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Regional deformation analysis in the Sannio-Matese area (Southern Apennines, Italy) by GPS surveys

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The central-southern Apennines and the Calabrian arc are among the most actively deforming zones of the Mediterranean basin connected with the motion of Africa and Aegean-Anatolian systems with respect to Eurasia. The tectonic stress, caused in this area by the convergence of the confining blocks, is elastically accumulated and periodically released along crustal discontinuities (faults) during earthquakes.
A detailed knowledge of the ongoing crustal strain rates is fundamental to constrain geodynamical models of the Italian peninsula and to understand the characteristics of the active tectonic stress release. Given the low deformation rates in the Central Mediterranean area, only a long-term monitoring can yield the necessary data set to model and understand the ongoing tectonic processes.
The Matese carbonatic massive occupies a surface of beyond 1000 km2 between the Campania Apennine northernmost part while Monti del Sannio, consisting primarily of quaternary deposits. It is located to the East of massive and represent the area of Apennine chain which degrades to East towards the Bradanica foredeep and it's delimited, in its complex, from Volturno, Biferno, Tammaro and Calore rivers.
The area was interested in historical events by several destructive earthquakes with an Intensity I greater or equal than IX MCS (1456, 1688, 1702, 1732, 1805, 1962), besides by seismic sequences of low energy (1885, 1903, 1905, 1990, 1992, 1997).
The first studies surveying the area started from 1990-2000 with the definition of geodetic networks, covering all or part of the massive Matese, with the aim of the evaluation of seismogenic sources responsible for the seismicity of the area.
A preliminary study from the geological and structural point of view was focused on the area extending among Benevento, Campobasso, Caserta, Isernia and L'Aquila provinces, in order to accurately define the sites in which the vertices of the network could be installed.
After a careful inspection of the existing GPS vertices and those who had a good state of preservation and a good level of reliability were incorporated into a new of geodetic Matese network, S.A.G.NET, consisted of total 38 3D vertices. Several surveys were carried out starting from 2000 with the aim to define the stress field characterized by plano-altimetric components.
In 2006 started an intensive work of gathering and validating to available data, integrating those previously obtained with a new survey carried out in the 2009. In this work describes in detail the final network S.A.G.NET, whose geometry was also bound to distribution facilities seismogenic notes present in the area. We also show the first results obtained from data collected from 2000 to 2009 and the cinematic framework currently in the area.