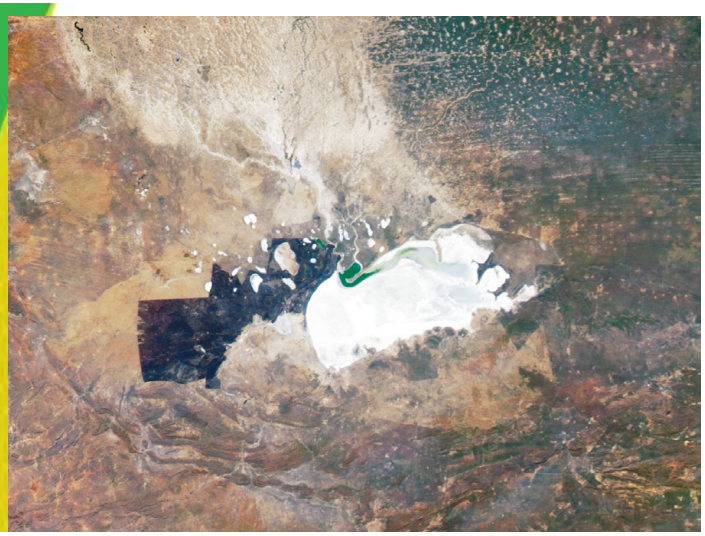
RCP45



Land Surface Temperature and Wildfire Monitoring_5

Thermal channels from optical sensors aboard satellites are useful for **land surface temperature and active wildfire monitoring**, the MODIS and Copernicus provide an invaluable resource for this data at medium and high resolution. The MESA Wildfire Station, developed during the MESA Project and installed in various institutions in Member States, used this dataset for monitoring active wildfires.

Wildfire in Namibia (June 2012) was monitored using satellite data during the AMESD project. Lessons learnt = improved wild fire control strategy and modification of fire control zones.

