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Tidal atmospheric and ocean loading in VLBI analysis

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In VLBI (Very Long Baseline Interferometry) analysis, reductions for tidal atmospheric and ocean loading are commonly used according to the IERS Conventions. In this presentation we examine such loading corrections from contemporary geophysical models within routine VLBI processing and discuss the internal consistency of the applied corrections for various effects. In detail, two gravitational ocean tide models, FES2004 and the recent FES2012 atlas with a much finer horizontal resolution and an improved description of hydrodynamic processes, are employed. Moreover, the contribution of atmospheric tidal loading is also re-considered based on data taken from two providers of station displacements, Goddard Space Flight Center and the TU Wien group. Those two models differ in terms of the underlying meteorological data, which can be a reason for inconsistency of VLBI reductions and may lead to systematics in the VLBI products at tidal frequencies. We validate this assumption in terms of Earth rotation parameters, by a tidal analysis of diurnal and semi-diurnal universal time and semi-diurnal polar motion variations as determined with the Vienna VLBI Software. Applying the loading models in a consistent way still leads to unexplained residuals at about 4-5 μas in the diurnal polar motion band, thus limiting the possibility of assessing geophysical models at this particular frequency.