Geophysical Research Abstracts,
Vol. 11, EGU2009-8217-4, 2009
EGU General Assembly 2009

Strain and stress fields across the Tindari fault system constrained by geodetic, seismological and tectonic data

M. Palano (1), G. Lanzafame (1), G. De Guidi (2), G. Puglisi (1), A. Scaltrito (1), and L. Scarfì (1)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Catania, Catania, Italy (palano@ct.ingv.it, +39 95 435801), (2) Università degli Studi di Catania, Dipartimento di Geologia e Geofisica, Corso Italia 57, 95129 Catania, Italy

The Tindari fault system (hereinafter TFS) is a regional zone of brittle deformation located in north-eastern Sicily between Mt. Etna and the Aeolian Islands at the transition between ongoing contractional and extensional crustal compartments related to the Neogene-Quaternary convergence process between African and Eurasian plates. This fault system consists of a NNW striking set of faults characterized by steeply inclined scarps (dip $\geq 60°$) that dip mostly eastward and having predominantly extensional dip-slip kinematics and subordinately rigth-lateral strike-slip ones.

Since 1994 more than 700 earthquakes ($1.0 \leq ML \leq 4.4$) was recorded by a local network managed by the Istituto Nazionale di Geofisica e Vulcanologia, sezione di Catania (hereinafter INGV-CT). Most of these events occurred as highly clustered swarms located at shallow depth (7-12 Km) close the villages of Castroreale and Rodì Milici (SZ1) and in the Gulfs of Patti and Milazzo coastal area (SZ2). Minor clusters occurred western of TFS, close the village of Patti (SZ3), and southern, close the village of Novara di Sicilia (SZ4). Using the FPFIT code the focal mechanisms for earthquakes with at least ten P-wave first motion polarities were computed. Focal solutions computed for SZ1 and SZ2 show a clear normal fault mechanism along NE–SW-striking elements, whereas focal plane solutions computed for SZ3 and SZ4 evidenced a mix of strike-slip and extensional features.

GPS monitoring of this area started on late 1995, when INGV-CT established a geodetic network consisting of seven self-centring benchmarks based on GPS technique and surveyed for the first time on October 1996. Since then, the network has been surveyed on 1998, 2002, 2003 and 2006.

Here, we present a multidisciplinary approach, which include new tectonic, morphological, seismological and geodetic data, in order to obtain a detailed spatial resolution of the horizontal strain- and stress-rate of the investigated area. In particular, in a first step, we estimate the horizontal strain-rate field from observed GPS velocity. Then, using a simple assumption in which the crust is taken to be purely isotropic, linear and elastic we estimated the stress-rate through the constitutive relation between strain and stress. In addition, the tensors of stress and strain are estimated from focal mechanism inversions and neo-tectonic fault slip data. Finally major results will be discussed in relation within the current active geological component.