

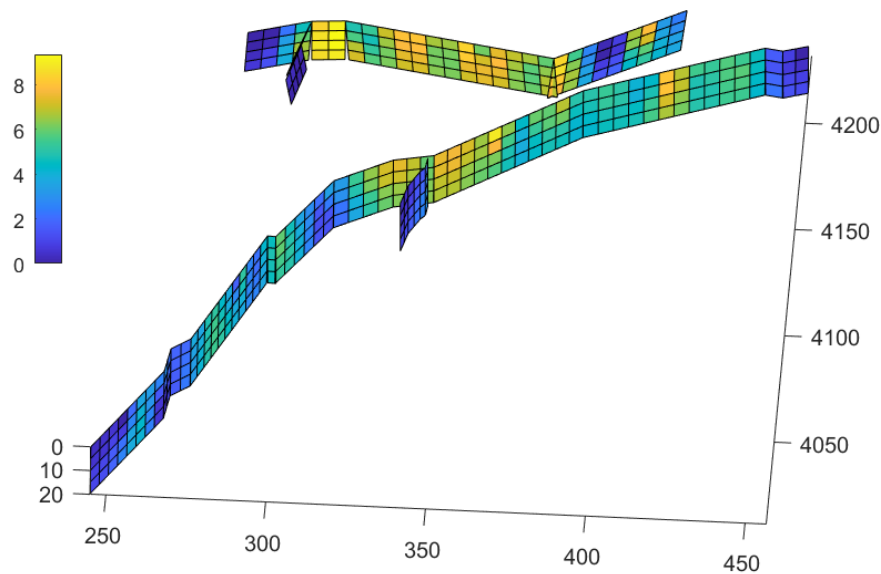
Fault slip distribution in the February 2023 Kahramanmaraş earthquake sequence from Sentinel-1 and ALOS-2 image offsets

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The 6 February 2023 Kahramanmaraş earthquake sequence involved two major earthquakes (M7.8 and M7.5) within 12 hours on separate faults, causing widespread damage and loss of life in SE Turkey and NW Syria. Dense image offsets, computed from Sentinel-1 and ALOS-2 SAR images, provide robust measurements of the surface deformation of both events; I use them here to estimate the distributions of slip on their causative faults.

I use the ISCE software to produce both range and azimuth offsets, for multiple ascending and descending tracks, and use them to map the major fault traces and splay faults involved in the events. To downsample the offsets into a useable form for modelling, I first use a distance-based sampling approach to produce a preliminary model, and then use a quadtree decomposition based on the modelled displacements to sample the offsets, employing a median filter to reduce the influence of noise originating from false image matches. Finally, I use the Okada-based slipinv software to invert for the slip distribution.

Preliminary results show a heterogeneous pattern, with up to 8 m of slip on a ~250 km rupture of the East Anatolian Fault (EAF) corresponding to the first event, and a ~125 km rupture of the Sürgü Fault, peaking at 9 m of slip, to the second. Both faults have splays that highlight possible complexities of both events, including a splay that likely initiated the first event, connecting to the centre of the main asperity on the EAF.



Preliminary slip model for the Kahramanmaraş earthquakes from Sentinel-1 azimuth and range offsets. Slip is in meters. Coordinates are in UTM km, zone 37N.