ERS Studies of Landforms and Surface Deformation

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We are pursuing a variety of studies of landforms and surface deformation processes in several sites around the world. Landforms in western China are being studied for their relationship to climate change and tectonic rates. In particular, ERS interferometric data were used to create a DEM from which the shapes of alluvial fans are being measured to show how depositional sources and rates have changed with climate, and to show the amount and direction of offset from an active fault that cuts the fans.

In Long Valley, California, a region of recent volcanic activity (surface eruptions within the last 800 years), we are interested in assessing the volcanic hazard by measuring the deformation of the resurgent dome in the center of the caldera. This region also provides us with experimental challenges since it has very rugged terrain, experiences strong seasonal variations, and has a variety of vegetation types. Finally, the region is well-instrumented with other geodetic devices thereby providing us with a good calibration.

In Chile, we are investigating the deformation field associated with a recent large subduction-zone earthquake. We are interested in the pre- co- and post-seismic deformation and its relationship to the earthquake cycle in the region. The area affected by the earthquake is very large. Preliminary results show up to 0.5 meter of subsidence inland and several cm of coastal uplift. This agrees very well with the existing (but very sparse) geodetic data available for this earthquake.

We recently collected data from NASA's Airborne Visible Infrared Imaging Spectrometer (AVIRIS), underflying 4 passes of ERS-1 and 2 over an area of the Mojave Desert, California. The AVIRIS data will be used to map water vapor over an area of about 10x20 km, which will be correlated with interferometric phase delays in the ERS data.

Keywords: ERS, interferometry, DEM, deformation

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