

QuakeSim Earthquake Modeling and Assimilation Environment

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QuakeSim is a portal, web services-based environment to model interacting fault systems. The primary objective is to integrate models of different scales, and data from different sources into an infrastructure for improving understanding of earthquake processes and better earthquake forecasting. One of the goals of QuakeSim is to prepare for the large volumes of data that spaceborne missions such as DESDynI will produce. Current QuakeSim applications include 1) elastic forward and inverse applications, 2) a viscoelastic finite element model called GeoFEST with mesh generation and refinement tools, 3) Virtual California, which simulates interacting fault systems, and 4) GPS time series classification and analysis tools. The QuakeSim applications can ingest distributed heterogeneous data in the form of InSAR, GPS, seismicity, and fault data into various earthquake modeling applications. QuakeTables is the QuakeSim database, which houses fault and InSAR data. The fault data are converted to a standard format through an ontology that was developed with input from paleoseismology, earthquake modeling, and database communities. The goal is to allow the modelers to test various fault representations. Data in its original format is also stored and simulated faults can also be input into the database. Interferograms from ERS are also being stored in QuakeTables. UAVSAR data will be stored as it becomes available. Simulations show that some earthquakes follow earthquakes on other faults, but don't precede them. Models also indicate that capturing the complexity and detail in the models is important for matching the results to the data.