Geophysical Research Abstracts
Vol. 15, EGU2013-4775, 2013
EGU General Assembly 2013
© Author(s) 2013. CC Attribution 3.0 License.

Potential of high resolution satellite imagery, remote weather data and 1D hydraulic modeling to evaluate flood areas in Gonaives, Haiti

Andrea Bozza (1,2), Arnaud Durand (1), Bernard Allenbach (1), Gabriele Confortola (2), and Daniele Bocchiola (2)

(1) SERTIT, University of Strasbourg, Illkirch Graffenstaden, France (sertit@sertit.u-strasbg.fr), (2) D.I.I.A.R. - Hydrology Division, Politecnico di Milano, Milano, Italy (daniele.bocchiola@polimi.it)

We present a feasibility study to explore potential of high-resolution imagery, coupled with hydraulic flood modeling to predict flooding risks, applied to the case study of Gonaives basins (585 km^2), Haiti. We propose a methodology working at different scales, providing accurate results and a faster intervention during extreme flood events. The 'Hispaniola' island, in the Caribbean tropical zone, is often affected by extreme floods events. Floods are caused by tropical springs and hurricanes, and may lead to several damages, including cholera epidemics, as recently occurred, in the wake of the earthquake upon January 12th 2010 (magnitude 7.0). Floods studies based upon hydrological and hydraulic modeling are hampered by almost complete lack of ground data. Thenceforth, and given the noticeable cost involved in the organization of field measurement campaigns, the need for exploitation of remote sensing images data.
HEC-RAS 1D modeling is carried out under different scenarios of available Digital Elevation Models. The DEMs are generated using optical remote sensing satellite (WorldView-1) and SRTM, combined with information from an open source database (Open Street Map). We study two recent flood episodes, where flood maps from remote sensing were available. Flood extent and land use have been assessed by way of data from SPOT-5 satellite, after hurricane Jeanne in 2004 and hurricane Hanna in 2008. A semi-distributed, DEM based hydrological model is used to simulate flood flows during the hurricanes. Precipitation input is taken from daily rainfall data derived from TRMM satellite, plus proper downscaling. The hydraulic model is calibrated using floodplain friction as tuning parameters against the observed flooded area. We compare different scenarios of flood simulation, and the predictive power of model calibration. The method provide acceptable results in depicting flooded areas, especially considering the tremendous lack of ground data, and show the potential of remote sensing information in prediction of flood events in this area, for the purpose of risk assessment and land use planning, and possibly for flood forecast during extreme events.