

## **JWG 1.2.4: Evaluation of the Terrestrial Reference Frames** (joint with IERS)

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### **Terms of Reference:**

Periodically, the International Terrestrial Reference System (ITRS) combination centres (CCs) of the International Earth Rotation and Reference Systems Service (IERS), namely the Institut National de l'Information Géographique et Forestière (IGN, France), the Deutsches Geodätisches Forschungsinstitut at the Technische Universität München (DGFI-TUM, Germany) and the Jet Propulsion Laboratory, (JPL, USA), compute new realizations of the ITRS. The official realization is named International Terrestrial Reference Frame (ITRF) and is published by the IERS ITRS product centre (PC) at IGN. DGFI-TUM and JPL compute their own ITRS realizations named DTRF and JTRF, respectively. These global TRF solutions comprise accurate station positions and are obtained by a combination of individual contributions of the four space geodetic techniques DORIS (Doppler Orbitography Radiopositioning Integrated by Satellite), Global Navigation Satellite Systems (GNSS), Satellite Laser Ranging (SLR), and Very Long Baseline Interferometry (VLBI). All three solutions are based on identical input data of the Scientific Services of the International Association of Geodesy (IAG), namely the IDS, the IGS, the ILRS, and the IVS. Since each IERS ITRS CC follows its own combination strategy, each solution comprises a solution-specific array of products (e.g., station positions, velocities, post-seismic deformation models, non-tidal loading correction time series, periodic corrections). In addition to the above mentioned ITRS realizations, global technique-specific TRF solutions as well as regional densifications of the ITRF are computed by different institutions.

The ITRF is used daily by a huge number of individuals and organizations in applications such as surveying, aircraft navigation, responding to disaster emergency etc. Furthermore, the ITRF provides the fundamental basis needed for a broad variety of Earth system research applications. Examples are the determination, monitoring, and interpretation of global change phenomena on different temporal and spatial time scales (i.e. sea-level rise and ice sheet melting), of Earth Orientation and Rotation, relativity, lunar science, as well as the calibration and evaluation of ocean and ice altimetry missions. Furthermore, it is the basis for the understanding of dynamics and modelling of satellite orbits and can be used in scientific research such as plate tectonics and crustal deformation monitoring and static and time-varying gravity field modelling. In short, the ITRF serves as the backbone in geosciences.

This JWG aims at complementing the evaluation of the ITRS realizations by the IERS ITRS PC with a special focus on the intercomparison of different global TRF solutions. The assessment aims at investigating conceptual differences of the three ITRS realizations with previous realizations based on user and application requirements important for, e.g., the precise orbit determination (POD) of low-, medium- and high-Earth-orbiting satellites and the estimation of Earth Orientation Parameters (EOPs) as well as the (mean) regional/global sea level rise.

**Main objectives:**

- Intercomparison of the combination strategies followed by the IERS ITRS CCs.
- Assessment/quantification of station position time series differences between the ITRS realizations and w.r.t. geophysical models (e.g., loading displacements).
- Promotion and development of alternative rigorous (and independent) methods for the intercomparison of global TRF solutions (e.g., POD of low-, medium- and high-Earth-orbiting satellites).
- Explore methods and procedures for the quality control of TRF solutions.