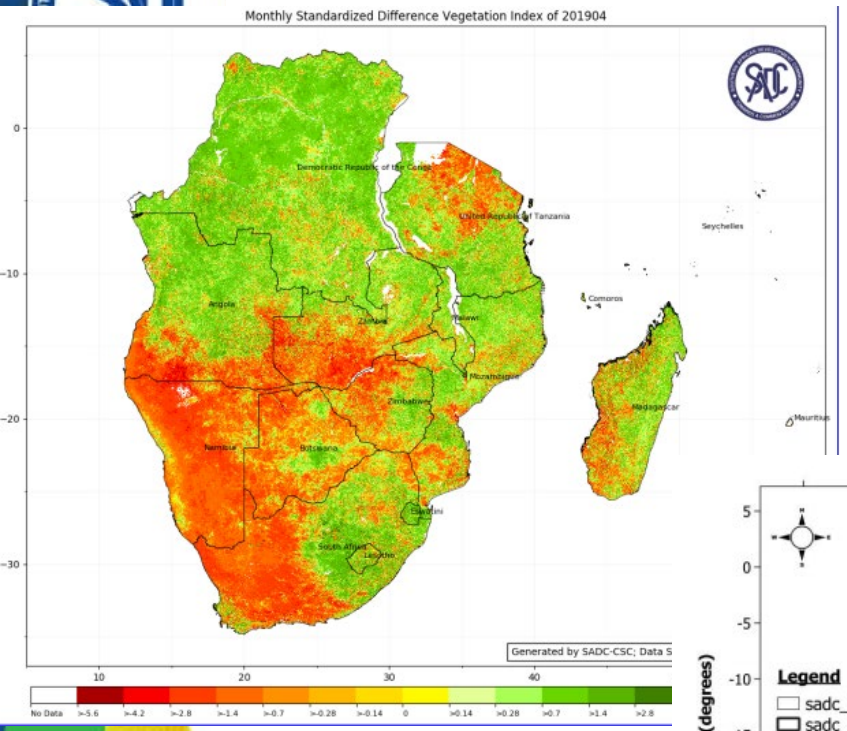


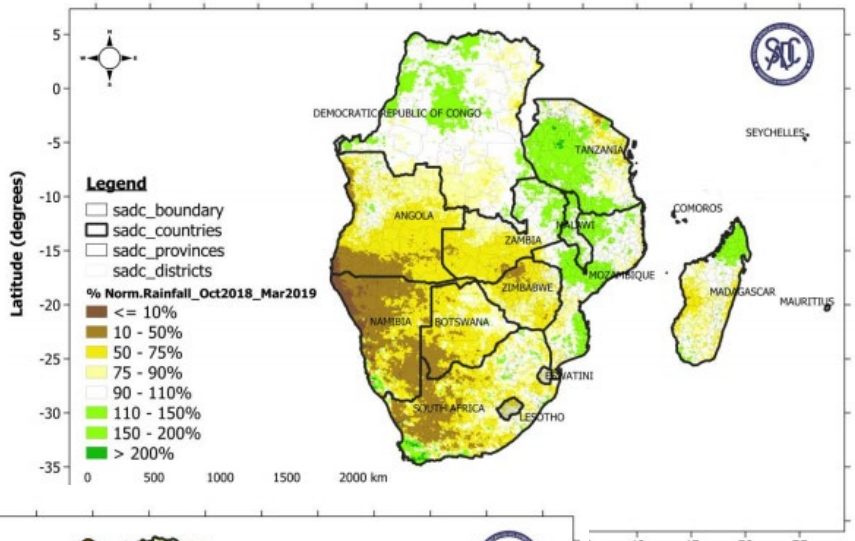
True Color satellite image over Etosha National Park (ENP) captured by the MODIS satellite on the 10 June 2012

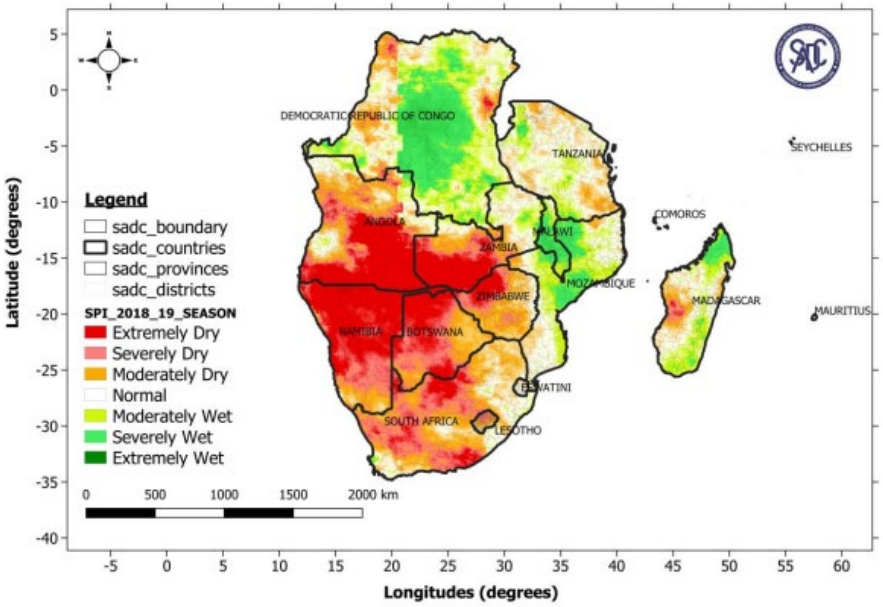
More than 644,000ha was burned in Namibia during June 2012 that also resulted in significant wildlife mortality

Drought Monitoring_6

Vegetation products based on satellite data (Proba-V/Copernicus) are used for agriculture and drought monitoring at the CSC, including satellite rainfall estimates







Outputs, Achievements and Impact

Climate information services

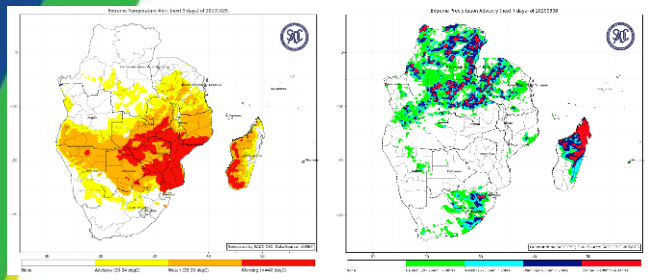
Services disseminated via website, email, social media and user forums

