Evaluation of the impact of different observations on forecasting a cold-air-damming event using the NCAR-DART system
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Motivation
The NCAR DART (Data Assimilation Research Testbed) modeling system contains a suite of Ensemble Kalman Filter (EnKF) approaches and interfaces to several research and operational models (Anderson et al., 2009, BAMS). In this study, DART is employed for a cold air damming (CAD) event to
1) study the capability of DART for real-time data assimilation and forecast,
2) investigate the impact of assimilation of observations of different platforms and different variables with DART, and
3) test the impact of inflation factors.

Case, model and data
A CAD event occurred in the northeastern states during 11 – 14 February 2008 was simulated at 6 hour cycles intervals and 24 hour forecasts in each cycle. DART EnKF (Ensemble Adjustment Kalman Filter) and WRF V3 were employed. The datasets evaluated include surface data, radiosondes, satellite winds, wind profiler data, and ACARS. All verification statistics were computed against radiosonde observations by interpolated the model to the observation locations.

Impacts of assimilating different observations
Further tests with assimilation of temperature only or wind only show that the results from assimilating temperature only are better than those of using wind only (Figs. 4-5).

Temperature vs. wind
Impacts of assimilation of different observations for domain and time average are given in Fig. 6. The results using radiosondes are the best.

Adaptive inflation factor
The NCAR DART (Data Assimilation Research Testbed) modeling system contains a suite of Ensemble Kalman Filter (EnKF) approaches and interfaces to several research and operational models (Anderson et al., 2009, BAMS). In this study, DART is employed for a cold air damming (CAD) event to
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2) investigate the impact of assimilation of observations of different platforms and different variables with DART, and
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Conclusions
1) DART assimilates different observations reasonably well and the result indicates that the radiosonde and ACARS data are most effective. Using wind profiler and satellite winds are less effective, especially at the upper layers.
2) Using temperatures only performs better than winds only.
3) The results were unexpectedly insensitive to a large change in the inflation factors.

On-going work: Conducting more experiments and analysis to validate the above findings and understand whether they are CAD-case dependent or a DART-EnKF property.