Evaluation of a Satellite-based Near Real-time Global Flood Prediction System

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Satellite-based rainfall and geospatial datasets are potentially useful for cost effective detection and early warning of natural hazards, such as floods, specifically for regions of the world where local data are sparse or non-existent. Recently, our group has implemented an initial satellite-based near real-time global flood prediction system that is operationally available. In this system, a relatively simple hydrologic model, based on the runoff curve number (CN) and antecedent precipitation index (API) methods, transforms rainfall into runoff. Runoff is then routed grid-to-grid to estimate flow. The key input to the current system is the near real-time rainfall estimates from the NASA-based Tropical Rainfall Measuring Mission (TRMM) Multi-satellite Precipitation Analysis (TMPA; 3 hourly, 0.25x0.25 degree). In this study we will present an in-depth testing/evaluation of this current flood prediction system, discuss its strengths and limitations and point toward potential improvements necessary for increasing its near real-time global flood prediction reliability and accuracy. This evaluation study focuses on the severe flooding events and will include comparison of the current product with observed runoff and inundation data at global and watershed scale as well as with other available remotely sensed products, such as those from Dartmouth Flood Observatory. Initial evaluation suggests that current global near-real time flood predictions provide valuable information related to spatial extent and onset time of extreme flooding events. However the accuracy diminishes in tracking the later stages of the flood event. This behavior suggests that one way to improve the current system is a new (possibly finer scale) routing component. Of course, flood predictions are intimately tied to the accuracy of the satellite-based rainfall estimates. Our presentation will also compare the performance of the flood prediction system when the current version of the NASA TMPA real time satellite-based rainfall estimates are replaced by the new version, which will be available in early 2009.