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Quality assessment of GNSS reference stations: Criteria and Thresholds

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When using a network approach, expressing reliably GNSS position and velocities in a given reference frame (ITRF2014, IGS14, ...) requires the identification of 'stable' and 'rebliable' reference stations. The choice of these reference stations can have a non-negligible impact on the estimated positions and velocities and of course on the derived geodynamic interpretations.

This study will present the work done to address this issue within EUREF and help the users of the EUREF products (more specifically of the EPN multi-year position and velocity solution) to identify the best reference stations in the EUREF Permanent Network (EPN). To that aim, a new station classification was developed based on a set of criteria.

First, the **position time series** of the stations were analyzed in terms of seasonal signals and scattering.

Then, we quantified the **reliability of the velocity estimation**: The EPN multi-year position and velocity solution is estimated using CATREF software (Altamimi et al., 2007). We used more realistic velocity error estimates taking into account a temporal correlated noisederived from the Hector software (Bos et al., 2013) and compared the velocity estimates from Hector and CATREF.

Finding a suitable reference station is particularly difficult when dealing with a different period of observations compared to the reference solution. Therefore, finally, we looked for a criterion to assess the stability of the station over its full history. For this, we quantified the **velocity variability over time** of a station by comparing the velocities estimated using various time spans with velocities from the full time span of the station.

Based on those criteria, the information has been organized and thresholds have been defined in order to end up with a simple station classification, which is currently under evaluation within EUREF. Based on this classification, we also developed a web tool in order to help the user to select the best reference stations in a considered area and for a given period of observation.