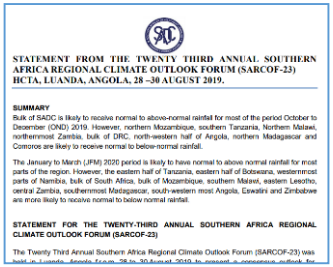
Climate Outlook Forums

Media address by the Director General of the Instituto Nacional de Meteorologia e Geofísica (INAMET) of Angola, Mr. Domingos Jose do Nascimento

Official opening by Hon. Mininister of Telecommunication & Information Technology of Angola, Dr Jose Carvalho da Rocha

Early Warning Products and Bulletins




STATEMENT FROM THE TWENTY THIRD ANNUAL SOUTHERN AFRICA REGIONAL CLIMATE OUTLOOK FORUM (SARCOF-23) HCTA, LUANDA, ANGOLA, 28 –30 AUGUST 2019.

SUMMARY

Bulk of SADC is likely to receive normal to above-normal rainfall for most of the period October to December (OND) 2019. However, northern Mozambique, southern Tanzania, Northern Malawi, northernmost Zambia, bulk of DRC, north-western half of Angola, northern Madagascar and Comoros are likely to receive normal to below-normal rainfall.

The January to March (JFM) 2020 period is likely to have normal to above normal rainfall for most parts of the region. However, the eastern half of Tanzania, eastern half of Botswana, westernmost parts of Namibia, bulk of South Africa, bulk of Mozambique, southern Malawi, eastern Lesotho, central Zambia, southernmost Madagascar, south-western most Angola, Eswatini and Zimbabwe are more likely to receive normal to below normal rainfall.

STATEMENT FOR THE TWENTY-THIRD ANNUAL SOUTHERN AFRICA REGIONAL CLIMATE OUTLOOK FORUM (SARCOF-23)

The Twenty Third Annual Southern Africa Regional Climate Outlook Forum (SARCOF-23) was

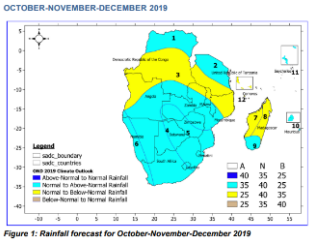
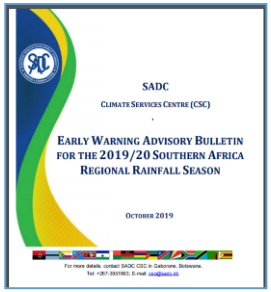


Figure 1: Rainfall forecast for October-November-December 2019



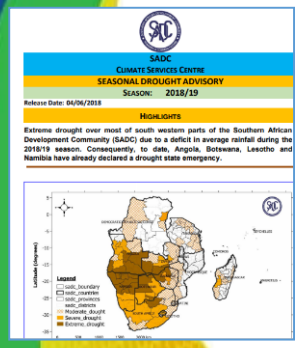


Figure 1: Projected landfall of Tropical Cyclone Kenneth (Data source: JTWC)

