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HYPODD Relocations and Stress Tensor Inversion Analyses of Local Earthquake Clusters in the Sea of Marmara

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Extensional focal mechanism solutions are mostly observed even in the Central Marmara by this comprehensive research although the main Marmara Fault that is the western branch of the NAF, is dominated by a right lateral strike-slip regime.
Marmara Region, a seismically very active area, is located at the western section of the North Anatolian Fault Zone (NAFZ). The 1912 Mürefte and 1999 Izmit earthquakes are the last devastating events of the western and eastern sections of this region, respectively. The region between the locations of these earthquakes, is prone to a large earthquake. Therefore, the analysis of the Sea of Marmara is significant.
The main objective of this research is to determine earthquake hypocenters and focal mechanism solutions accurately, hence we obtain recent states of stresses for this region. Accordingly, this research aims to define branches of fault structures and its geometrical orientations in the Sea of Marmara.
In this study, a cluster of events in the Central Marmara is analyzed using hypocenter program as a usual location technique. In addition, these events and other clustered events (Korkusuz Öztürk et al., 2015) are relocated using HYPODD relocation procedure. Even though NAF is mostly dominated by a right lateral strike slip fault, we found out many extensional source mechanisms.
Also, from the comparison of relocation results of hypocenter and HYPODD programs, it is found out that most of the relocations have the same orientations and dipping angles of the segments of the main Marmara Fault are not clear. As a result, since we observe many normal faulting mechanisms in the Sea of Marmara, we expect to observe some deviations in orientations of vertical orientations of the fault segments comparing a dip-slip model. Therefore, this research will continue to clearly identify fault dip angles of main fault segments in Marmara Sea. Further, our sensitive relocation and stress analyses will make an important contribution to a better understanding of the fault movements of the Sea of Marmara, and shed light on earthquake fracture analyses for heterogeneous stress states.