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Initial results from Topo-Iberia continuous GPS network

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Topo-Iberia GPS network consists of 26 continuous GPS reference stations located in the Spanish part of the Iberian Peninsula (22 stations) and northern Morocco (4 stations). The first station was installed at Cabo Busto (Asturias) in March 2008 and the last one at Sierra Nevada (Betics) in October 2008. Since this date all the stations are fully operational.

The network has been designed as two X-shaped transects crossing the Iberian Peninsula from NE to SW and NW to SE, with denser coverage in the seismically active areas of the Betics, Pyrenees and Cantabrian chains. During the design of the spatial distribution of the network, we took into account the existence of the already functioning GPS networks, especially ones which had high-quality monumentations that could satisfy the high-precision geodetic standards, required for tectonic deformation monitoring. For this reason, due to the existence of the CatNet CGPS network in Catalonia (www.icc.cat), we have not installed any new stations in this part of Spain.

A major objective behind the establishment of this array is to monitor millimeter level deformation of the crust due to the collision of African and Eurasian (including Iberian micro-plate) tectonic plates. More specific goals of the project include the identification of the areas and/or specific seismic faults which exhibit higher deformation rates, which could imply an increased seismic hazard in these specifics areas.

Here we report the initial results of data analysis performed at the University of Barcelona using GAMIT/GLOBK software from MIT (Herring et al. 2006; King & Bock 2004). The analysis was performed in a network mode strategy using double-differences. In this processing mode all the stations are analyzed together and the ambiguities are resolved. In total we have processed daily data from more than 120 continuous GPS sites, that included the 26 Topo-Iberia CGPS sites; 22 core stations of IGS and EUREF, as well as, the data from the Spanish national network of IGN and various regional permanent GPS networks in Spain, such as CATNET in Catalonia, ERVA in Valencia, RAP in Andalucía and several other stations from Rioja, Basque country and Castilla y León (IGN). Due to the large number of stations has been necessary to split the processing into various subnetworks.

Since the network was installed, several stations have had hardware problems. Unfortunately most of these problems were related to the faulty choke-ring antennas that had to be replaced. This has resulted in artificial jumps in the final time-series that had to be corrected manually, and somewhat have affected the precision of the estimated velocity rates. The duration of the analyzed data do not exceed 1.5 years. Because of this limitation, and considering that the tectonic deformation rates in this part of the world do no exceed 5 mm/yr, the results presented here are of the preliminary character and should be treated with care.

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