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Seismic Deformation at the Northern Tip of the Subducting African Plate in SW Turkey Seismic Deformation at the Northern Tip of the Subducting African Plate in SW Turkey

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We investigate the seismotectonic features resulting directly and indirectly from the interaction between the northeast moving African plate and the westward moving Anatolian block focusing mainly offshore and onshore of the region between the Fethiye Bay and the Gulf of Antalya. Our data is the broadband waveforms recorded at the seismic stations run by Kandilli Observatory and Earthquake Research Institute. In addition to these stations we deployed three broadband stations along the Mediterranean seaside to improve the network coverage so as to constrain better the source parameters of the smaller events taking place offshore. The recorded 3-component waveforms of the small to moderate size earthquakes were analyzed to determine a seismic moment tensor for each event. The tectonic implications of the spatial distribution of the events and their focal mechanism solutions shed light onto the present geodynamic processes taking place along the Anatolia-Africa boundary zone.

These results points out three distinct patterns of deformation undergoing in the western, central and eastern part of the project region. The tectonics in the western part is mainly influenced from the interaction of the motion along the eastern flank of the Hellenic arc and the southwestward extrusion of Anatolia. The intermediate depth seismic activity along the eastern flank of the Hellenic arc where predominantly left-lateral strike-slip faulting occurs extends well below the Fethiye Bay and even further northeast. The piece of knowledge that gives sign for the propagation of the left-lateral motion further beneath the mainland is based on quite recent data acquired from the Cameli Basin which comes both from the field and seismology. The analysis of the data reveals conjugate extensional directions from NW-SE in Mio-Pliocene and NE-SW to N-S in Quaternary up to present. In the western part although the intermediate depth seismic activity exhibits strike-slip faulting the shallow seismicity shows predominantly normal faulting mechanisms. The central part of the project area undergoes different pattern of deformation where most of the seismic activity is confined within the crust and the dominant focal mechanisms are strike-slip and reverse faulting resulting from north to northeast compression and south- to southeast extension. No normal faulting mechanism events are inferred from the seismological data in the central part though the field data points out several recent normal faulting events. The tectonics of the eastern part of the project area is influenced mainly from the subduction process along the western flank of the Cyprus arc. The intermediate depth seismic activity beneath the Gulf of Antalya exhibits mostly reverse and strike slip faulting resulting from NE compression while the shallow seismic activity show predominantly normal faulting.

Considering the three pattern of deformation we suggest that the western part of the study region is influenced from the north-eastward propagation of the eastern flank of the Hellenic arc. Subduction process along the western flank of the Cyprean arc is active and effective beneath the Gulf of Antalya. The central part is a transition between the two where no evidence of subduction is observed and this part is probably the most northern tip of the African plate that touch Anatolian block supporting the highly elevated mountains.

キーワード: Small earthquakes, Seismic moment tensors, Subduction, African plate, Seismic deformation, Turkey
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