

QuakeSim Modeling Efforts Using QuakeTables Faults, Interferograms

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QuakeSim tools for modeling and inversion are now combined with detailed fault models and high-quality interferograms from airborne and spaceborne differential interferograms constructed with synthetic aperture radar (InSAR). One proven workflow takes an interferogram image of single-component displacement (up to 120 megapixels), analyzes the image for correlation and noise, averages the pixels in 25x25 pixel panels, transforms the reduced data to a general nonlinear inverse application format (QuakeSims Simplex), inverts for the dominant fault slip represented in the image, and invokes a forward model (QuakeSims disloc) that produces a synthetic interferogram for comparison to the original data. This workflow is the first step toward semiautomated assimilation of the increasing supply of interferogram images of surface deformation available to estimates of subsurface geophysical processes. A simple aquifer estimation process has been added to Simplex, such that aquifer loading and fault slip may be estimated together. Estimates of coseismic slip and afterslip from the Sierra El Mayor (Mexico, 2010) earthquake are obtained. Key to such modeling efforts is the QuakeTables federated database, which now contains updated fault data for California Geological Survey 1996 and 2002 Hazard Maps, the Uniform California Earthquake Rupture Forecast (UCERF 2) collection of faults, and SCEC Simulator Workshop Northern California data. These faults are presented for selection in both a map environment and as an on-screen list, and can be downloaded as entire sets in spreadsheet format; QuakeTables faults are also available to QuakeSim modeling tools. QuakeTables also presents processed interferograms and associated metadata, displayed in an image grid of thumbnails, as well as in a map view. Interferograms may be downloaded in KML format and as pixel data. Satellite-based interferograms are presented, as well as airborne interferograms from the NASA UAVSAR project.