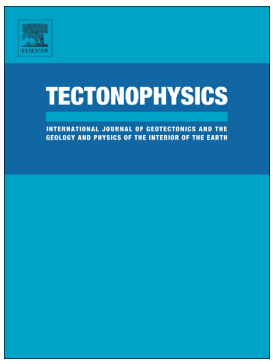

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Local earthquake tomography of the Jalisco, Mexico region

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Abstract

The states of Jalisco, Colima, and Michoacán in western Mexico overlie the boundary of the subducting Rivera and Cocos plates, presenting an ideal target for seismological inquiry to better understand the resulting mantle flow and regional volcanism. The different dips between the two subducting plates are thought to provide a mantle conduit that has contributed to the Colima Volcanic Complex (CVC), but there is considerable debate on the depth of the Rivera plate and width of the resulting conduit. With data from the Mapping the Rivera Subduction Zone (MARS) and Colima Deep Seismic Experiment (CODEX) networks, two temporary broadband arrays deployed in the region between 2006-2008, we inverted for three-dimensional P- and S-wave velocity as well as Vp/Vs structure of the upper ~70 km of the crust and mantle in the Jalisco region. Using a newly-developed automatic P- and S-wave picker, we increased P picks by ~74% and S picks by more than a factor of four compared to a database of manual picks for the 803 earthquakes used in the inversion. Additional relocated earthquakes extending to the trench are consistent with previous interpretations of the Rivera and Cocos plate interfaces. Areas of high Vp/Vs above both subducting slabs suggest the presence of fluids resulting from dehydration of subducted material. Extensive crustal seismicity occurs near these anomalies. A zone of high Vp/Vs is also present under the CVC. We also compare the results of different methods for obtaining Vp/Vs: a direct inversion for Vp/Vs from S minus P times versus simply