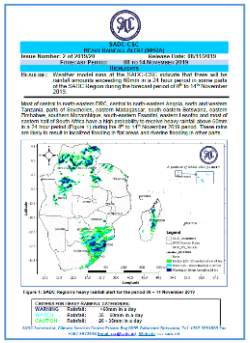


Figure 1: SADC Regions heavy rainfall alert for the period 26 – 30 November 2019

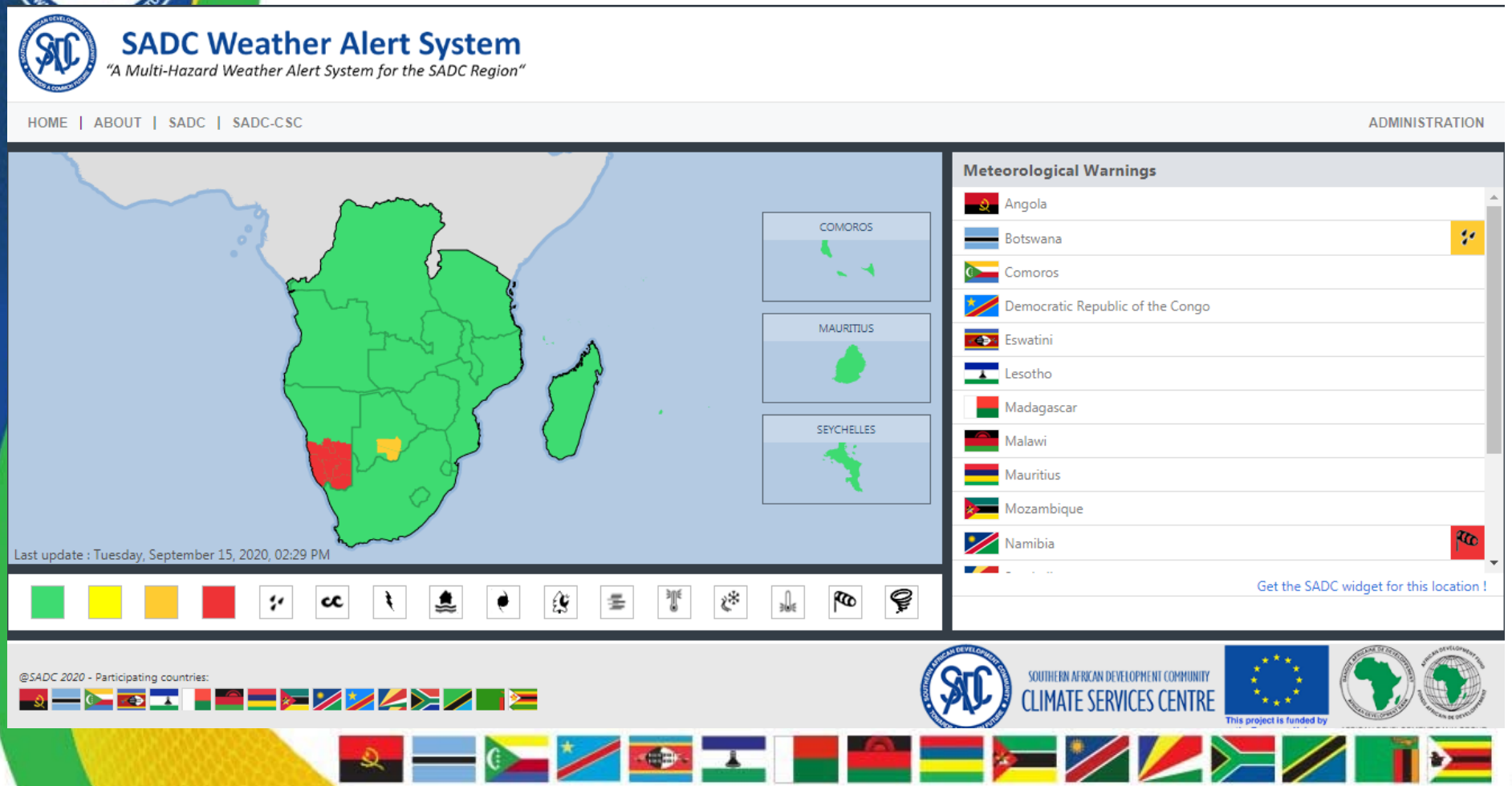
Caution: Rainfall: 20 - 30mm in a day

Regional Climate Outlook Forums to disseminate Seasonal Outlook Statement and Early Warning Advisory Bulletin

Early Warning Advisories issued to NMHSs

Communication & Dissemination

The SADC Weather Alert System will soon be commissioned SARCIS-DR (SAWIDRA-SADC) project.
It is a platform for SADC NMHSs to upload their weather alerts.



Impact

- DRR Agencies: enhanced preparedness & response to disasters (SADC DRR Unit)
- NMHS:
  - ✓ improved weather and climate information (Infrastructure: AWS, HPC, AMSS)
  - ✓ Enhanced services for early warning (secondment of experts, training workshops)
- SARCOF process: Platform for Water, Health, Energy, Transport, Agriculture, DRM Sectors to develop preparedness and mitigation strategies
- Communities: (interaction with local users including Farmers Unions, and those in Disaster Prone Areas)

SADC-CSC
HEAVY RAINFALL ALERT (SHRA)
Issue Number: 2 of 2019/20 **Release Date: 08/11/2019**
FORECAST PERIOD: 08 TO 14 NOVEMBER 2019
HIGHLIGHTS

HEADLINE: Weather model runs at the SADC-CSC indicate that there will be rainfall amounts exceeding 60mm in a 24 hour period in some parts of the SADC Region during the forecast period of 8th to 14th November 2019.

