CLOUD ANALYSIS FOR THE MAPS/RUC SYSTEM

Stanley G. Benjamin, Dongsoo Kim, John M. Brown, **Dezso Devenyi**
NOAA Forecast Systems Laboratory
325 Broadway, Boulder, CO 80303 USA
devenyi@fsl.noaa.gov

Initialization of hydrometeors in numerical forecasting systems is a prerequisite for successful forecasting of different types of clouds and precipitation. The Mesoscale Analysis and Prediction System (MAPS, operationally implemented at NCEP as theRapid Update Cycle (RUC)) explicitly predicts five hydrometeor mixing ratios, cloud water, rain water, ice, snow, and graupel, using a mixed phase bulk microphysics routine developed for the NCAR/Penn State MM5 research model. In the operational RUC as of December 1998, these fields are simply cycled in the 1-h assimilation cycle to avoid spinning up cloud fields in each run. Now, a first step toward a MAPS/RUC cloud analysis is being tested in which GOES cloud-top pressures are assimilated with the 1-h explicit hydrometeor forecast. In this scheme, cloud are cleared and constructed with percentage of water/ice phases based on the same temperature saturation function used in the MM5 microphysics. Various algorithms are applied to spread cloud fields into data void regions both horizontally and vertically, and adjustments of water vapor mixing ratio are made in both cloud clearing and building. Initial forecast experiments with and without assimilation of GOES cloud-top pressures show some improvement in 6-h forecasts with GOES but, not surprisingly, areas with little effect.

Assimilated GOES cloud-top pressures were determined directly from imager data and MAPS forecast fields using an optimization technique developed by Kim originally with polar orbiter data. This cloud-top field compares well with a similar product produced from GOES sounder data, and provides better horizontal coverage and improved timeliness. The MAPS/RUC cloud analysis can use cloud-top pressures from either source.

In the presentation a description of the cloud analysis method will be given and latest test results will be presented, including results from parallel cycles with ongoing hourly assimilation of satellite cloud-top products.