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Chapter VII

Modification of a Successive Corrections Objective Analysis
for Improved Derivative Calculations

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Abstract

The use of objectively analyzed fields of meteorological data for complex diagnostic studies and for the initialization of numerical prediction models places the requirements upon the objective method that derivatives of the gridded fields be accurate and free from interpolation error. A modification of an objective analysis developed by Barnes provides improvements in analyses of both the field and its derivatives. Theoretical comparisons, comparisons between analyses of analytical monochromatic waves, and

comparisons between analyses of actual weather data are used to show the potential of the new method. The new method restores more of the amplitudes of desired wavelengths while simultaneously filtering more of the amplitudes of undesired wavelengths. These results also hold for the first and second derivatives calculated from the gridded fields. Greatest improvements were for the Laplacians of the height field; the new method reduced the variance of undesirable very short wavelengths by 72 percent. Other improvements were found in the divergence of the gridded wind field and near the boundaries of the field of data.

REFERENCE

Achtemeier, G. L., 1989: Modification of a Successive Corrections Objective Analysis for Improved Higher Order Calculations. Mon. Wea. Rev., 117, 78-86.