SCALING SOURCE DIMENSION OF THE Mw 6.7 JUNE 5, 1688 SANNIO SOUTHERN-APENNINES EARTHQUAKE, USING GEOPHYSICAL, GEOLOGICAL AND MORPHOMETRICAL DATA

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The identification of the seismogenetic source of the Mw = 6.7, 1688 Sannio normal faulting earthquake is still a subject of scientific debate. This is due to several reasons comprising a) the possible incompleteness of the damage pattern, b) the difficult or not straightforward recognition of the induced surface deformation, c) the probable occurrence of blind or hidden faulting, and d) the low tectonic deformation rates and youthfulness of the source. According to the magnitude scaled with Wells and Coppersmith's relationships the earthquake ruptured a 30 km-long, 16 km-wide normal fault. However, published works propose seismogenic sources for this earthquake slightly smaller than the expected from the empirical relationships alone. Similar results were obtained for other large historical events in central-southern Apennines. This may reflect either a routinely overestimation of the magnitude of earthquakes listed in the historical catalogue, or an underestimation of the geologically determined seismogenic sources.
The goal of this paper is to collect original information for identifying the sismogenetic source of the 1688 earthquake, making use of seismological, geological and morphometrical data.
In particular, the seismological data used in this study are relative both to the historical and recent seismic activity in the Sannio area, which in instrumental times was characterized by low energy seismic sequences (1990-92 and 1997, Md = 4.1). As regards the morphometrical analysis, we studied the Tammaro basin area (Sannio, Southern Apennines) for identifying the long term surface deformation induced by the seismogenetic fault of the 1688 earthquake. The reason of our choice is due to a) the hypothesis of the 1688 source location inside this basin, suggested by the seismogenetic source database DISS v. 3.1, b) the presence along the Tammaro river of young geomorphological features useful for revealing tectonic surface deformation, and c) clustering of recent seismic events inside this area along hypothetical boundaries of the master fault.
Our analysis has been carried out by integrating the morphometrical data derived by processing of a very high resolution DTM (5x5 m pixel), with the geological and geomorphological data derived from photo-interpretation and field surveys in a GIS environment. The preliminary results have provided the following conclusions: a) the topographical parameters extracted from DTM show significant NW-SE lineaments on the right hand side of the valley of the Tammaro river; this evidence is further constrained by morphological analyses carried out both from orthophoto and from field surveys, that confirm the presence of a structural mountainside corresponding to the above lineaments; b) the low energy sequences, which were progressively activated, do not coincide with the main structural lineaments exposed at surface, but highlight the activity of buried structures likely acting as *segment-boundaries* and constraining the dimension of the 1688 seismogenetic source.

Key words: 1688-earthquake