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Station Position Time Series Obtained from Regional and Global GNSS Network Analysis

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More than ten years (1996-2008) of weekly GPS solutions of 299 globally distributed stations have been used to quantify the impact of the reference frame definition and especially the size of the network on the estimated station positions, velocities, and residual position time series.
For that purpose, weekly regional solutions (covering the European region) and global solutions have been respectively stacked to obtain regional and global station positions, velocities, and residual position time series. In both cases, the estimated long-term solutions have been tied to the ITRF2005 under minimal constraints using a selected set of reference stations. This study shows that: (1) regional position and velocity solutions can present biases with respect to each other and to global solutions, while in comparison, global solutions are much more stable; (2) the obtained residual position time series are affected by the size of the network with significantly reduced periodic signals in the regional networks, e.g. a 27% reduction of the annual signals in the height component. In summary, we will evidence the limitation of regional networks to produce reliable station positions, velocities and especially residual position time series.