

## Characterization of Fault Motions Observed with UAVSAR

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Publically available data from the Uninhabited Aerial Vehicle Synthetic Aperture Radar (UAVSAR), which measures deformation between repeat visits, provide an excellent opportunity for characterizing fault motions. These include the main shock fault trace and near-field deformation, effects of larger aftershocks and swarms, triggered slip at a distance, and interseismic creep. Limitations include the following. The discovery time to find events of interest in the large image data set: the set today has nearly 2000 strips, each with roughly 100-200 megapixels. Next, the common occurrence of incoherent patches in an interferogram leaves irregular holes in the deformation image. Next, the circumstance where faults with slip much larger than a phase cycle or that cut across an entire image: that defeats unwrapping. Finally, the overprinting of deformation at spatial scales that match the signatures of atmospheric water vapor irregularities and uncompensated aircraft motion. To address these limitations, we demonstrate a number of examples with remediation. The Geo-Gateway.org visual interface to the UAVSAR data set allows fast browsing and extraction of deformation profiles, allowing detailed examination at full resolution before using the time and bandwidth required to download images. We are also beginning to deploy automatic surface fracture detection to highlight features of interest. We have established reliable means of detecting and avoiding incoherent patches and pixels so they do not interfere with surface fracture detection and modeling. We have established by far field considerations, the otherwise ambiguous large slip across a rupture cutting entirely through an image using the South Napa Earthquake, and established methods for estimating a component of surface fault slip for each distinct view-direction flight path. Two flight paths captured the La Habra Earthquake coseismic deformation, allowing separate estimation of the vertical deformation and one component of the horizontal deformation. Ruptures that do not reach the surface but that terminate within about 400 m, such as the Ocotillo aftershock of the El Mayor-Cucapah Earthquake, are detected and given rough characterization. Faults that appear to have very shallow slip deficit, such as the South Napa event, display near-field deformation that matches a simple deficit model.