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Models for the transition zone between „cold" and „hot" upper mantle in the North America

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We examine travel times from controlled source explosions and natural earthquakes up to 3000 km distance in North America. There are significant differences of up to 5 sec in arrival times for distances between 800 and 2500 km below the tectonically stable ("cold") and tectonically active ("hot"), upper mantle. These differences indicate the difference in mantle structure between these two main types of tectonic areas. The most interesting regions are where profiles cross the transition zone between cold and hot upper mantle. We selected two profiles from the "Early Rise" project and registrations of several earthquakes from the territory of USA and Canada at seismological stations along the selected profiles. On the basis of this data we build one and two-dimensional models of the transition between "cold" and "hot" lithosphere. The relatively thick low velocity layer extending from about 100 km to 220 km depth characterizes cold regions. For the "hot" upper mantle this low velocity layer is much thicker, extending approximately from 100 km depth, as for "cold" areas, to about 300 km depth. The transition zone between these two areas is relatively sharp with a total lateral width of only tens of kilometers.