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Seismogenic sources in northeastern Italy and western Slovenia: an overview from the Database of Individual Seismogenic Sources (DISS 3.0.4)

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RIASSUNTO

Sguardo d'insieme sulle sorgenti sismogenetiche del nordest italiano e della Slovenia occidentale dal Database delle Sorgenti Sismogenetiche Individuali (DISS 3.0.4)

Il Database delle Sorgenti Sismogenetiche Individuali (DISS) contiene sorgenti capaci di generare terremoti con Mw > 5.5 e fornisce una visione sinottica della sismogenesi in Italia e nelle aree limitrofe. In questo lavoro presentiamo un dettaglio sulle sorgenti dell'Italia del nord-est e della Slovenia occidentale. I terremoti distruttivi nell'area veneto-friulana sono generati da faglie inverse lungo strutture N-NO-immergenti della Catena Subalpina. Nell'area slovena sono invece generati da faglie trascorrenti destre che seguono i vecchi lineamenti dinarici.

Key words: NE Italy, Seismogenic Sources, Slovenia.

We present an overview of the seismogenic sources of northeastern Italy and western Slovenia, included in the latest version of the Database of Individual Seismogenic Sources (DISS, v. 3.0.4; DISS WORKING GROUP, 2007).

DISS is a large repository of geologic, tectonic and active fault data on Italy and surrounding areas (Fig. 1) resulting from its authors' first-hand experience and from a large amount of literature data (BASILI *et alii*, 2008).

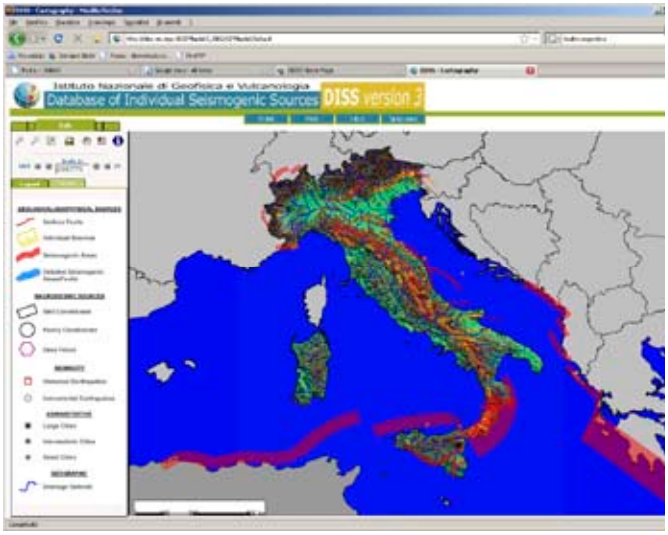

Fig. 1 – Screenshot of the web-page of the DISS, ttp://diss.rm.ingv.it/diss.

DISS' main object is the Seismogenic Source. DISS Seismogenic Sources are active faults capable of generating Mw > 5.5 earthquakes. We distinguish two main categories of Seismogenic Sources (BASILI *et alii*, 2008):

- "Individual Seismogenic Sources" are obtained from geological and geophysical data and are characterized by a full set of geometric (strike, dip, length, width and depth), kinematic (rake) and seismological parameters (average displacement, magnitude, slip rate, recurrence interval). Individual Seismogenic Sources are assumed to exhibit "characteristic" behavior with respect to rupture length/width and expected magnitude. They are tested against worldwide databases for internal consistence in terms of length, width, average displacement and magnitude, and can be complemented with information on fault scarps when present. This category of sources favors accuracy of the information supplied over completeness. As such, they can be used for deterministic assessment of seismic hazard, for calculating the probability of occurrences of strong earthquakes for the sources themselves (AKINCI *et alii*, 2008), for calculating earthquake and tsunami scenarios (LORITO *et alii*, 2008; TIBERTI *et alii*, 2008), and for tectonic and geodynamic investigations (e.g. BURRATO & VALENSISE, 2008).

- "Composite Seismogenic Sources" (also termed "Seismogenic Areas") are obtained from geological and geophysical data and characterized by geometric (strike, dip, width, depth) and kinematic (rake) parameters, but their length is more loosely defined and spans an unspecified number of Individual Sources. They are not assumed to be capable of a specific earthquake but their potential can be derived from existing earthquake catalogues. A Composite Source is essentially identified on the basis of regional surface and subsurface geological data. This category of sources favors completeness of the record of potential earthquake sources over accuracy of source description. In conjunction with seismicity and modern strain data, Composite Sources can thus be used for regional probabilistic seismic hazard assessment and for investigating large-scale geodynamic processes (e.g. BARBA *et alii*, 2008; MELETTI *et alii*, 2008).

