InSAR for Geothermal Reservoir Management and Sustainable Development

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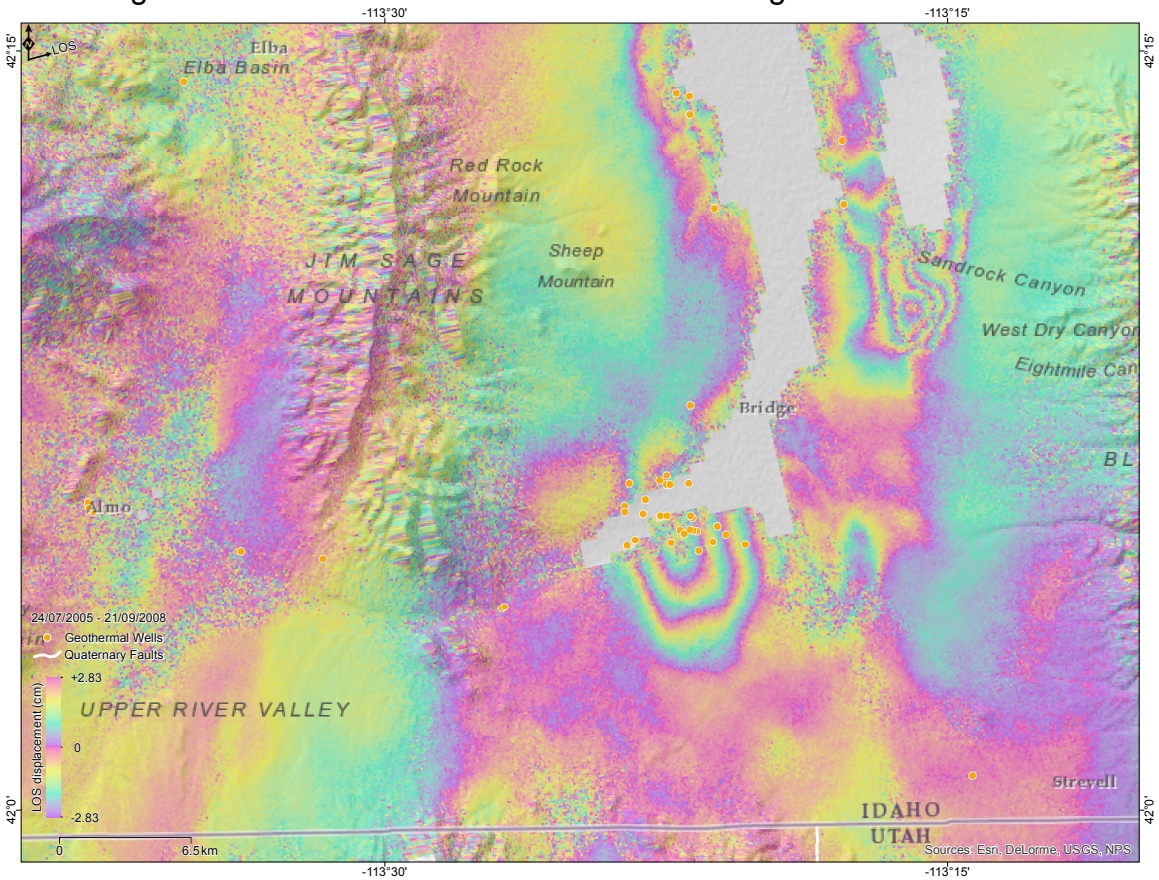
Geothermal energy is a rapidly growing source of power within the United States. Understanding the hydrothermal-geomechanical response of a geothermal reservoir to fluid production and injection is essential for integrated management and sustainable development of the reservoir. Changes in the underground water level, pressure, and temperature caused by geothermal production activities may lead to extensive ground deformation. Therefore, regular monitoring of active geothermal fields is necessary to evaluate the impact of production activities and assess local ground stability. Knowledge of the reservoir compaction, geometry, and response to production behaviors will help in defining ideal locations for new production and recharge wells that can directly improve the performance of the reservoir. This research addresses active geothermal processes and recent seismic events and investigates their impacts on the local crustal deformation at the Raft River geothermal power plant in southeastern Idaho and at the Coso geothermal site in eastern California. The study incorporates geodetic data from Interferometric Synthetic Aperture Radar (InSAR) and Global Positioning System (GPS) measurements acquired between 1992 and present. Volumetric analysis and modeling are conducted to characterize the selected geothermal reservoirs.



Line-of-sight deformation (color scale) superimposed on the hill-shaded relief (grey scale) of the study site in southeastern Idaho