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Calibrating the Tropospheric Delays of VLBI Observations using Numerical Weather Prediction Models

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The observations of geodetic Very Long Baseline Interferometry (VLBI) are affected by the troposphere, and this effect needs to be considered in the VLBI data analysis. The normal way of doing this is to estimate the zenith tropospheric delays and tropospheric gradients as additional parameter in the analysis. However, due to the poor geometric distributions of the observations in some VLBI sessions, like the Intensives, the tropospheric parameters cannot be estimated with a high accuracy. An alternative is to use external information on the tropospheric delay from Numerical Weather Prediction Models (NWM). Due to the increasing accuracy of the NWM, this alternative is becoming more and more interesting. In this work, we use tropospheric delays from the fifth ECMWF reanalysis, ERA5, in the analysis of VLBI data and evaluate the impacts on the results. We study the impact of different types of VLBI sessions, like Intensives, local networks, and global networks. The results of this study will show to what extent ERA5 data can be used to correct the tropospheric delays in geodetic VLBI. Furthermore, the results also give information on the accuracy of the tropospheric delays from NWM.