Geophysical Research Abstracts
Vol. 15, EGU2013-1018, 2013
EGU General Assembly 2013

Different ITRS realizations and consequences for the terrestrial pole coordinates

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In the current ITRS realizations which are based on a combination of long time series of observations of different space geodetic techniques, the station positions are corrected for various geophysical and instrumental effects. The residual station motions are assumed to be linear. Actually, the effects are not modeled perfectly or not modeled at all (e.g. hydrological loading). This means, that the residual station motions are not linear but show non-linear signals with amplitudes of up to a few centimetres. Neglecting these non-linear motions computing a multi-year reference frame (MRF) effects on consistently estimated parameters are found.
In order to take the non-linear motions into account, an alternative parametrization of station positions is presented in this study. Therein, the station positions are estimated weekly from a combination of the geodetic space techniques GPS, VLBI and SLR. The resulting weekly reference frames are called epoch reference frames (ERF). For comparisons, based on the same input data as the ERF, a MRF is computed using the conventional approach.
In this study, the two approaches are compared and pros and cons are worked out. We show that the variation of the Center of Figure (CF) with respect to the Center of Mass (CM) of the Earth is considered in the ERF and can be computed from these frames. Additionally, we compare the terrestrial pole coordinates of both solutions. We show, to what extend the pole coordinates are affected by the non-linear motions of the individual stations and the (CF-CM) variation of the network.