High Resolution Prediction of Tropical Cyclone 'Nargis'

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Cyclone 'Nargis' was a strong tropical cyclone that made landfall on Myanmar (also known as Burma) in May 2008, causing catastrophic destruction and at least 22,000 fatalities. It developed on April 27 in the central Bay of Bengal. Initially it tracked slowly northwestward, and encountering favorable conditions it quickly strengthened. Dry air weakened the cyclone on April 29, though after beginning a steady eastward motion Nargis rapidly intensified to attain peak winds of at least 165 km/h (105 mph) on May 2. The cyclone moved ashore in the Ayeyarwady Division of Myanmar near peak intensity, and after passing near the major city of Yangon (Rangoon), the storm gradually weakened until dissipating near the border of Myanmar and Thailand.

In this paper the cyclone ‘Nargis’ is studied using the Weather Research and Forecasting (WRF-ARW) Model forecasts. The operational WRF2.2 model forecasts are used to study the predicted track and intensity of the cyclone vis-à-vis the operational global model predictions of NCMRWF the T254L64 model. This is followed by experiments with enhanced horizontal resolution using a nested domain of 9 km grid increment for a detailed study of the cyclone structure. The T254L64 model captures the broad circulation and genesis in the initial analysis (though intensification is poor compared to observations) and develops the system into a well organized cyclone and takes it close to the Myanmar coast in the Day-3 and Day-5 forecasts. The WRF model predicts strong intensification despite poor initialization. Experiments with WRF 9km nested runs with two-way interaction gives strong intensification at the time when cyclone is close to the observed landfall point. The 9km WRF runs show that the cyclone featured a moderate diameter eye wall, with diameter increasing with height. The cyclone is characterized by warm core as seen by the temperature cross section. The mean vertical circulation consists of inflow below 900 hPa and out flow between 700 - 100 hPa. The strong updrafts occur in the eye walls, which is also a region of strong convection and rainfall. The θ_e in the eye wall is relatively high; this is due to convection, which transports high θ_e in the boundary layer upward. The eye region features warm, dry downdrafts of moderate strength typical of strong cyclones.