



Reliability of Regional and Global GNSS Network Solutions Expressed in the Global Reference Frame

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Ten years (1997-2006) of weekly GPS solutions of 205 globally distributed stations have been used to investigate the impact of the reference frame definition on the estimated station positions and velocities. For that purpose, weekly regional solutions (covering the European region) and global solutions have been respectively stacked to obtain regional and global station positions and velocities. In both cases, the estimated long-term solutions are tied to the ITRF2005 under minimal constraints using a selected set of reference stations.

Several sets of global and regional reference stations were tested to first evaluate the impact of the reference frame definition on the global and regional solutions, and later on the derived geodynamic interpretations.

This study has shown that:

- regional position solutions present biases with respect to each other or to a global solution which can reach the centimeter level. In comparison, global solutions are much more stable and agree within the 2 mm-level.
- regional velocity fields show systematic effects with respect to the global velocity field with differences reaching up to 1.3 mm/yr in the horizontal and 2.9 mm/yr in the vertical depending on the geographical extend of network and the set of regional reference stations.

In summary, we evidence the limitation of regional networks to produce reliable station positions and velocities and conclude that when geodynamics require the highest precisions for the GNSS-based velocities, a global reference frame definition should be applied.