Characteristics of Conrad Discontinuity in the Northern Margin of Tibet Plateau Obtained from Regional Seismic Data

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Qaidam Basin, located in the northern margin of the Tibet Plateau, is the junction of several tectonic blocks. The blocks’ extrusion resulted in large faults and strong historical earthquakes. Previous studies have shown that the crustal structures of the eastern and the western Qaidam Basin are obviously different. In this study, the seismic reflection and refraction phases from Conrad and Moho discontinuity in Qaidam Basin are distinguished by waveform simulation and travel time fitting of 3 regional earthquakes on 32 stations. The results of travel time fitting and waveform simulation show that the first arrivals in the epicenter range of 90km ~ 260km are the P* phases from the Conrad discontinuity. The depth of Conrad discontinuity under the eastern basin is about 4 km shallower than that in the western basin, which can be attributed to different crust thickening models between the eastern and western basin. In addition, the focal depths of regional earthquakes occurred within recent 5 years in Qaidam region also shows the difference of the Conrad discontinuity. The Conrad discontinuity is considered to be the lower boundary of the low velocity layer in the upper crust. The upper crust thickening in the western basin led to the sinking of the layer, while the multiple thrusts resulted in the rise of the lower crust in the east. The two different effects could interpret the depth change of the Conrad discontinuity in the basin from the west to the east.