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Algorithm of local anisotropy tomography and its realization in the Baikal region and Middle East

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We develop an algorithm for anisotropy seismic tomography which provides variable values of seismic velocities along different lateral orientations. The algorithm is based on the information about arrival times from local events recorded at the stations of local and/or regional networks. Preliminary locations of sources is performed using the travel times computed in 1D isotropic velocity model and corrected for station elevations and the Moho depth. Relative coordinates of sources are corrected using the Double-difference method. The anisotropy in each point of the study volume is represented as laterally oriented ellipsoid fixed by four parameters: fast and slow horizontal velocities, angle of the main horizontal axis and vertical velocity. These parameters are obtained in rectangular cells of variable size at a general inversion step simultaneously with Moho depth variations, source parameters (coordinate and origin time corrections) and station corrections. We present here the results of realization of this algorithm to the real data in two regions: Middle East and Baikal rift zone. In the Middle East we observe strong contrast of the anisotropy parameters in the crust coinciding with the Dead Sea transform (DST). Western flank has mostly SN directions of fast P-velocities while in the Eastern flank the orientation of anisotropy is mostly WE. Below the crust, the anisotropy vectors have S-shaped distribution: latitudinal orientations beneath the flanks and longitudinal orientation beneath the DST. The velocity anomalies beneath the Middle East remain similar to the results of isotropic inversion. Beneath the Baikal rift, just under the Moho, we observe clear low-velocity zone. The anisotropy vectors seem to indicate diverging flows from the center of the rift. Beneath the Eastern Sayan zone of Cenozoic volcanism, the observed horizontal anisotropy is almost zero.