

Improving the simultaneous application of the DSN-PC and NOAA GFS datasets

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Abstract

Our surface-based sensor network, called Distributed Sensor Network for Prediction Calculations (DSN-PC) obviously has limitations in terms of vertical atmospheric data. While efforts are being made to approximate these upper-air parameters from surface-level, as a first step it was necessary to test the network's capability of making distributed computations by applying a hybrid approach. This means we used public databases like NOAA Global Forecast System (GFS) and the initial values for the 2-dimensional computational grid were produced by using both DSN-PC measurements and NOAA GFS data. However, though the latter consists of assimilated and initialized (smoothed) data the stations of the DSN-PC network provide raw measurements which can cause numerical instability due to measurement errors or local weather phenomena. Therefore it was necessary to apply 2D smoothing algorithms on the initial conditions so that we are able to directly integrate DSN-PC data into the computational grid. In this paper we present the methods for smoothing our data and the results of the weather prediction calculations.

Keywords: sensor network, distributed computing, weather prediction, data assimilation, data smoothing