



From strong earthquakes to seismogenic sources in the newly released DISS: examples from the southern Apennines (Italy)

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We present our contribution to the improvement of the seismogenic knowledge of the southern Apennines as summarised in the new version (3.0.2) of the Database of Individual Seismogenic Sources (DISS).

DISS (the new version of which is presented in this same session) is a georeferenced repository of tectonic, fault and paleoseismological information for the Italian territory and surrounding regions. The core object of DISS is the seismogenic source, a simplified and georeferenced three-dimensional representation of a fault plane. The seismogenic sources are identified through geological and geophysical investigations, are capable of primary slip during a large earthquake and are assumed to exhibit “characteristic” behavior with respect to rupture length/width and expected magnitude.

DISS uses a wide spectrum of geological and seismological data to investigate potentially damaging earthquakes (notice that Italy is especially vulnerable even to M 5.5 earthquakes). In southern Italy, due to the complex and long tectonic history and rough inherited landscape, the identification of seismogenic sources responsible for historical earthquakes is a difficult task, and requires necessarily multidisciplinary investigations. Our methodology implied an integrated way of exploiting geological and geomorphological data (such as the analysis of drainage patterns and the recent landscape evolution), the contribution of paleoseismological investigations, and the use of kinematic and geodynamic constraints. It also included the critical review of detailed intensity patterns for historical earthquakes and the analysis of subsurface data from industrial seismic reflection, gravimetry, seismic tomography. DISS benefits from the

crucial information stemming from recent earthquakes on seismic release patterns: new earthquakes often shed light on the style of seismogenic faulting of a given region, and may ultimately help explaining poorly understood historical earthquakes.

The southern Apennines region is a controversial area with a remarkable structural complexity and strong seismicity. This sector of southern Italy stretches from Molise to Campania, Puglia and Basilicata, and from the Tyrrhenian coast to the Adriatic coast.

The active structures identified in the previous versions of DISS were large dip-slip faults along the Apennines hinge zone, and the strike-slip Mattinata Fault System (MFS) in the Gargano promontory. In October-November 2002 two earthquakes struck the northern sector of the area under examination, E of the Apennines axis in a region characterized by a low seismic release. They were caused by pure right-lateral slip between 10 and 20 km of depth along vertical, previously undetected east-west faults, W of the MFS. These earthquakes shed light on a yet unexplored mechanism of tectonic deformation in southern Italy, since they took place deep within the foreland (Meso-Cenozoic Apulian carbonate platform overlying the Paleozoic basement).

These earthquakes spurred the investigation of additional east-west faults that criss-cross the Apulian platform from the core of the Apennines thrust belt to the Adriatic coastline and were only suspected to exist prior to 2002. The new DISS contains several new seismogenic sources that are portions of such east-west faults, thus representing a fresh and updated look at seismogenic processes in southern Italy.