

A Generalized Approach to Microwave Satellite Data Assimilation Quality Control and Preprocessing

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We present recent efforts supported by the Joint Center for Satellite Data Assimilation (JCSDA) to advance and increase passive microwave satellite observations assimilated within the GSI analysis system used to initialize both the Global Forecast System (GFS) model and regional Hurricane WRF (HWRF) model at the National Oceanic and Atmospheric Administration (NOAA). Specifically, the use of a 1d-variational (1dvar) preprocessor within the GSI will be discussed. The 1dvar preprocessor is applicable to current and future microwave satellite sounders and imagers including those from POES and MetOp AMSU-A and MHS, NPP/JPSS ATMS, DMSP F16-F20 SSMI/S, GCOM-W AMSR2, TRMM/TMI and GPM GMI. The capability of the 1dvar preprocessor (which applies over all-surfaces and in all-weather conditions) includes increased quality control of the microwave radiances to be assimilated, provides dynamic surface emissivity over all surfaces therefore allowing the extension of the microwave data assimilation coverage, and cloudy and rainy data assimilation through providing hydrometeor (cloud, rain, ice) information to the assimilation system. This 1dvar preprocessing increases the number and types of observations that can be assimilated. The information provided by the 1dvar preprocessor will help with the assimilation of surface sensitive channels over non-ocean surfaces as well as cloudy and rainy radiance assimilation. Advancement in the assimilation of these types of observations should have significant positive impact on both global NWP forecast and regional NWP along with tropical cyclone track and intensity forecasts. Current status of the implementation of the 1dvar preprocessor in the GSI will be shown, along with examples and benefits from the quality control information it may provide, followed by discussion of its overall utility in data assimilation.