



Study of structural change in volcanic and geothermal areas using seismic tomography

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Long Valley caldera is a large silicic volcano. It has been in a state of volcanic and seismic unrest since 1978. Farther escalation of this unrest could pose a threat to the 5,000 residents and the tens of thousands of tourists who visit the area. We have studied the crustal structure beneath 28 km X 16 km area using seismic tomography. We performed tomographic inversions for the years 2009 and 2010 with a view to differencing it with the 1997 result to look for structural changes with time and whether repeat tomography is capable of determining the changes in structure in volcanic and geothermal reservoirs. Thus, it might provide a useful tool to monitoring physical changes in volcanoes and exploited geothermal reservoirs. Up to 600 earthquakes, selected from the best-quality events, were used for the inversion. The inversions were performed using program **simulps12** [Thurber, 1983]. Our initial results show that changes in both V_p and V_s were consistent with the migration of CO_2 into the upper 2 km or so. Our ongoing work will also invert pairs of years simultaneously using a new program, **tomo4d** [Julian and Foulger, 2010]. This program inverts for the differences in structure between two epochs so it can provide a more reliable measure of structural change than simply differencing the results of individual years.