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LOTOS code for local earthquake tomographic inversion: benchmarks for testing tomographic algorithms

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We present the LOTOS-07 code for performing local earthquake tomographic (LET) inversion, which is freely available at www.ivan-art.com/science/LOTOS_07. The initial data for the code are the arrival times from local seismicity and coordinates of the stations. It does not require any information about the sources. The calculations start from absolute location of sources and estimates of an optimal 1D velocity model. Then the sources are relocated simultaneously with the 3D velocity distribution during iterative coupled tomographic inversions. The code allows results to be compared based on node or cell parameterizations. Both Vp-Vs and Vp – Vp/Vs inversion schemes can be performed by the LOTOS code. The working ability of the LOTOS code is illustrated with different real and synthetic datasets. Some of the tests are used to disprove existing stereotypes of LET schemes such as using trade-off curves for evaluation of damping parameters and GAP criterion for selection of events. We also present a series of synthetic datasets with unknown sources and velocity models (www.ivan-art.com/science/benchmark) that can be used as blind benchmarks for testing different tomographic algorithms. We encourage other users of tomography algorithms to join the program on creating benchmarks that can be used to check existing codes. The program codes and testing datasets will be freely distributed during the poster presentation.