

SSMIS Cloudy Radiance Assimilation for Studying Hurricanes

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Satellite radiance measurements under cloudy conditions contain crucial information on the associated weather systems, especially severe storms such as hurricanes. For instance, the brightness temperature images at the 54.4 GHz channel of the Special Sensor Microwave Imager/Sounder (SSMIS) clearly shows the warm core inside of hurricanes, a typical temperature structure in such storms due to huge release of latent heat from the warm and moist inflow near the surface to form clouds and precipitation during the upward movement. Thus, efforts have been made at the US Joint Center for Satellite Data Assimilation (JCSDA) to utilize cloudy radiances in the data assimilation system equipped with a newly developed community radiative transfer model (CRTM), able to handle absorption and multiple scatterings by clouds. In this presentation, we present results from a case study for the assimilation of SSMIS radiance measurements during hurricane Katrina in 2005. The global fields of geophysical parameters are first interpolated at the grid points of Weather Research and Forecasting Modeling System (WRF) and then as an input for NCEP Gridpoint Statistical Interpolation system (GSI). Radiances from SSMIS are utilized in the GSI system. The temperature and water vapor fields as well as the cloud parameters are obtained in the data assimilation. The improved initial temperature field can be applied to obtain the pertinent three-dimensional rotational winds using the (gradient) balance equation.