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Tidal displacement and loading effects in VLBI analysis

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State-of-the-art Very Long Baseline Interferometry (VLBI) analysis determines relative positions of radio telescopes with an accuracy of a few millimetres. For achieving this accuracy it is essential to have adequate models for describing periodic deformations of the Earth's surface which can reach up to tens of centimetres. The crustal deformation is fully projected in the local site displacement vector between each two antennas. The largest variation in the station coordinates is caused by lunisolar tidal forces, ocean tidal loading, and atmospheric pressure loading. In this work we present the application of the correction models in the VLBI software package OCCAM, which is used for VLBI data analysis by several institutes. Site displacement caused by solid Earth tides is modelled according to the International Earth rotation and Reference systems Service (IERS) Conventions 2003, ocean tidal loading corrections are computed with 11 tidal constituents, and atmospheric loading is modelled with two tidal waves, S1 and S2, and the significantly bigger non-tidal contribution. The temporal variation of the displacement effects is shown for selected VLBI antennas during the continuous VLBI campaign CONT05. We also show the capability of VLBI to validate theoretical parameters in the solid Earth tide displacement model. VLBI allows the estimation of complex Love and Shida numbers whose effective values are dependent on frequency of the tidal wave and on station latitude.