Adaptive targeting of wind observations: the climate research and weather forecasting perspectives

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Abstract

Results from field experiments and Observing System Experiments are demonstrating the value of targeting specific areas with high-resolution temperature, moisture and wind observations. Such targeting is predicated on the assumption that high-resolution coverage is not economically or even technically desirable on a continuous and global basis. As a result, adaptive targeting strategies are being developed and evaluated with most of these strategies using model ensemble statistics to identify regions where observations would make the greatest impact on weather forecasts. This paper will summarize the results of several efforts to demonstrate the potential impact of targeted observations taken with dropsondes.

As we look forward to the provision of global wind observations by space-based lidars, several issues related to adaptive targeting need to be examined. The most obvious issue is obtaining a description of the targeted areas, their size, persistence, number of targets per day, etc. We will report on the ongoing effort at NOAA/NCEP to produce such a target climatology.

Perhaps a more fundamental issue can be phrased in the form of a question: How would climate research goals be impacted by an observation strategy that is designed to use a space-based wind sounder primarily to obtain better initial conditions for forecast models? Clearly the argument that whatever improves the analyses used by forecast models is good for climate studies needs careful evaluation. If monthly mean meridional flows are to be used as constraints by or inputs to climate models, then targeting observations primarily in the mid-latitudes will certainly not provide the winds in the tropics, an area where the direct observation of the wind field is most critical. This paper will discuss several observational strategies that may meet both climate research and operational meteorological data needs.