

New Mathematical Methods for Variational Objective Analysis
Grace Wahba and Donald R. Johnson
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The overall objective of the work is to develop and test some new mathematical methods for variational objective analysis of meteorological information, which include provision for simultaneous analysis of data from different observational systems and the direct merging of satellite and radiosonde data using tropopause/inversion height.

We wish to continue to develop theory for the dynamic estimation of relative weights to be given to forecasts and observations from heterogeneous observing systems. A pilot simulation study of certain of the methods in realistic simulated examples involving observations and forecast of the 500 mb height, has been completed. We will prepare the results for publication during the proposed funding increment.

We will continue our work on multiple smoothing and tuning parameters and accuracy estimates in the problem of assimilation of diverse sources of information in NWP. It is anticipated that some results on identifiability of certain weighting and tuning parameters will be prepared for publication. We will continue our study of the "partial spline" method of inclusion of non-smooth and other special types of information (noted in Section 3 of reference [1]), with special emphasis on accuracy estimates.

References

- [1] G. Wahba, D. R. Johnson, and F. Reames. Multiple smoothing and weighting parameters in direct variational methods for objective analysis of meteorological information. In F.-X. LeDimet and O. Talagrand, editors, *Assimilation of Observations in Meteorology and Oceanography*, pages 448-453. Proceedings of the International Symposium, World Meteorological Organization, Clermont-Ferrand, France, 1990.