



Subsurface structure of St.Elias region based on seismic tomography

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In this study we present tomographic modes derived for the region of St Elias (Southern Alaska) based on local seismic tomography approach. The data set of local tomography was collected by a permanent seismic network which consists of more than 190 stations. We used the data on more than 6800 earthquakes, which were recorded during 2005 to 2008. About 91700 P and 35900 S arrival times were used to obtain three-dimensional (3-D) V_p and V_s models of the crust and uppermost mantle beneath St. Elias Mountains. The tomographic inversion is based on the LOTOS code (Local Tomography Software) which enables simultaneous determination of P and S velocity distributions and source locations. The obtained model covers crustal and uppermost mantle structures down to the depth of 80 km.

The computed seismic models reveal some tectonic structure and processes occurred in the St. Elias region. At 5 and 15-km depth, there appears a clear correlation between anomalous low velocities of P and S-waves and the fold-thrust mountainous belts of the St. Elias mountains. Also there is a connection of the low-velocity anomaly with sedimentary basins which are mostly located in glacial rivers, and with the Chugach - St.Elias Fault. Low-velocity anomalies to the North of St.Elias Mountains correspond to the areas of volcanism. Vertical cross-sections show that the low-velocity anomalies associated with volcanoes are traced down to a depth of at least 80 km.

There are two high velocity anomalies beneath St. Elias region. One of them is sloped northward to a depth of more than 60 km. The direction of this anomaly could be an evidence of sinking the Pacific oceanic plate beneath Yakutat. The second anomaly is located to the North of first one and probably represents the dipping part of the Prince William Sound partly located above the Yakutat block. These high-velocity anomalies form a sandwich shaped structure which control the general tectonic regime of the St Elias region.

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