



Assessing Impact of Target Observations in the Presence of Satellite Observations for Snowstorm Prediction

K. Park, X. Zou, and Y. Wu

Department of Meteorology, Florida State University (zou@met.fsu.edu,
fax:001-850-6449642)

The snowstorm case that occurred during 5-6 December 2003 and was observed during the North Atlantic THORPEX Regional Campaign (TReC) is studied in order to evaluate the impact of targeting observations to snowstorm forecast with and without satellite observations. The Penn State/NCAR mesoscale model version 5 (MM5) and its adjoint modeling system are used for sensitivity and data assimilation studies. A control forecast is carried out with model initial conditions derived from the NCEP large-scale analysis at 15 UTC 04 December 2003. It is found that the large scale flow patterns, such as the surface low pressure systems and the upper-level trough over the north America, are well simulated. However, it fails to capture detailed structure of the two low-pressure systems, as well as the exact location and the intensity of the snowstorm. Compared to observations, the low pressure system over the Atlantic Ocean is too strong, while the second low pressure system originated from the Gulf of Mexico is too weak. Most of the heavier precipitation in the model is located east of where it is observed. Thus the snowfall/precipitation over the northeast part of the United States has lessened. Moreover, the upper trough, which is forecasted to be over the Ohio Valley, is located to the west of and is not as sharp as the observed one. As a result, the snowfall/precipitation fails to reach New Jersey, New York, Connecticut, Massachusetts and New Hampshire after 06 UTC 06 December.

Many different types of observations were made available before, during and after the snowstorm through TReC. These include temperature, humidity and wind profiles from the targeting airborne AMDAR soundings, ship/mobile radiosonde, and balloon carried dropsondes. Satellite observations, such as water vapor, wind vectors, tem-

perature, humidity and total column ozone, were also available for the study of the snowstorm. A subset of observations is selected for data assimilation based on results from a set of adjoint sensitivity experiments. Results of the assimilation of TreC target observations with and without satellite observations and the forecast impact of TReC data for snowstorm prediction will be presented at the conference.