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Seismicity of the eastern Hellenic Subduction Zone

A. Bruestle (1), L. Kueperkoch (2), M. Rische (1), T. Meier (3), W. Friederich (1), and EGELADOS working group (1)

(1) GMG, Ruhr-University Bochum, Ruhr-University Bochum, Bochum, Germany (andrea.bruestle@ruhr-uni-bochum.de), (2) BESTEC GmbH, Landau, Germany, (3) Institute of Geosciences, Christian-Albrechts-University, Kiel, Germany

The Hellenic Subduction Zone (HSZ) is the seismically most active region of Europe. The African plate is subducting beneath the Aegean lithosphere with a relative velocity of 4 cm per year. A detailed picture of the microseismicity of the eastern HSZ was obtained by the recordings of the temporary networks CYCNET (September 2002 - September 2005) and EGELADOS (October 2005 - March 2007). In total, nearly 7000 earthquakes were located with a location uncertainty of less than 20 km.
The SE Aegean is dominated by (1) shallow intraplate seismicity within the Aegean plate, by (2) interplate seismicity at the plate contact and by (3) intermediate deep seismicity along the subducting African slab. Strong shallow seismicity in the upper plate is observed along the Ptolemy graben south of Crete extending towards the Karpathos Basin, indicating intense recent deformation of the forearc. In contrary, low shallow seismicity around Rhodes indicates only minor seismic crustal deformation of the upper plate. An almost NS-striking zone of microseismicity has been located, running from the Karpathos basin via the Nisyros volcanic complex towards the EW striking Gökova graben. In the SE Aegean the geometry of the Wadati-Benioff-Zone (WBZ) within the subducting African plate is revealed in detail by the observed microseismicity. Between about 50 to 100 km depth a continuous band of intermediate deep seismicity describes the strongly curved geometry of the slab. From the central to the eastern margin of the HSZ, the dip direction of the WBZ changes from N to NW with a strong increase of the dip angle beneath the eastern Cretan Sea. The margin of the dipping African slab is marked by an abrupt end of the observed WBZ beneath SW Anatolia. Below 100 km depth, the WBZ of the eastern HSZ is dominated by an isolated cluster of intense intermediate deep seismicity (at 100-180 km depth) beneath the Nisyros volcanic complex. It has an extension of about 100x80 km and is build up of 3 parallel, linear subclusters, dipping along the subducting slab to the NW. The change of crustal deformation and slap dip indicates a significant deformation of the eastern HSZ between Karpathos and Crete.