Impact Of The High-Resolution TRMM Observation On Tropical Cyclone Analysis And Numerical Weather Prediction

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With its unmistakable spiral shape and central eye, the tropical cyclone (TC), including hurricanes and typhoons, is the most memorable feature over the ocean, because of its dangerous strong winds and floods that pose threat at landfall and inland. Several international activities have pioneered the development and application of contemporary techniques for the specification of surface winds and ocean response in tropical cyclones. The methods are refined, upgraded, and applied in hindcast studies to develop definitive extreme ocean response criteria for design of offshore and coastal structures. A hallmark of these endeavors is the meticulous efforts directed towards specification of the time and space evolution of sea surface wind field in cyclones utilizing both in-situ and satellite data. Surface observations over the vast waters are extremely sparse, limited to a few island stations and a ship report. Occasionally, reconnaissance aircraft fill some of this void, but this resource is expensive. With the advent of remote sensing, the detection, tracking and observation of the inner-core convective activities of the storm are made possible. On-board the low inclination Tropical Rainfall Measuring mission (TRMM) is a TC package that includes a passive microwave sensor (TMI), a rain radar (PR), Lightening Imaging Sensor (LIS) and a visible infrared scanner (VIRS). The intent of this article is to demonstrate how this suite of sensors contribute and offer unique observations of tropical cyclones, impact on numerical weather forecast and the overriding consideration in emergency response and disaster management. Specific validation results from various research agencies are briefly presented here-in.

Keywords: Tropical Cyclone, TRMM Microwave Imager , Rain Radar, Visible-Infrared Scanner, eye- wall.