SESSION 30- Multiscale Deformation and Earthquake Processes Across the Main Marmara Fault of the North Anatolian Fault System and Broader Regions

Conveners

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Session Description

Recent earthquakes and emerging geophysical observations along the Marmara segment of the North Anatolian Fault (NAF) and nearby fault segments have strongly highlighted the need to deepen our current understanding of how this major plate-boundary system accommodates strain and transfer stress. The NAF represents one of the most active and well-studied continental strike-slip fault systems in the world, providing an exceptional natural laboratory for investigating the processes that govern lithospheric deformation and earthquake dynamics. Deformation along the NAF occurs across multiple spatial and temporal scales rom distributed off-fault strain and aseismic creep to dynamic rupture during large earthquakes. Understanding how these processes interact within the complex structural framework of the NAF is essential for advancing our knowledge of fault mechanics and seismic hazard. This session aims to highlight recent interdisciplinary advances that shed light on the mechanisms and patterns of deformation along the North Anatolian Fault System with particular emphasis on its Marmara segment and nearby segments. We invite contributions that explore multiscale deformation from the plate scale to the fault microstructure and

across the full earthquake cycle including interseismic strain accumulation, coseismic rupture, and post-seismic relaxation. Emerging tools such as distributed acoustic sensing (DAS), InSAR, and dense seismic arrays are now revealing near-fault deformation and rupture processes at unprecedented resolution, and studies integrating these with seismic, geodetic, and geological observations, field and laboratory analyses, and numerical or theoretical modelling are particularly encouraged. We aim to bring together diverse datasets and perspectives, and this way to foster a comprehensive

understanding of how fault zone structure, rheology, and multiscale deformation govern earthquake processes along the North Anatolian Fault especially within the Marmara region and other comparable plate-boundary systems.