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Combination of strong- and weak-motion data from both permanent and temporary networks for attenuation studies: The case of the January 8, 2006 Kythera intermediate-depth earthquake

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In January 8 of 2006, an intermediate earthquake occurred at the western part of the Hellenic trench close to the island of Kythera (southern Greece). This is the only intermediate depth earthquake in the broader Aegean area that has produced such an extensive set of useful recordings. The main reason for this is the fact that this earthquake was not recorded only from the two main permanent seismological networks operating in Greece, one operated by the National Observatory of Athens and one operated by the seismological station of Thessaloniki but also from a large number of strong-motion sensors, operated by the Institute of Engineering Seismology and Earthquake Engineering (ITSAK). However, the majority of recordings were obtained from EGELADOS, a large-scale temporary amphibian broad-band seismological network deployed in the Southern Aegean area and operated by a large working group involving the National Observatory Athens, Technical University Chania, University Thessaloniki (Greece), Istanbul Technical University (Turkey), University Hamburg, GeoForschungszentrum Potsdam (Germany) and coordinated by the Ruhr-University Bochum (Germany). An effort for combining all the available data (weak and strong motion data) has been made for studying the properties of ground motion attenuation of this intermediate depth earthquake. All the available seismological data were

homogeneously corrected for instrument response and filtered for removing noise in order to derive peak ground motions. The strong motion data were also processed with two routines used for data correction from ITSAK (Boore D.M., 2001; Skarlatoudis et al, 2003) for calculating peak ground motions. The combination of both types of data reveals interesting properties of the earthquake wave field, that would remain "hidden" if only one type of data was used. For instance, at short distances weak-motion broad-band recordings are clipped, whereas at large distances strong-motion sensors introduce an artificial "level" clipping, resulting in a significant bias of strong-motion predictive relations, in agreement with observations (Fukushima, 1991) in similar environments (e.g. Japan). Moreover, the data have been used for a validation of proposed peak ground motion attenuation relations and the detailed study of the very inhomogeneous radiation pattern of southern Aegean intermediate-depth events in both near and far field.