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Geological and geophysical evidences for seismic hazard assessment of northwestern and southwestern Crete (Greece)

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Abstract
Geological and electrical resistivity surveys (ERT) reveal potentially seismic active sources in western Crete, located within the outer forearc of the Hellenic subduction zone in one of the most seismically active deformed region in Europe (Papazachos et al. 1998; Laigle et al. 2004). The study is focused in Kastelli-Kissamou (northwestern Crete) and Paleohora (southwestern Crete) areas. Geological field evidences suggest a recent tectonic coastal uplift of 6.8 m and a relatively high rate of emergence for Kastelli-Kissamou while a high rate of emergence of 9.0 m for Paleohora area is evident, probably in association with the AD 365 earthquake. Numerous active faults striking NNE and NNW in Kastelli-Kissamou area suggest the tectonic setting of Kastelli-Kissamou. Important active faults striking almost E-W and NNE form a complex tectonic environment for Paleohora area. Geophysical survey is conducted to experimentally verify ground truthing field observations of the subsurface and to reveal tectonic structures not directly observable at the Earth's surface. The geoelectrical data are collected using an IRIS-Syscal Jr. Switch 48 instrument. Dipole–dipole and Wenner-Schlumberger configuration arrays using 5 m and 15 m electrode spacing are conducted. The recorded ERT data are collected to provide apparent resistivities inverted to a 2D geoelectrical resistivity model. The RES2DINV (Loke, 1997) modeling software is used to process the collected geoelectrical data and to finally perform the 2D geoelectrical data inversion. The inversion routines are based on the smoothness-constrained least squares method (Sasaki, 1992) and the forward resistivity calculations were executed by applying an iterative algorithm based on a Finite Element Method (FEM). Fourteen ERT profiles are obtained in the Kastelli and Paleohora areas. For Kastelli-Kissamou seven of the eight ERT profiles intersect possibly active faults. For Paleohora area six ERT profiles were conducted and three important faults were identified. For Kastelli-Kissamou and Paleohora areas the identified fault zones striking inland and crosscutting the populated areas are capable to enhance ground seismic motion and to significantly contribute to the seismic hazard assessment of the studied areas. Specifically significant outcome to seismic hazards assessment is that the area that covers the coastline of Paleohora and Grammeno can be associated with a fault zone striking almost E-W. The results of the geological and geophysical surveys are cross-correlated verifying the validity of the outcomes.

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References
Laigle M, Sachpazi M, Hirn A (2004) Variation of seismic coupling with slap detachment and upper plate structure along the western Hellenic subduction zone. Tectonophys. 391:85-95

Loke MH (1997) Rapid 2D resistivity inversion using the least-squares method. RES2DINV Program manual, Penang, Malaysia

Papazachos BC, Papadimitriou EE, Kiratzi AA, Papazachos CB, Louvari EK (1998) Fault plane solutions in the Aegean Sea and the surrounding area and their tectonic implication. Boll. Geofis. Teor. Appl 39:199–218

Sasaki Y (1992) Resolution of resistivity tomography inferred from numerical simulation. Geophys. Prospect. 40:453–46