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The Chennai flood (India): preliminary results using CETEMPS Hydrological Model (CHyM) stress index

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An extreme weather event hit the coastal city of Chennai, India, in November-December 2015 causing severe damage to infrastructure worth billions of dollars, people's lives and their livelihood. Nearby districts to Chennai, such as Cuddalore, Kancheepuram and Tiruvallur were also affected by rainfall over 300mm during the first week of December. This was caused by the unusual wind surges in the troposphere providing favorable environmental conditions for the extensive rainfall and the formation of a deep depression in the Bay of Bengal on 30 November 2015, which was blocked by Eastern Ghats that inhibited the movement of the synoptic system. Electricity and telecommunication lines were suspended and some hospitals were shut down for a few days. It brought the whole city into a state of emergency and National Disaster Rescue Force were deployed in an effort to take care of the evacuation of people.

In this work, we present the estimation of the hydrological stress caused by the extreme rainfall event in Chennai and the nearby river basins during the course of this northeastern monsoon event in India. The hydrological stress is given through the application of Best Discharge based Drainage (BDD) Index, calculated by the CETEMPS Hydrological Model (CHyM). Hydrological simulation is carried out by forcing the model with the 3-hourly NASA IMERG 0.1x0.1 grid precipitation dataset. Preliminary results show a spatial coherence between the hydrological stress detected by the index and the most impacted river segments, due to heavy precipitation. The application of hydrological stress indices is helpful for forecasting fluvial floods in the river network with minimum calibration requirements, providing a useful tool for warning the respective authorities for minimal losses due to natural calamities.