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Sensibility of the Reference Frame Definition in a Regional GNSS Network

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The EUREF Permanent Network (EPN) includes about 200 GNSS stations in Europe. Today, the EPN is tied to the IGS05 by using minimal constraints on more than 20 EPN stations also included in the IGS05. This means that only regional stations are used for the reference frame definition which consequently can be a major error source. We have therefore investigated the sensibility of the station positions by adding data from carefully chosen IGS stations located on other continents to the processed network.

For that purpose, we have done two processing. In the first one, only 42 regional EPN stations were considered and in the second one, this regional network is extended with the data of 47 well-selected IGS05 reference stations to obtain a global network. The data processing was done with Bernese V5.0, using absolute antenna phase center corrections and IGS orbits, starting from GPS week 1400 (Nov 2006) and covering almost a year. We have also looked into the effect of using the ITRF2005 instead of the IGS05 to determine the reference frame. Each time the reference frame is determined by applying a Helmert transformation under minimal constraints using the Bernese or CATREF software.

The paper will show the sensibility of the obtained station positions with respect to the underlying reference frame (global/regional and ITRF2005/IGS05) and the software used to perform the minimal constraints (CATREF/Bernese). We will show that the different solutions can present biases with respect to each other which can reach the centimeter level.