

# Multigrid Methods for the Variational Data Assimilation

Youn-Hee Kang<sup>1</sup>, Do Young Kwak<sup>2</sup> and Kyungjeen Park<sup>3</sup>

1) *Numerical Model Development Division, Korea Meteorological Administration, Seoul, KOREA*

2) *Department of Mathematical Science, Korea Advanced Institute of Science and Technology, Daejeon, KOREA*

3) *Numerical Data Application Division, Korea Meteorological Administration, Seoul, KOREA*

Corresponding Author : Youn-Hee Kang, kyh80@korea.kr

## ABSTRACT

There are two necessary conditions to solve Numerical Weather Prediction models, initial and boundary conditions. Especially, the initial condition has an important bearing on the model performance. To get a good initial condition, many data assimilation techniques have been developed for meteorology and oceanography. Currently, the most commonly used for operational applications are 3 or 4 dimensional variational data assimilation methods. In this study, we introduced a multigrid method for the minimization process in data assimilation by interpreting the minimization process as a numerical PDE discretized by the cell centered finite difference (CCFD). We perform some numerical experiments by the multigrid method to compare the iteration number and analysis fields with conjugate gradient method.

## REFERENCES

1. Baker, D.M., Huang, Y.-R., Guo, A., Bourgeois and Q.Xiao, "A three-dimensional variational data assimilation system for use with MM5: Implementation and initial results", *Mon. Wea. Rev.*, Vol. 132, 2003, pp. 897-914.
2. Do Y., Kwak, "V-cycle multigrid for cell-centered finite differences", *SIAM J. Scientific Computing*, Vol. 21 no 2, 1999, pp. 552-564.