


ACPC deploys a high resolution weather prediction system to enable better weather prediction and longer-term planning in Africa

A high resolution Numerical Weather Prediction and Early Warning System to generate more precise meteorological data has been deployed by the Economic Commission for Africa (ECA) Africa Climate Policy Centre (ACPC) to help African Small Island Developing States (SIDS) to build resilience to extreme weather events and provide higher quality data for longer-term weather planning.

The early warning system, deployed through the ClimDev-Africa Programme, a joint initiative of the African Union Commission (AUC), ECA and the African Development Bank (AfDB), operates at a much higher resolution than existing models, bringing greater precision to weather warnings and forecasts.

Africa's social and economic growth is heavily dependent on changes in weather and climate and the system has the potential to help farmers improve planning on when to prepare the land and to consider the most appropriate crops to plant based upon more precise seasonal forecasting. Humanitarian agencies can also use the data to plan for the necessary measures to support communities at risk of extreme weather events.

In Africa, climate variability has major implications for food and water security, threatens human health and puts fragile infrastructure under further strain. This is particularly true for SIDS which are highly vulnerable to extreme weather and changes in climate.

New system brings greater accuracy

Most current weather prediction systems can only model weather in sections of 50km, the new system operates at a resolution of 9 km; for the island model this is higher still, showing a 1 km resolution. Finely-tuned information on variables such as rainfall, temperature, wind and cloud cover enables forecasters to predict a high level of detail.

Until now, models with resolutions of only 50 km have been available to African national hydrological and meteorological services and research institutions. With this coarse resolution, models are unable to provide robust weather and climate information. Such broad resolution also fails to anticipate extreme weather events with devastating effects for SIDS, exacerbating the problems of these already vulnerable States.

This is the first time a model has been developed across Africa that also takes into account the unique challenges of island States and will prove an invaluable tool - in making finely-tuned data accessible to Africa's National Meteorological and Hydrological Services and; in providing researchers and climate scientists with a rich research resource.

In a recent capacity building workshop on the use and management of the new system, ACPC brought together 31 participants and experts from African SIDS, the Regional Economic Communities, ECA and partner ISOR as well as international experts from leading centres such as the Icelandic Meteorological Office, NOAA, and the University of Mexico.

Enabling African SIDS to better manage the impacts of climate variability, establishing and managing the early warning system and promoting disaster risk reduction, supports the SAMOA Pathway - Small Island Developing States Accelerated Modalities of Action - for the implementation of sustainable development and poverty eradication, an outcome of the Third International Conference on Small Island Developing States (SIDS) held in Apia, Samoa on 1-4 September 2014.

Climate variability on the rise

Climate-related disasters are increasing across the globe. The World Disasters Report 2015 found almost 107 million people are estimated to have been affected by disasters in 2014, a relative increase on the previous year. According to the report, there is little doubt that climate change will lead to an increase in the frequency and severity of hazards and the number of people exposed to them. The report also shows that in 2014, 87 per cent of disasters were climate-related, continuing a 20-year long trend of climate-related disasters outnumbering geophysical disasters in the ten most disaster-affected countries in the world1.

Figures for Africa reflect this upward trend. According to the International Disaster Database2, comparing the two periods 1981-89 and 2005-13, the number of floods increased over six times from 64 occurrences to 403 while the number of people affected increased from seven million to 29m. Those affected by droughts for the same period increased from 74 million to 116m.

According to the IPCC Special Report on Extreme Events (2013)[3], these trends are anticipated to become more frequent and intense as climate variability and change gather pace. Early warning systems are fundamental in helping to predict and manage climate-related disasters. It is vital for African countries to develop these systems to support disaster risk reduction strategies and build resilience to the negative impacts of climate variability and change.

Promising results

Feedback from the participating islands, mainland countries and regional climate centres has already been extremely positive.

In the recent case of Hurricane Fred, the system tracked the movement of the hurricane over the Cape Verde Islands and the Atlantic Ocean with a high level of accuracy. Figure 2.1 shows the eye of the storm 72 hours before it reaches the islands; the model tracks the hurricane with moderate accuracy; images captured 24 hours before the storm shown in Figure 2.2 match closely with the actual course of the hurricane. In the aftermath of Hurricane Fred, a storm track model was also configured for the region (Figure 3). The simulated maximum sea level rise caused by the storm was closely in line with the observed movement of the hurricane (Figure 4).

[1] World Disasters Report 2015, International Federation of Red Cross and Red Crescent Societies (IFRC) http://www.ifrc.org/en/publications-and-reports/world-disasters-report/

[2] http://www.emdat.be/disaster_trends/index.html

[3] Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX), Intergovernmental Panel on Climate Change http://www.ipcc-wg2.gov/SREX/

Figures 1

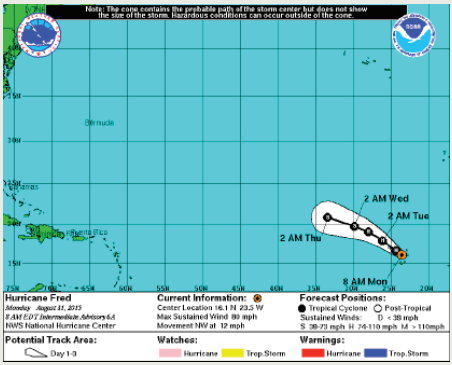


Figure 1: Tropical Storm Fred on 12 UTC, Monday 31 August, 2015 (NOAA Hurricane Center).

