



High-resolution earthquake location in the Western Sea of Marmara

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A detailed analysis of the micro-seismicity along the submerged section of the North-Anatolian Fault, in the Western part of the Sea of Marmara (SoM), based on recordings from Ocean Bottom Seismometers (OBSs), shows that 1D velocity models cannot take into account the complicated velocity structures, especially the ~ 3 to 5 km thick sediment infills within the Marmara Trough. Consequently, 1D-models, which are commonly used, lead to inaccurate results on earthquake locations and to misleading interpretations, particularly for shallow seismicity. In contrast, earthquake locations obtained with a specifically tailored, high-resolution, 3D-velocity model, reveal the existence of two types of seismicity in the western part of the SoM: (i) deep events ($d > 8-10$ km), characterized by predominantly strike-slip focal mechanisms and related to crustal processes, possibly creeping along the Main Marmara Fault (MMF); (ii) shallow events ($d < 5-6$ km), characterized by predominantly normal fault mechanism and possibly related to gas-induced processes. Shallow earthquakes can be further classified in two categories: those that occur at depths between 2 and 6 km (e.g. within or at the base of the “post-kinematic” Plio-Quaternary basins) and those that occur at depths shallower than 1~2 km. The most shallow seismicity cannot be properly identified by using far away land-stations and simplified 1D velocity models.