Poster Abstract
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Imaging Deformation Processes along the Southern Dead Sea Transform using 8 years of InSAR

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The southern Dead Sea Transform Fault, bordering Saudi Arabia and Jordan in the east, and Egypt and Israel in the west, is one of the least-studied major active strike-slip faults due to the challenges of access in remote and sparsely populated regions. This region has experienced several major earthquakes, with the most recent one, the Mw 7.2 1995 Nuweiba earthquake occurring offshore of the Gulf of Aqaba. Recent geodetic studies have brought to light the region's present-day kinematics and strain build-up, suggesting variations of interseismic coupling, with a decreasing locking depth towards the southern Gulf of Aqaba.

Our motivation is to further complement and understand an integrated picture of the deformation processes amid the entire breadth of the plate boundary. Given the unfavored satellite line-of-sight observation and the small tectonic rate, we show that it is crucial to compensate for the dominant non-tectonic long-wavelength signals, including the tropospheric, ionospheric delays, and the non-negligible cm-per-year scale spatial ramp of the plate motion in the satellite's reference frame.

By constructing high-resolution dense InSAR time series on multiple tracks of Sentinel-1 radar data spanning from late 2014 to 2022, we can image a spectrum of various deformation processes from south to north segments with sub-mm/year scatter, including the interseismic slip across the Gulf of Aqaba, the strain accumulation along the Wadi Arabah Faults, and the elastic rebound within the flanks of Dead Sea basin. We also reveal a large elastic rebound motion further inland to the Al Jawf province associated with hydrological processes. We aim to understand the transitioning between these signals and constrain the uncertainties and correlation among the physical model parameters along the Dead Sea fault that was not well explored in the past due to data scarcity from campaign GNSS and discrete burst-overlap interferometry.