Effects of Cyclone Aila Convection on Heavy Rain and Flooding in Bangladesh, Bhutan, NE-India and Nepal

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Bangladesh has been ravaged by many severe cyclonic storms with core of hurricane winds (i.e. super cyclones) namely Bakerganj Cyclone of 1876, 12 November Cyclone of 1970, 29 April Cyclone of 1991 and Sidr of 2007. Though Cyclone AILA-2009 was of moderate intensity it ravaged southwestern part of Bangladesh badly. Alongside it ravaged West Bengal of India, eastern Nepal and southern Bhutan. Due torrential rain these four countries had flooding effects. A series of heavy rainfall events caused devastating floods across portions of south central and southwest Bangladesh into Northwestern Bangladesh, Southeastern Nepal and Bhutan from May 26-27, 2009. The occurrence of both a frontal and mesoscale flash flood pattern and the entrainment of tropical moisture from weastern Bay of Bengal (BoB) combined to produce the heavy rainfall. Tropical moisture from weastern BoB combined to produce the heavy rainfall. The wet spell episode persisted over a two day period. An extensive area with storm totals of 25 to 50 mm rainfall stretched from southwest Bangladesh into southeastern Nepal and Bhutan. There were isolated pockets with storm totals in excess of 50 mm. This is a case study examining the meso-scale, upper air and hydro-logic aspects which led to the prolonged heavy rain and flood episode. Advanced Research WRF (ARW) Model with horizontal resolution of 9 km x 9 km, 50s time step and 27 vertical levels has been used to simulate the nature of Cyclone AILA and its associated wind, rainfall etc. Six hourly Final Reanalysis (FNL) data of National Centers for Environmental Prediction (NCEP) were used as input to WRF-ARW Model for the simulation of "AILA". The model results are compared with the TRMM, Kalpana-1 images and the India Meteorological Department (IMD) predicted results. Further, the intensity of the events, generated from the simulations is also compared with the national meteorology predictions in order to evaluate the model performance. Grid Analysis and Display System (GrADS) and GMT (Generic Mapping Tool) softwares have been employed for visualization. The results obtained from the model are in good agreement with the reported data.

Keywords: simulation, visualization, scenario, Advanced Research WRF (ARW) Model, Final Analysis (FNL), TRMM, Kalpana-1.