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Variation of crustal thickness in the Central Zagros (Fars Province) using teleseismic waves

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Extended Abstract

Summary

We compute P receiver functions to investigate the Moho discontinuity beneath the Central Zagros (Fars Province) in Iran. We selected data from teleseismic events (Mb ≥ 5.5, 30 ˚<△< 95˚) recorded since 2002 to 2016 at three-component short period and broadband stations from Shiraz Telemetry Seismic Network and Ghir three-component broadband stations. The P to S converted phases from Moho discontinuity are observed. The results show that the Moho discontinuity under the Shiraz Network is not flat topography. The results are consistent with previous studies in the region and are obtained using the number of stations added in the region.

Introduction

The continental collision between the Arabian and Eurasian plates results in a complex deformation within Iran, and is controlled by the continuing convergence of the Arabian plate toward the Eurasian plate. It is assumed that most deformation is accommodated in the major mountain belts (Zagros and Alborz) with large reverse faults. The depth of Moho is an important parameter to characterize the structure of the crust. Furthermore, it provides significant constraints on tectonic evolution of the region. The high seismicity and complex tectonic structure in central Zagros provide an ideal study area for investigation of crustal thickness. The main goal of this paper is to resolve the Moho discontinuity and its lateral depth variation beneath central Zagros of Iran. We calculate the P receiver functions beneath each station.

Methodology and Approaches

Data selected from teleseismic events (M_b ≥ 5.5, 30 ˚<△< 95˚) recorded between 2002 to 2016 at 11 short periods and broadband stations. Methodology of P receiver functions analysis is used in this paper. Receiver function (RF) method is now a well-known tool for studying crustal thickness when such a complete data set is available. As the P-to-S conversion points at the Moho is laterally close to the stations, the Moho depth estimation is less affected by lateral velocity variations, and thus, provides a good point measurement. A time window of 110 s is considered, starting from 10 s before the P-onset arrival time. First, the instrument response is deconvolved from the original records. ZNE components are then rotated into the local LQT ray-based coordinate system. A low-pass filter of 2 s is applied to the P receiver functions (PRFs). They are stacked after move-out correction for a reference slowness of 6.4 s/°.

Results and Conclusions

First of all, we calculated PRFs for each station, and then, the Moho depth was estimated only from the delay time of the Moho P-to-S conversion phases. Then, we used the model of velocity from previous study in the central Zagros to estimate crustal thickness under each station from P-to-S converted waves in receiver functions. The average Moho depth is approximately 50.0±3 Km and varies from 32.0±3 to 60.0±3 km. Shallower Moho is found under the KAZ1 station and deepest Moho is found under QIR1 station. Our results show that the Moho discontinuity is not flat under the Central Zagros region.