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An analysis system for production of globally complete daily air temperature analyses for the EUSTACE project

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A new observational analysis system will be presented for merging a variety of in situ and satellite observation sources into a globally complete air temperature analysis. The system will form part of the EUSTACE processing system, which will produce daily, global analyses of near surface air temperatures since the mid 19th century at 0.25 degree spatial resolution.

The analysis approach decomposes observed temperatures into variability at different spatial and temporal scales, including model components for estimation of temperature climatologies, large-scale variability and daily resolution analyses. Each of these components is estimated using modern computationally efficient geostatistical methods (Lindgren et al., 2011). Observational uncertainty is accounted for in the analysis scheme, including uncertainty arising from of systematic biases in input observations. Together these features will permit quantification of uncertainty in daily temperature fields and in long term changes.

Examples of application of the analysis system will be presented. These will use in situ air temperature observations together with satellite derived air temperature retrievals over land, sea and ice that have been developed within the EUSTACE project (www.eustaceproject.eu).

Lindgren, F., Rue, H. and Lindström, J. (2011), An explicit link between Gaussian fields and Gaussian Markov random fields: the stochastic partial differential equation approach. Journal of the Royal Statistical Society: Series B (Statistical Methodology), 73: 423–498. doi:10.1111/j.1467-9868.2011.00777.x