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Benchmarking of numerical weather prediction short-range surface temperature forecasts relative to persisted observation deviations and relative to an observation-based statistical interpolation methodology.

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There are many users with needs for high-quality, high-resolution gridded analyses of surface temperature. Unfortunately, the production of unbiased surface temperature analyses is very challenging, in part because the background forecasts, commonly assumed to be unbiased, are often quite biased. In the absence of a rich network of observations, the analysis will be contaminated by this background forecast bias.

A common rule-of-thumb for making a short-term forecast is to persist the anomaly relative to climatology. If the current condition is 5C warmer than climatology, it is reasonable to assume that the next hour's condition will be 5C warmer than climatology, here assuming that the temperature climatology varies from hour to hour and day to day. This then suggests that for rapidly updating data assimilation systems such as those used to generate hourly analyses of surface temperature, a useful benchmark may be to compare the 1-hour numerical forecasts to a statistical forecast generated by persisting a deviation from climatology.

In this talk we present the benchmarking of short-range numerical forecasts against persisted observation deviations from climatology and against a statistically generated gridded "forecast." To generate a benchmark statistical forecast we utilize data assimilation concepts. The background is a high-resolution, day-of-year and time-of-day dependent climatology appropriate for the next hour, and this is updated by observation deviations with respect to the observation climatology from the current hour in question. The assimilation methodology is an optimal interpolation scheme. The background-error covariance model is defined objectively, and accounts for account horizontal distance between grid point and observation location, vertical distance, and similarity of coastal proximity. These three factors to a covariance model with significant anisotropies.

At the conference, the results from these benchmarks will be presented. The strong performance of the benchmark may have implications for how surface data assimilation is best performed in the future, and these will be discussed as well.