**Investigating observational (surface and vertical profile) nudging impacts on WRF performance in predicting cloudiness in Uintah Basin – case study Jan 31- Feb 4, 2013.**

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**Abstract**

Four-dimensional data assimilation was applied in WRF model sensitivity tests to study the impact of observational nudging on model performance in simulating inversion layers in the Uintah Basin, Utah, U.S.A. in winter 2013. Our previous study showed that surface observational nudging substantially improved WRF model performance in simulating surface wind fields, correcting a 10°C warm surface temperature bias, correcting overestimation of the planetary boundary layer height (PBLH) and correcting underestimation of inversion strengths produced by regular WRF model physics without nudging. However, the combined effects of poor performance of WRF meteorological model physical parameterization schemes in simulating low clouds, and warm and moist biases in the temperature and moisture initialization and subsequent simulation fields, likely amplified the overestimation of warm clouds during inversion days when surface observational nudging was applied. In this study we will test whether nudging with vertical profiles improves model performance in simulating cloudiness in Uintah Basin.