A new realization of the International Terrestrial System was computed at the ITRS Combination Centre at DGFI as a contribution to ITRF2008. The solution is labelled DTRF2008. In the same way as in the DGFI computation for ITRF2005 it is based on either normal equation systems or estimated parameters derived from VLBI, SLR, GPS and DORIS observations by weekly or session-wise processing. The parameter space of the ITRS realization comprises station positions and velocities and daily resolved Earth Orientation Parameters (EOP), whereby for the first time also nutation parameters are included. The advantage of starting from time series of input data is that the temporal behaviour of geophysical parameters can be investigated to decide whether the parameters can contribute to the datum realization of the ITRF. In the same way, a standardized analysis of station position time series can be performed to detect and remove discontinuities. The advantage of including EOP in the ITRS realization is twofold: (1) the combination of the coordinates of the terrestrial pole—estimated from all contributing techniques—links the technique networks in two components of the orientation, leading to an improvement of consistency of the Terrestrial Reference Frame (TRF) and (2) in their capacity as parameters
common to all techniques, the terrestrial pole coordinates enhance the selection of local ties as they provide a measure for the consistency of the combined frame. The computation strategy of DGFI is based on the combination of normal equation systems while at the ITRS Combination Centre at IGN solutions are combined. The two independent ITRS realizations provide the possibility to assess the accuracy of ITRF by comparison of the two frames. The accuracy evaluation was done separately for the datum parameters (origin, orientation and scale) and the network geometry. The accuracy of the datum parameters, assessed from the comparison of DTRF2008 and ITRF2008, is between 2–5 mm and 0.1–0.8 mm/year depending on the technique. The network geometry (station positions and velocities) agrees within 3.2 mm and 1.0 mm/year. A comparison of DTRF2008 and ITRF2005 provides similar results for the datum parameters, but there are larger differences for the network geometry. The internal accuracy of DTRF2008—that means the level of conservation of datum information and network geometry within the combination—was derived from comparisons with the technique-only multi-year solutions. From this an internal accuracy of 0.32 mm for the VLBI up to 3.3 mm for the DORIS part of the network is found. The internal accuracy of velocities ranges from 0.05 mm/year for VLBI to 0.83 mm/year for DORIS. The internal consistency of DTRF2008 for orientation can be derived from the analysis of the terrestrial pole coordinates. It is estimated at 1.5–2.5 mm for the GPS, VLBI and SLR parts of the network. The consistency of these three and the DORIS network part is within 6.5 mm.

Stichworte: Combination of space geodetic techniques; ITRF; GPS; VLBI; SLR; DORIS; EOP; Combination on normal equation level; reference frame

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