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ZTD time series analysis of GNSS regional integrated networks

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Several regional GNSS networks can be used to improve the knowledge of atmosphere, with particular reference to its lower layer, the Troposphere. To reach this goal, it is necessary to have an average spacing between Permanent Stations of several tens of kilometers. To study an extended area, the integration of multiple networks framed in the global IGS network is often necessary. This integration lead to in-homogeneity issues, which can be overcome thanks to a common adjustment.
For the French-Italian border region, the GNSS data from 181 Permanent Stations (PSs), belonging to different International, National and Regional networks, have been used to estimate a set of homogeneous tropospheric parameters (ZTD, horizontal North-South and East-West tropospheric gradients) through common elaboration techniques and procedures. The elaboration of GNSS data led to the realization of a DataBase (DB; ftp://renag.unice.fr//products/GPS_climatology_Sguerso_Labbouz_Walpersdorf) of two-hourly ZTD estimates and couples of N-S and E-W gradients over 14 years from January 1998 to April 2012 (Sguerso et al., 2013), recently updated until December 2015.
ZTD time series have been compared with IGS's official tropospheric products on the entire available time span, extending what previously done for a single year.
To pursue this goal, ad-hoc Fortran codes have been written to automatically obtain a common format for ZTD estimations, accounting for eventual gaps and maintaining the two-hourly step between consecutive data. This comparison results extremely useful to validate the ZTD estimations and to check the coherence of tropospheric parameters evaluated in different networks.
The results of the comparison with IGS ZTD and the time series analysis for seasonality statistics will be presented, together with the codes used in the validation process.
The analysis of the time series will help to study climatological trends and the variability of ZTD according to seasonality and geographic position and to improve real-time monitoring precision.