MODELING SUPPORT FOR DATA ASSIMILATION

Rolf F. Hertenstein*
Tomi Vukicevic
Thomas J. Greenwald

CIRA
Colorado State University
Ft.Collins, CO 80523-1375
(970) 419-8642
herten@eimmart.cira.colostate.edu

1. OBJECTIVE

Forward model integrations using only standard initialization data are a necessary step in the development of a data assimilation system. These serve as benchmarks against which simulations using more sophisticated data assimilation techniques can be compared.

2. RESEARCH

Simulations of a widespread stratus cloud event over Texas and Oklahoma on May 2, 1996 are performed using the Regional Atmospheric Modeling System (RAMS). Sensitivities to two radiation schemes as well as two microphysical (bulk and bin) schemes were run. Results indicate that RAMS produces a stratus layer with a vertical structure similar to that observed, but the simulated cloud layer is not as horizontally extensive as that observed. Simulations were performed using only standard gridded, rawinsonde, and surface observations for model initialization.
The simulation uses 80 X 80 grid points on the 25 km coarse grid, and 120 X 160 grid points on the fine 5 km grid. The simulation runs at approximately 1.2 times real time on a cluster of nine 500 MHz processors representing about 85% efficiency.

Code was developed to perform quantitative verification between model and observed surface and rawinsonde data for available stations. Model data was interpolated to observation data locations, and in the case of surface data, model data at the lowest model level (25 m) was further reduced to 2m for temperature and humidity, and 10m for winds. Verification was calculated at the initial time as well as every 6 hours for surface data, and 12 hours for rawinsonde data. Various model vs. observation differences and statistics are being calculated. Rawinsonde data was compared for all levels up to 150 mb.

3. CONCLUSIONS

Preliminary analyses have been performed for the bulk microphysical simulation. Fine grid spacing of 5 km necessarily limits the simulation domain, and thus, the number of observations available for comparison. The fine-grid domain contains 10 surface observation stations. Results show an average difference between model and surface observation temperature of approximately -2C, i.e., the model is on average too cool. Differences range from almost zero to a maximum of approximately –7C in a part of the model domain with clear-sky conditions. Results for dew-point temperature average about -1.5C, i.e., the model is too dry. Four rawindsonde stations exist within the fine-grid domain. Agreement is good between model and observations, with an average difference for each column between 0.08 and 0.3C. Individual levels differed by as much as 3C.

Results to date indicate that the model simulation was credible. Further analysis will be presented during the conference.

4. ACKNOWLEGMENTS

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