

For WMO Data Assimilation Symposium:

A Multigrid Technique in Advanced Data Assimilation

Yuanfu Xie¹, Alexander E. MacDonald, and Zoltan Toth
Earth System Research Laboratory, NOAA, Boulder, CO

ABSTRACT

Advanced data assimilation schemes combine information from various sources of observations, and background forecasts with knowledge about the dynamics of the systems analyzed. Modern numerical techniques are used to optimize the quality of the analysis and the efficiency of the computations. Multigrid techniques, for decades used successfully in solving numerical partial differential equations, provide an ideal platform for the advanced data assimilation systems. In this presentation, we will highlight a number of contributions multigrid techniques offer in advanced data assimilation applications, including a) use of ensemble-derived covariances in 3/4DVAR; b) improved ensemble localization; c) multiscale 4DVAR; d) computational efficiency. Some of the advantages of the multigrid techniques in data assimilation will be demonstrated through numerical experiments. A plan for a hybrid multi-scale data assimilation system for a Non-hydrostatic Icosahedral grid Model (NIM) will also be discussed.

¹ *Corresponding author contact information: Dr. Yuanfu Xie, NOAA/ESRL/GSD/FAB, 325 S. Broadway, CO.
Email: Yuanfu.Xie@noaa.gov*