



Variational Bias Correction for Radiosonde Wind Direction Bias

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Bias correction of conventional observation data is an important task to achieve homogeneous time series usable for climate studies. Climate studies normally apply homogenization methods on the whole time series. This is only possible for past records and cannot be applied to the input data of current NWP models. Therefore another bias correction is needed.

The European Centre of Medium-Range Weather Forecast (ECMWF) has developed a variational bias correction system (VarBC, Dee and Uppala, 2009) that adjusts incoming observations within the data assimilation system. VarBC is so far used for incoming satellite data and a system for aircraft data is under development.

In cooperation with ECMWF the existing VarBC system is adapted for conventional observations. Radiosonde wind direction was chosen as first candidate for homogenization. There is no indication that systematic wind direction biases might origin from a model bias therefore an existing bias has its origin in the observations. Gruber and Haimberger (2008) found systematic radiosonde wind direction biases due to wrong north alignment of the observing stations. These biases are constant throughout the whole vertical wind profile and should be reliably adjustable within VarBC.

Further plans are to extend the system for radiosonde temperatures. One of the interesting tasks will be to assess the impact of anchoring observations when applying VarBC to radiosonde temperatures. This is especially important for reanalysis and climate studies. Possible options are a subset of high quality radiosonde observations or using the GPS radio occultation data set (at least from 2001 onwards).

Details of implementation and first results will be presented.

D. P. Dee and S. Uppala, 2009: Variational bias correction of satellite radiance data in the ERA-Interim reanalysis, *Q. J. R. Meteorol. Soc.* 135: 1830–1841

C. Gruber and L. Haimberger, 2008: On the homogeneity of radiosonde wind time series, *Met. Zeitschrift*, Vol. 17, 5: 631-641