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Seismogenic sources are complemented by:

- Comments on critical issues, and summaries of published papers;

- Sets of original figures, pictures, maps and sections taken from the literature or drawn by the compiler of the source;

- A list of pertinent references.

Fig. 2 – Overview of the seismogenic sources of northeastern Italy and western Slovenia included in DISS 3.0.4. The Individual Seismogenic Sources are represented with yellow rectangles, Composite Seismogenic Sources with red ribbons.

DISS supplies a synoptic view of seismogenesis in northeastern Italy and western Slovenia (Fig. 2; BURRATO *et alii*, 2008). In the Veneto-Friuli area destructive earthquakes are generated by thrust faulting along N-NWdipping structures of the Eastern Southalpine Chain (ESC). Thrusting along the mountain front responds to about 2 mm/y of regional convergence, and it is associated with growing anticlines, tilted and uplifted Quaternary palaeolandsurfaces and forced drainage anomalies. In western Slovenia, dextral strike-slip faulting along the NW-SE trending structures of the Idrija fault system dominates the seismic release. Activity and style of faulting are defined by recent earthquakes (e.g. the Ms 5.7, 1998 Bovec-Krn Mt. and the Mw 5.2, 2004 Kobarid earthquakes), whereas the related recent morphotectonic imprint is still a debated matter.

DISS supplies a segmentation model for the outermost ESC thrust front, and the association of the four major shocks of the 1976 Friuli earthquake sequence with individual segments of major thrust fronts. In western Slovenia DISS contains several Composite Sources that follow the main strike-slip faults (i.e. Rasa, Idrija, and Ravne faults), and two Individual Sources associated with the 1511 and 1998 earthquakes.

This paper cannot substitute a complete in-depth visit of the DISS web site (http://diss.rm.ingv.it/diss).

REFERENCES

AKINCI A., PERKINS D., LOMBARDI A. M. & BASILI R. (2008) - *Uncertainties in probability of occurrence of strong earthquakes for fault sources in the Apennines, Italy*. Journal of Seismology. doi: 10.1007/s10950-008-9142-y.

BARBA S., CARAFA M.M.C. & BOSCHI E. (2008) - *Experimental evidence for mantle drag in the Mediterranean*. Geophys. Res. Lett., **35**, L06302, doi:10.1029/2008GL033281.

BASILI R., VALENSISE G., VANNOLI P., BURRATO P., FRACASSI U., MARIANO S., TIBERTI M.M. & BOSCHI E. (2008) - *The Database of Individual Seismogenic Sources (DISS), version 3: summarizing 20 years of research on Italy's earthquake geology*. Tectonophysics, **453,** 20–43, doi:10.1016/j.tecto.2007.04.014.

BURRATO P., POLI M.E., VANNOLI P., ZANFERRARI A., BASILI R. & GALADINI F. (2008) - *Sources of Mw 5+ earthquakes in northeastern Italy and western Slovenia: An updated view based on geological and seismological evidence*. Tectonophysics, **453**, 157-176, doi: 10.1016/j.tecto. 2007.07.009.

BURRATO P. & VALENSISE G. (2008) - *Rise and fall of a hypothesized seismic gap: source complexity in the 16 December 1857, Southern Italy earthquake (Mw 7.0).* Bull. Seism. Soc. Am., **98** (1), 139-148, doi: 10.1785/0120070094.

DISS WORKING GROUP (2007) - *Database of Individual Seismogenic Sources (version 3.0.4): A compilation of potential sources for earthquakes larger than M 5.5 in Italy and surrounding areas*. Available at: http://diss.rm.ingv.it/diss.

LORITO S., TIBERTI M.M., BASILI R., PIATANESI A. & VALENSISE G. (2008) - *Earthquake-generated tsunamis in the Mediterranean Sea: scenarios of potential threats to Southern Italy*. Journal of Geophysical Research, **113**, B01301, doi:10.1029/2007JB004943.

MELETTI C., GALADINI F., VALENSISE G., STUCCHI M., BASILI R., BARBA S., VANNUCCI G. & BOSCHI E. (2008) - *A seismic source zone model for the seismic hazard assessment of the Italian territory*, Tectonophysics, **450** (1-4), 85-108, doi:10.1016/j.tecto.2008.01.003.

TIBERTI M.M., LORITO S., BASILI R., KASTELIC V., PIATANESI A. & VALENSISE G. (2008) - *Scenarios of earthquake-generated tsunamis in the Adriatic Sea.* P. Cummins, L. Kong and K. Satake (Eds): Topical Issue on Tsunamis. Pure and Applied Geophysics, doi: 10.1007/s00024-008-0417-6.