Most of central to north-eastern DRC, central to north-eastern Angola, north and western Tanzania, parts of Seychelles, eastern Madagascar, south-eastern Botswana, eastern Zimbabwe, southern Mozambique, south-eastern Eswatini, eastern Lesotho and most of eastern half of South Africa have a high probability to receive heavy rainfall above 60mm in a 24 hour period (Figure 1) during the 8th to 14th November 2019 period. These rains are likely to result in localized flooding in flat areas and riverine flooding in other parts.

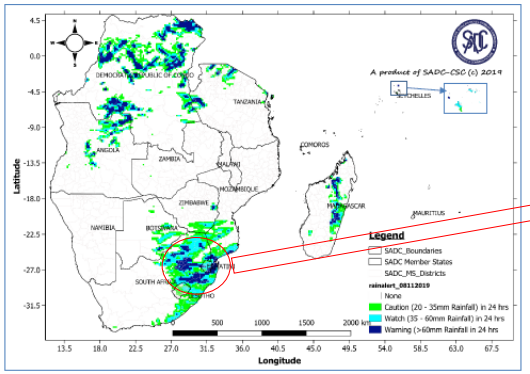


Figure 1: SADC Region's heavy rainfall alert for the period 08 – 14 November 2019

CRITERIA FOR HEAVY RAINFALL CATEGORIES:

WARNING	Rainfall:	>60mm in a day
WATCH	Rainfall:	35 – 60mm in a day
CAUTION	Rainfall:	20 - 35mm in a day

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16 PEOPLE KILLED IN INCLEMENT WEATHER IN KZN AS PROVINCE BRACES FOR 'MEGA-STORM'

Officials from the Cooperative Governance Department held a briefing in Dubran on Thursday after several parts of the province were ravaged by severe storms over the past four days.

The Mvoti River on 14 November 2019 after heavy rain in the area. Picture: @SAPoliceService/Twitter

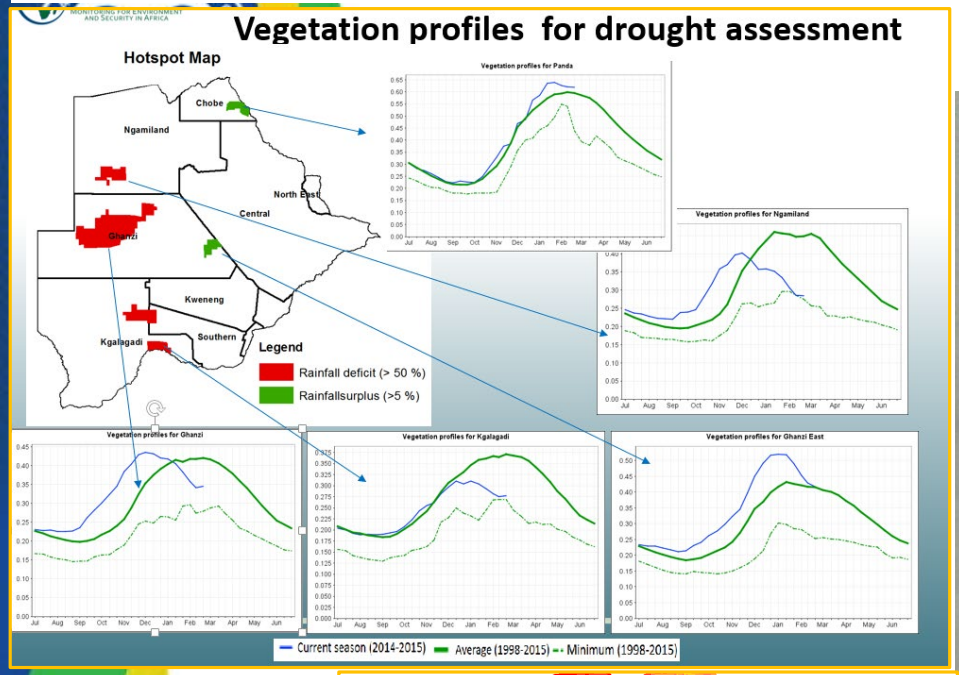
KZN weather: Taxi carrying passengers swept away by floods

