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On the impact of inhomogeneities in meteorological data on VLBI data analysis

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In this study, the issue of the quality of meteorological data employed for VLBI data analysis is addressed. Traditionally, ambient barometric pressure and temperature values are used to model the hydrostatic component of the neutral atmospheric propagation delay and the thermal deformation of antennas, in VLBI data analysis. Unlike the other microwave-based space geodetic techniques currently contributing to the TRF, where the necessary meteorological data are customarily acquired by either empirical or numerical weather models, VLBI analysis has the advantage that the aforementioned nuisance effects can be potentially eliminated more effectively employing in situ meteorological data. Nevertheless, there are cases where erroneous meteorological records yield unacceptable products which have a dubious traceability. For instance, if the recorded pressure series at a certain site has a significant positive bias with respect to the actual one, negative zenith wet delays will indicate a serious problem. Should the bias be anything but like this, its detection will be challenging and it will contaminate the geodetic products of the site and potentially at other sites participating in the same session. In the long term, such biases will affect the scale of the estimated TRF.

We establish a service for the online detection and correction of inhomogeneities in recorded meteorological data at the VLBI sites. Employing the homogenized data set, the “IVS Rapid Tropospheric Combination Center” is re-launched providing zenith total and wet delays, as well as linear horizontal gradients.

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