THE CUATENEO GPS NETWORK TO QUANTIFY CRUSTAL DEFORMATIONS IN THE SE OF THE IBERIAN PENINSULA.

M. Castellote (1, 2), J. Fleta (2), J. Giménez (3), X. Goula (2), M. Soro (2), E. Suriñach (1), J. Talaya (2) and A. Térmens (2)

(1) Dept. de Geodinàmica i Geofísica. Universitat de Barcelona. 08028-Barcelona, Spain, emma@natura.geo.ub.es. (2) Institut Cartogràfic de Catalunya. Parc de Montjuïc. 08038-Barcelona. (3) Departament de Ciències de la Terra. Universitat de les Illes Balears.

The Eastern Betics are regarded, together with the Alborán Sea area, as one of the most tectonically active areas in the Iberian Peninsula. This recent tectonic activity is related to the N-S to NNW-SSE convergence of the Eurasian and African plates, which converge with a velocity of approx. 5 mm/yr in the western Mediterranean (Demets et al, 1994).

The CuaTeNeo GPS network was set up in the SE of the Iberian Peninsula in order to quantify mainly the strike – slip predominant fault system of Alhama de Murcia, Palomares and Carboneras. These faults are important NNE-SSW trending sinistral strike-slip faults and have been active in the eastern Betics since the late Miocene (Bell et al, 1997; Galindo-Zaldivar et al, 1993).

As regards seismicity, the area of our interest was affected in historical times by destructive earthquakes I>VIII (MSK) and the instrumental seismicity reveals some earthquakes of magnitude greater than 4. Recently, an earthquake, the Mula earthquake, with a magnitude of 5.0 (Mb) and a maximum intensity of VI-VII in MSK scale occurred. Moreover, comparison of the precision levelling data obtained by the Instituto Geográfico Nacional along the last 125 years allowed the identification of recent vertical deformations which are related to the tectonic activity of the area confined by the network (Giménez et al, 2000). The analysis of selected data of XX century seismicity shows deformation rates of 0.6 mm/yr in the area of interest (Buforn et al, 2001).

The CuaTeNeo GPS network consists of 15 durable geodetic vertical vertexes distributed in the provinces of Almeria and Murcia, covering an area of 40 km x 150 km. Eleven of these points are materialised in a concrete pillar anchored in the substratum whereas four points are materialised in a stainless steel nail directly fixed in the substratum (Soro et al, 1997).

The first campaign (CuaTeNeo epoch 0) was carried out in April 1997. The measurements lasted seven days and the observation consisted of daily sessions of approx. 16 hours (14:00- 6:00 UTC). Seven double frequency receivers were used. Each point was measured at least two times (Colomina et al, 1999).

The data process was carried out using Bernese software (V.3.5) developed by the University of Bern. Precise ephemerides and observations from the Ebre, Madrid, San Fernando and Matera IGS permanent stations were used in the computation. The global adjustment (least square method) of the whole network (88 baselines) was carried out using the program GeoTeX-ACX (V.1.2) developed by the ICC. The position of all the points was determined with a mean precision of about 1.04 mm in the longitude and 1.34 mm in the latitude (Table 1). The corresponding statistical parameters associated with the calculation are shown in Table 2.

A new CuaTeNeo campaign is planned for the current year (2001). The use of the GPS permanent station CART (Cartagena), in operation since in 1998 and belonging to the ROA permanent stations GPS network is projected (Fig 1). The incorporation of this station, which is located near the CuaTeNeo network, will provide us with an improved frame of reference for the network.

Figure 1. Distribution of the points of the CuaTeNeo GPS network. The monitored faults and their expected movements are indicated.

	Min.	Mean	Max.
Lat.	0.96	1.04	1.31
Long.	1.26	1.34	1.51
height	3.97	4.48	5.59

Table 1. Standard deviations of the 15 adjusted points. Units in 10^{-3} m.

	Min.	Mean	Max.	RMS	Φ
X	-1.441	0.162	2.551	0.696	0.679
Y	-0.948	0.003	0.998	0.369	0.370
Z	-1.243	0.110	1.854	0.525	0.514

Table 2. Statistical parameters of the 88 GPS baselines residuals. Units in 10^{-2} m.

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