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The Relief Project: large earthquake faulting and implications for the seismic hazard assessment in Europe, the 1999 IZMIT DUZCE earthquake sequence (MW 7.3-7.1, Turkey)

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Two destructive earthquakes (Mw 7.4, Mw 7.3) with 170-km of surface faulting devastated recently a large region of Western Turkey. The RELIEF project (Contract EVG1-CT-2002-00069) consists of mainly field investigations in the earthquake area that aim to cover different disciplines from paleoseismology, physics of the seismic source and engineering seismology. The occurrence of large earthquakes along the North Anatolian Fault represents a unique natural laboratory and the only opportunity to test our present understanding of the earthquake process and refine our current seismic-hazard models. The RELIEF project consists of data collection and analysis of the Izmit-Duzce earthquake areas and an integrated analysis of the seismic hazard assessment in the Marmara Sea region. Four main objectives are defined: (1) Systematic geomorphologic and paleoseismological analyses (with trenching) along each earthquake rupture- segment to document the faulting behaviour during the Holocene and late Pleistocene; (2) Use of Radar interferometry and Digital Elevation Model, and comparisons with the source time function (seismometer and strong motion waveform analyses), physical dimension and dynamic properties of the earthquake faulting; (3) Detailed studies of site effects (including response spectra) and their relationships to the earthquake ruptures; and (4) Critical evaluation of previous hazard assessments, and the development of new methodologies and scenarios for the seismic hazard mitigation in Europe.