



Non-linear station motions in the DGFI realization of the ITRF2014

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The DGFI Terrestrial Reference Frame DTRF2014 is the most recent realization of the International Terrestrial Reference System computed by DGFI-TUM. It comprises 3-dimensional station coordinates and velocities which are estimated in a common adjustment together with Earth orientation parameters (EOP). The input data for the DTRF2014 are observations of the four fundamental space geodetic techniques (GNSS, VLBI, SLR and DORIS) from 1979 until 2015 as well as terrestrial difference vectors (local ties) between the technique-specific reference points.

In previous ITRS realizations, the motions of the crust-fixed reference points were approximated through linear velocities. Un-modeled and/or residual non-linear station motions were neglected and, therefore, deteriorated station coordinates, velocities as well as commonly adjusted EOP. For the DTRF2014, geophysical non-tidal loading corrections provided by the IERS Global Geophysical Fluids Center (IERS-GGFC) which account for atmospheric and hydrological effects were considered.

In this study, we present the strategy to apply non-tidal loading corrections at the normal equation level of the Gauss-Markov model. We compare DTRF2014 solutions with and without non-tidal loading corrections and investigate their impact on TRF parameters (station coordinates, velocities, geodetic datum) and EOP. Furthermore, a validation of different DTRF2014 solutions with independent ITRS realizations computed by other institutions is shown.