



The impact of targeted satellite observations on weather prediction

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Observations are used in assimilation schemes to produce an estimate of the current state of the atmosphere, referred to as the analysis. This initial state is then used in a forecast model to produce a prediction of the future state of the atmosphere. Large quantities of satellite data are excluded from the assimilation process because of operational time constraints and the potential for high density observations to reduce the quality of the analysis. To retain the important observational data without significantly increasing the processing time, additional observations can be targeted in sensitive areas of the atmosphere which are influential on a regional forecast skill. The distribution of Advanced TIROS Operational Vertical Sounder (ATOVS) observations was investigated to determine the impact of targeted satellite observations on forecast skill.

Several case studies were identified and the sensitive regions were targeted with high density ATOVS observations. Both the distribution of targeted observations at the analysis time, and the length of time for targeting observations, were investigated. The forecasts produced in the targeting experiments were compared with a control forecast produced using global high density ATOVS observations. The results indicate that a small number of targeted high density observations can produce a forecast, in the verification region, with a similar level of forecast skill as a forecast produced using global high density ATOVS.

The impact of the global density of ATOVS observations on forecast skill was also investigated. Global forecast errors were calculated over a 3 week period when different densities of ATOVS were assimilated. The results show that there was an optimal thinning distance. Below this, the forecasts were degraded because of the presence of significant observational error correlations not accounted for in the assimilation scheme.