



## Seismicity of the East Anatolian Fault Zone: Insights into structural variation and fault kinematics

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The East Anatolian Fault Zone (EAFZ) represents an inter-plate boundary extending over  $\sim$ 500 km between the Arabian and Anatolian plates. Relative motion of the plates occurs with slip rates of about  $9 \pm 1$  mm/y resulted in destructive earthquakes in Eastern Turkey as documented by historical records. We investigate fault segmentation of the EAFZ as well as interaction of sub-segments by combining data from available regional seismic stations operated by Kandilli Observatory Earthquake Research Institute and the Directorate of Disaster Affairs to achieve the best possible hypocenter locations. We optimized a reference 1-D velocity model using a grid-search approach and re-located hypocenters using the Double-Difference earthquake relocation technique. The refined hypocenter map provides insights into the internal deformation within the fault zone down to a resolution of about 0.5 km. The distribution of hypocenters suggests that the EAFZ is characterized by NE-SW and E-W oriented sub-segments that slightly deviate from its overall trend. The main fault is surrounded by sub-parallel aligned hypocenters possibly representing fault-normal and fault-parallel oriented subsidiary faults. Structural variation along the EAFZ significantly affects faulting mechanisms along the fault zone. Fault mechanisms indicate predominantly left-lateral strike slip which turns into normal/thrust faulting depending on fault orientation and present state of tectonic loading. Spatiotemporal evolution of hypocenters indicates a systematic migration of micro- and moderate-sized earthquakes from main fault into adjacent fault segments within several days documenting progressive interaction between the major branch of the EAFZ and its secondary structures.