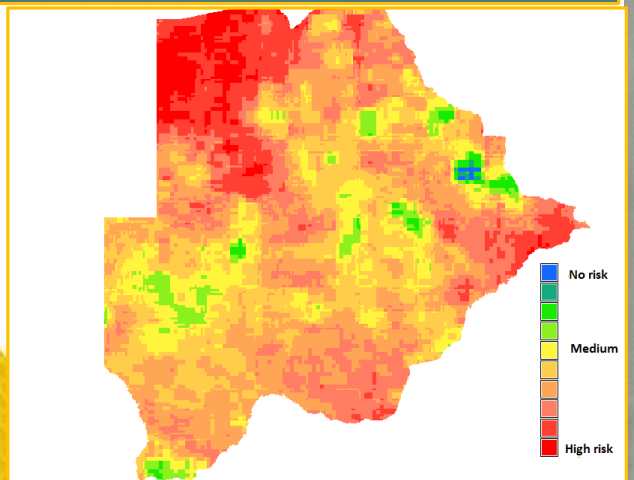
Fortunately, the victims survived the incident with minor injuries.

by Andile Sicetsha — 2019-11-14 10:01 — in News

Impact

Vegetation and rainfall performance & seasonal rainfall forecasts: assist for drought assessment in Botswana, leading to declaration of drought in 2015

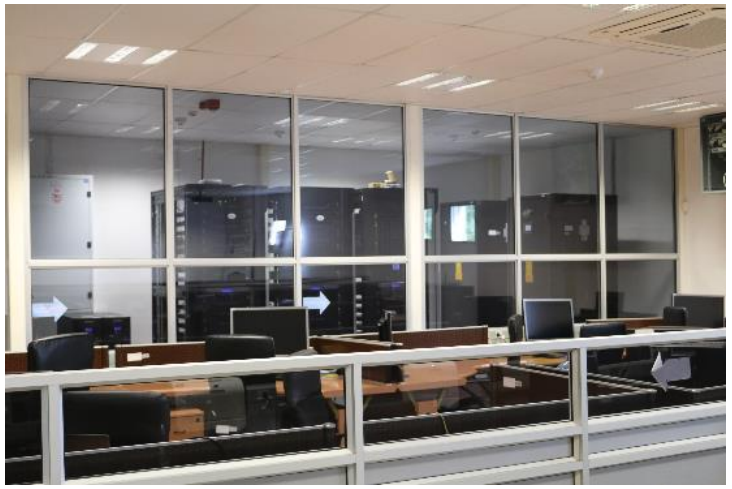


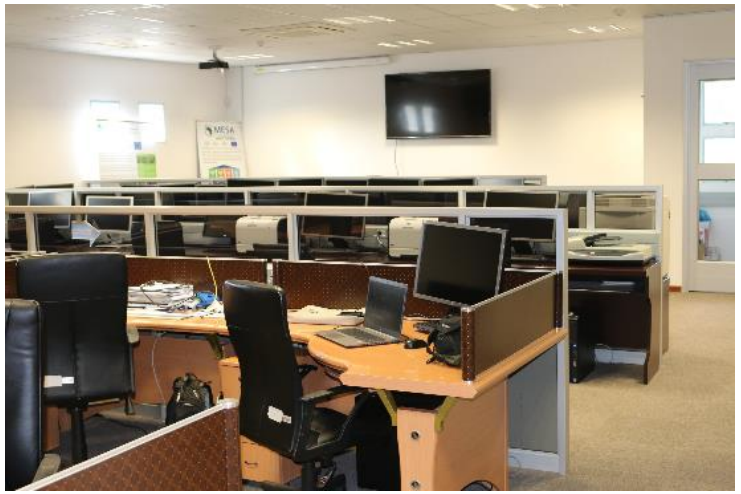


Lessons learned

- Satellite Observation is crucial in ensuring the continuity of provision of services by the CSC
- The Copernicus Climate Change Service (C3S) provides free access to data, need to ensure this service continues to support services SADC
- The EUMETSAT Meteosat Second Generation (MSG) Satellites are nearing end of life, hence need for support to ensure uptake of Meteosat Third Generation (MTG) satellites
- Need for improvement of meteorological infrastructure at Member State and the CSC for enough capacity to access, process and store satellite data

Thank you for your attention





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