



Seismic images of the tremor region at the San-Andreas-Fault system around Cholame

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We present seismic images of the Coast Ranges and the San-Andreas-Fault system in Central California including the non-volcanic tremor region around Cholame. The seismic images have been obtained by applying the advanced seismic imaging techniques (Fresnel volume migration) to the industry seismic reflection data set WSJ-6. The reflection profile was acquired in 1981 over a distance of about 180 km from Morro Bay to the Sierra Nevada foothills running across several prominent fault systems, e.g. the Rinconada fault in the western part as well as the San Andreas fault in its central part. The latter includes the region of increased non-volcanic tremor activity near Cholame, as reported by several authors.

We are able to image the crust and the uppermost mantle down to approximately 40 km depth by recorrelating the original field data to 26 seconds two-way traveltimes. A 3D tomographic velocity model derived from local earthquake data (Thurber et al., 2006, Lin et al., 2010) was used. The imaging technique was implemented in 3D taking into account the true shot and receiver locations. The imaged subsurface volume itself was divided into three separate parts to correctly account for the significant kink in the profile line near the San Andreas fault.

The most prominent features in the resulting images are areas of high reflectivity down to 30 km depth in particular in the central western part of the profile corresponding to the Salinian Block between the Rinconada fault and the San Andreas fault. Southwest of the San Andreas surface trace a broad zone of high reflectivity is located at depths between 20 km to 35 km. Non-volcanic tremor events that were located by Nadeau et al. (2009) appear southwest of the San Andreas fault below the seismogenic zone down to depths of approximately 30 km. Most of the tremors are located at the top of the high reflectivity body and below a strong southwest dipping reflector that may be interpreted as the base of the Salinian Batholith.

In the area of the San Joaquin Valley along the eastern part of the profile line slightly west dipping sediments show up between depths of 2 km to 10 km. These sediments are folded and faulted below the region of the Kettleman Hills. Steeper west dipping reflectors can be identified below the uppermost sedimentary layers down to depths of approximately 20 km.

The resulting images are compared to existing interpretations and discussed in the frame of the suggested non-volcanic tremor locations in that area.