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A semi-quantitative method for the characterization of active faults

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A comprehensive and detailed study of an active fault system is essential for seismic hazard assessment. An integrated study should include field mapping, kinematic analysis, structural and geological constraints, tectonic geomorphology analysis, paleoseismology, etc, in order to define temporal and spatial constraints. Several definitions for active faults have been proposed by researchers and organizations. Invariably, all of them involve time constraints, i.e. single or repeated activations in a given period of time. Despite the uncertainties involved, there is a general consensus about the characterization of a fault as “active”, “possibly active” or “inactive”. In this paper, a semi-quantitative methodology for further classifying active faults is proposed. The methodology consists of several criteria describing various aspects of faulting, each of which is assigned a weighted factor. Those criteria are related to:

1. Geometrical characteristics of the fault (length, strike, slip, plunge).

2. Active stress field (direction and magnitude).

3. Geological structure (age and correlation of geological units).

4. Geomorphological signature (effect of faulting on ground surface).

5. Quantitative paleoseismological data (recurrence interval, slip per event, etc.).

The result of the application of each weighed factor is a number that corresponds to the level of activity of each fault or fault segment. This number (“activity index”) is directly comparable to indices calculated for other faults and can be a useful tool in seismic hazard analysis. This methodology has to be tested and validated with information from known earthquakes in order to fine-tune it and become an easily applicable technique.