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International Terrestrial Reference Frame (ITRF) and global geodynamics

The International Terrestrial Reference Frame (ITRF), the most accurate global RF available today, is an Earth mass-centered reference frame that allows a precise determination of any station position as a function of time. The goal of ITRF is to determine locations and deformations with an improved precision (accuracy 0,1 mm/yr) everywhere and anytime on Earth. ITRF is constantly being updated since 1988 by the International Earth Rotation and Reference Systems Service (IERS). Four spatial geodesy techniques are used: VLBI, SLR, DORIS and GNSS. The contribution of the latter, including GPS and GLONASS, is the most fundamental. The latest RF realization , ITRF–2014, is published in 2016 and is open access. It is of great importance for actual geodynamics being used to determine the co- and post-seismic deformation (PSD), post-glacial rebound, a response of earth crust to loading, and in other applications. But the most important one for geodynamics is the scheme of site velocities. The scheme is in good accordance with the ideas of plate tectonics which were stated earlier and independently; every plate has its own array of vectors and the plates are divided by boundary zones of three types: convergent, divergent and transcurrent. The scheme shows that the boundaries may be stable or moving: convergence and divergence depend on different velocities of neibouring plates oriented either oppositely or in the same direction (one plate may advance or lag behind the another). A discrepancy of within-plate vectors may also show the weaker deformations. The scheme demonstrates a correctness of Euler's theorem, stating that plates move around rotational poles. The comparison of the scheme with time progressons of oceanic volcanic chains and stripe magnetic anomalies shows that the vectors of plate movements were rather conservative during the last 30–40 years.

Biography

Victor Puchkov Nikolaevich obtained his Science Degree and Doctor of Sciences from the Geological Institute of Russian Academy of Sciences (Moscow). During the 58 years of his scientific career he worked successively in academic and geological institutes of Syktyvkar, Ekaterinburg and Ufa (from 1991 till 2017 as the Director of the Institute of Geology in Ufa; in 2017 he was appointed a Scientific Leader of the Institute). He has published ~850 papers and books dealing mostly with different aspects of the geology of the Urals and general problems of geodynamics.

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