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Block structure of San-Francisco zone from the local earthquake tomography

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Here we present the results of local source tomographic inversion of the San-Francisco region. The data set was collected by a permanent seismic network which consists of more than 7200 stations. We used more than 14,000 earthquakes, which were recorded during 2002 to 2006. About 267000 P and 12000 S arrival times were used to obtain three-dimensional (3-D) Vp and Vs models of the crust beneath the San-Andreas fault. Source location and determination of the 3-D velocity models were performed simultaneously based on an iterative tomographic algorithm, LOTOS (Local Tomography Software). We performed the inversion for two different sizes of the study area (600 and 300 km diameter) covering the San-Andreas fault and surroundings areas. The spatial resolution in both cases was tested using a checkerboard test with different sizes of anomalies. We found that for the most areas of the San-Andreas fault we can robustly distinguish the features greater than 15 km of lateral size. The odd/even test, which reveals the role of the random noise in the data, shows very high quality of the data and robustness of the most reconstructed features. The San-Andreas fault which was formed due to a relative displacement between Pacific plate and North American plate has a complex structure of blocks and fault branches. The results of the inversion reveal block structure of the crust within the fault system and show the transition zone from the oceanic to continental crust. Sedimentary rocks of the Central valley were imaged as a prominent low-velocity feature at shallow depths. Comparison with the results of other authors shows rather good general correspondence of the main features.