Statement of Research Interest

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During M.Tech project work[1] titled "*Multisatellite Observations of Indian Ocean Tropical Cyclones*" I carried out the analysis of INSAT (Indian Geostationary Satellite), DMSP and TRMM satellite observations. This thesis work focused on the study of the structural and evolutionary features of Indian Ocean (IO) tropical cyclones (TC), their diurnal variability, identification of lead parameters for intensification and fixing their center using TMI data. This work was extended for several cyclones over the Indian Seas.

Out of the work pursued after my thesis work, one of the results[2] that interested me was the relationship between the fraction of deep convection and the intensificaton potential of cyclones over IO. For this, observations from TRMM (Tropical Rainfall Measuring Mission) Microwave Imager (TMI) have been analysed for 18 tropical cyclones and depressions over Indian Ocean. Polarization Corrected Temperatures (PCT) of 85 GHz was used to define the convective elements within the tropical storms. Our analysis indicates that the relative population of convective elements is crucial to the intensification of tropical storms. As compared to the intense stage, the areal extent of convective pixels was seen to reduce significantly for systems decaying from intense to depression stage. For decaying depressions this area was even smaller. Also, during the developing and decaying stages, the convective elements show a larger spatial variability compared to mature stage of tropical cyclones. I would like to pursue this aspect of tropical cyclones in my future studies.

Specifically I am interested in the following:

1. It is apparent from our analysis of TMI and PR data that at the time of landfall, there is a sudden and significant growth of some individual deep convective cells that belong to the portion of cyclone lying over the land. The vertical extent and rainfall potential of such cells is significantly larger than those over the ocean. My interest is to analyze the factors leading to this anomalous land convection both observationally and numerically. Besides understanding the impact of the factors like low-level wind shear, land orography and friction, I am also interested to investigate whether the diurnal element (i.e noon v/s night) also plays a role in such growth.

2. I would also like to do some modeling studies using high-resolution regional models like MM5 to understand the impact of orography and other boundary parameters on the growth of land convection during the landfall of cyclone. Sensitivity tests will be carried out to study the impact of model resolution, and surface properties on the simulation of intense land convection.

3. Identification of convective features and major cloud types in VIS/IR images using combined analysis of TMI/VIRS data. My main objective is to use the result of such analysis in studying the life cycle of convective features using geostationary satellite data available at higher temporal resolution (~ 30 min)

4. Assimilation of satellite data such as QSCAT Winds, Rain, PW in the mesoscale model (MM5) for the study of intensity and track prediction of Indian Ocean tropical cyclones.

References:

1. Mtech Thesis : Multisatellite Observations of Indian Ocean Tropical Cyclones

2. observations of Indian Ocean Tropical Cyclones by 85 GHz Channel of TRMM Microwave Imager (TMI)