Figures 2.1 & 2.2: Numerical forecasts from ACPC Numerical Weather Prediction of Hurricane Fred valid on 12 UTC, Monday August 31, 2015.

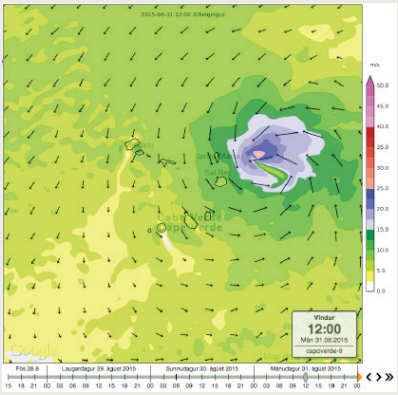


Figure 2.1 shows the areas with the storm approaching 72 hours before; the centre of the storm is located slightly further to the north compared with observations; the simulated wind speed is slightly lower than observations.

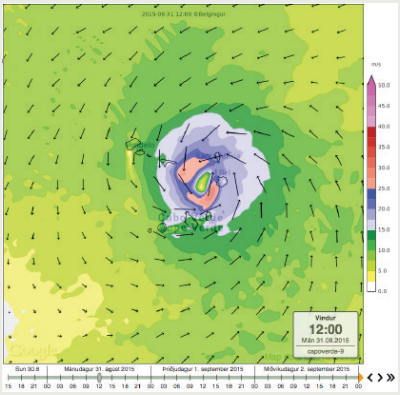
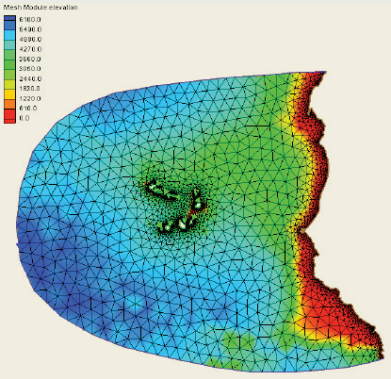


Figure 2.2 captures the same area 24 hours before the storm; the hurricane's centre and simulated winds are in close agreement with observations.

Figures 3.1 & 3.2



Figures 3.1 The ADCIRC storm surge model was installed and run for the Cape Verde islands, the model catchment was quite large (Figure 3.1).

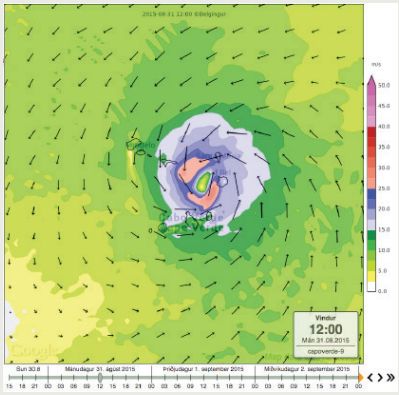


Figure 3.2 shows a zoomed-in view of the Cape Verde islands.

Figures 4

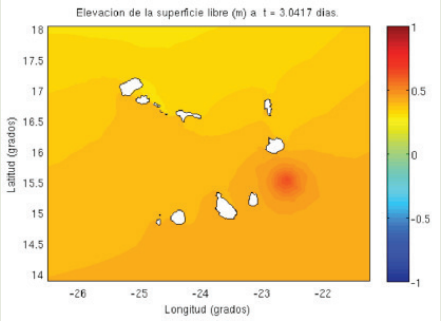


Figure 4: Simulated sea level rise caused by Hurricane Fred. The model was generated with analysis from NOAA's Global Forecasting System.

Next steps

This is the first time a model has been developed across Africa that takes into account the unique challenges of its island states.

The next stage is to produce a range of climate products and services for priority sectors which support the implementation of Africa's transformative agenda. Wind is one of the principle energy sources for the island states and has the potential to provide widespread access to safe and affordable energy. Immediate next steps will be to generate climatic wind data to advance wind energy planning, operations and management.

About ClimDev-Africa

The ClimDev-Africa Programme is an initiative of the African Union Commission (AUC), the United Nations Economic Commission for Africa (ECA) and the African Development Bank (AfDB). It is mandated at the highest level by African leaders (AU Summit of Heads of State and Government). The Programme was established to create a solid foundation for Africa's response to climate change and works closely with other African and non-African institutions and partners specialised in climate and development.

For more information, contact:

Africa Climate Policy center
United Nations Economic Commission for Africa
Menelik II Road, PO Box 3001
Addis Ababa, Ethiopia
info@climdev-africa.org
www.climdev-africa.org

Supported by:

USAID FROM THE AMERICAN PEOPLE
NDF NORDIC DEVELOPMENT FUND
DFID Department for International Development