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Ray-traced tropospheric slant delays from numerical weather models in VLBI analysis

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Tropospheric propagation is a major source of error in the analysis of observations from space geodetic techniques, such as Very Long Baseline Interferometry (VLBI). Nowadays, numerical weather models (NWM) provide valuable datasets for atmospheric research which can also be used for ray-tracing to derive slant delays for the observations in the neutral atmosphere, i.e. mainly in the troposphere. We discuss different approaches of deriving those slant delays of radio signals from data of the European Centre for Medium-range Weather Forecasts (ECMWF). For example, we use different interpolation and extrapolation methods, as well as different horizontal and vertical resolutions of the datasets, and we apply different assumptions like the refractivity coefficients or the Earth radius. Finally, we show results for a two-week campaign of continuous VLBI sessions in 2008 (CONT08), where we applied ray-traced delays to the observed delays and analyzed the repeatability of baseline lengths. If no additional gradients are estimated we find a clear improvement with respect to the results from the classical approach using mapping functions. Furthermore, we compare zenith delays and gradients as derived from NWM and space geodetic techniques during CONT08.