



Present-day GPS crustal deformation rates in the Eastern Betics (SE Spain)

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The Eastern Betic Shear Zone (EBSZ) in the Betic Cordillera (south-eastern Spain) absorbs part of the convergence between the Eurasia and African (Nubia) plates, stretching for ~400 km from Alicante to Almeria. The EBSZ is a NE-SW transpressive left-lateral NE-SW trending fault-system composed by several individual faults, from south to north: Carboneras, Palomares, Alhama de Murcia, Carrascoy and Bajo Segura. The EBSZ is seismically one of the most active zones of the Iberian Peninsula, although in the last half century no significant (MSK I>VII) crustal type earthquakes have occurred in the area. The lack of big events might suggest an increased seismic potential of the faults in EBSZ.

The CuaTeNeo GPS network was installed in 1996 in the Eastern Betics with the main goal of determining the ongoing activity of the abovementioned fault systems. The network consists of 15 highly stable monuments, covering an area of 120x50 km in Murcia and Almeria. The network has been observed four times in 1997, 2002, 2006 and 2009. The results presented here are based on the analysis of the data of these four campaigns, spanning 12 year long time period and the data from continuous GPS stations of various networks, such as IGS, IGNE, RAP and MERISTEMUM. The GPS data was analyzed using the GAMIT/GLOBK analysis package developed at MIT.

The obtained results indicate a continued tectonic activity of the Eastern Betics. Specifically, present-day GPS crustal deformation rates at the coastal stations are about 1-1.5 mm/yr, roughly parallel to the convergence direction of the Nubia-Eurasia plates. While the stations more inland exhibit insignificant motions with respect to the stable part of the Iberian or Eurasian plates. More detailed examination of the calculated deformation field leads to several other important observations: 1) A block delimited by the Carboneras and Corredor de la Alpujarras faults escapes westward, indicating continuing activity of these faults; 2) In the northern part, a narrow band delimited by Alhama de Murcia and Palomares faults, shows a significant fault perpendicular strain accumulation and slight left-lateral movement.

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