A Regional Numerical Weather Prediction Model and its Application to Flood Forecasting in Mozambique

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After the devastating floods caused by the tropical cyclone Eline in February 2000, Mozambique decided to implement a disaster risk management (DRM) infrastructure including a cyclone warning system and an *Inter District Operational Flood Warning System* (SIDPABB). SIDPABB concentrates on flood warnings for the River Buzi in Central Mozambique and takes care of nine flood-prone regions near the river mouth. SIDPABB consists of three components, namely *measurements* (water level and 6-hourly precipitation at five sites along the river), *data analysis* at the forecasting centre in Buzi, and *local DRM committees* in the nine regions.

A regional high-resolution numerical weather prediction model like the HRM of the Deutscher Wetterdienst (DWD) is able to supply additional important information to SIDPABB in the form of three- to five-day forecasts of tropical cyclone track and associated precipitation pattern. HRM can thus provide early warnings ahead of a potential disaster. To run HRM operationally, a national meteorological service needs a *suitable computer platform*, a reliable *link to the internet* for receiving initial and lateral boundary data files which DWD extracts from analyses and forecast of its global model GME up to four times per day, and *trained staff members* to take care of the HRM model suite and derive products (e.g. graphics) for users like forecasters or DRM staff members.

In a project funded by the German “Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)” DWD helped to implement HRM as operational regional NWP model at the national meteorological service (INAM, Maputo) and train staff members in maintenance and usage of the model. To increase the sustainability of the project HRM was also implemented at the Physics Department of the university UEM in Maputo. The project which was conducted in 2008 and 2009 included an intensive two-month training of four staff members of INAM and UEM at DWD, the acquisition of high-end Linux workstations at INAM and UEM, a two-week on-site training by three German experts in Maputo and an extended four-month visit of a German diploma student (Mr. M. Christian) from the university of Bonn for supporting the usage of HRM forecasts at SIDPABB.

Finally, a research cooperation between INAM and the Brazilian national weather services INMET (National weather service in Brasilia) and DHN (Marine weather service in Niteroi near Rio de Janeiro) has been initiated by DWD and GTZ in early 2010. INMET and DHN are using HRM operationally since more than 10 years already. Since Brazil and Mozambique belong to the Portuguese speaking nations, this cooperation allows also involving staff members of INAM not trained in English. While INMET plans to improve the application of HRM forecasts in agro-meteorology, DHN will provide a wave and storm surge model (driven by HRM wind forecasts) to increase risk assessment capabilities for Mozambique’s densely populated coastal regions in case of a tropical cyclone threat.

The cooperation between INAM/UEM (Mozambique), DWD/University of Bonn (Germany) and INMET/DHN (Brazil) is an example of a successful international research and development activity, aiming at reducing the vulnerability of developing countries against natural disasters.

At more than 25 national meteorological services worldwide, the operational regional numerical weather prediction system is based on the HRM and data of the global model GME of the Deutscher Wetterdienst.