Use of satellite based observations in Continental Flood Alert System in Europe and Africa

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LISFLOOD is a semi-physical rainfall-runoff model that allows the simulation of hydrological processes in medium to large scale river basins. This model is used at the European Commission Joint Research Centre for studying floods, hydrological global changes and droughts. LISFLOOD is the basis of the European Flood Alert System (EFAS), which is a pre-operational catchment based probabilistic flood prediction system aiming at warning European partner members with a lead-time of up to 10 days. Currently, the transfer of the European system to African applications is being explored.

The system makes extensive use of satellite data for the determination of static base maps such as DEM or land use, and to deduce model parameters, e.g. slope gradient, forest fraction. The changes in leaf area index through the seasons are derived from NDVI satellite measurements and incorporated in regular intervals in the model. A study on the use of the MODIS Snow Cover Area data is currently being performed for the European system. Preliminary results show the positive impact of the data on the model discharge and snow content simulation over a European basin, allowing to determine better the onset of snowmelt floods, which are particular difficult to capture, and thus improve the skill of the forecasting system.

Possibilities of using real-time satellite-derived precipitation data for an operational pan-African flood alert system are currently investigated. Six real-time precipitation products (CMORPH 0.25°, CMORPH ∼ 8 km, PERSIANN 0.25°, PERSIANN-CCS, TRMM-TMP and RFE 2.0) are being evaluated over 3 African catchment areas by performing a statistical analysis with ground measurements and comparing the resulting hydrological calculations. The aim of this study is to identify the data set that results in the most accurate hydrological initial conditions, which are crucial for the following calculation of the flood forecast.