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Crustal structure and Moho depth in the Eastern Mediterranean and Middle East derived from tomographic inversion of local ISC data

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50000 P and S arrival times from ~2000 sources recorded by ~ 250 seismic stations from the ISC catalogue were employed to study a circular area of 6 degrees radius centered on the Dead Sea. All the sources have been relocated in three steps. The first step consists of the absolute location of sources using the arrival times of P and S rays. The theoretical travel times are computed in a 1D spherical velocity model and corrected for inhomogeneous Moho depth. The starting Moho is 1x1 degree resolution model constrained from a-priori information. Special attention in this algorithm was paid to separation of Pg, Sg and Pn, Sn phases and rejection of outliers. In the second location step, the source parameters were corrected using the double difference method. In the third step, the sources were relocated simultaneously with velocity parameters and the Moho topography in a general block of tomographic inversion. The grids for parameterization of velocity distribution and Moho depth variation were constructed according to the ray density. The simultaneous inversion provides 3D P and S velocity distribution in the crust, 2D distribution of Pn and Sn velocities under the Moho, 2D variation of the Moho depth, and four parameters for relocation of each source. Synthetic tests were made to show the ability of the algorithm to resolve different sorts of parameters. The results obtained are consistent with other independent observations. Low velocity patterns in the uppermost layer correlate with the distribution of sediments along the Dead Sea transform. In the lower part of the crust, the tomographic images show evidence of 105 km lateral displacement along the Arava fault. The obtained Moho depth variation between the Dead Sea and Aqaba agrees with results from receiver function analysis and gravity modeling. The distribution of P and S velocity under the Moho shows a sharp contrast between continental (slower) and oceanic (faster) lithosphere.