Determination of Moho depths in Ilan plain by receiver function analysis

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Abstract

The Ilan Plain (IP) in northeast Taiwan is located at the southwestern tip of Okinawa Trough and bounded to the northwest by the Hsueshan range and to the south by the Central Range. While Okinawa Trough is formed by back-arc spreading, the Hsueshan and Central mountain ranges are deformed Eurasian continents. Knowing the distributions of crustal thickness here is crucial to distinguish the portions of continental lithosphere from those of oceanic lithosphere in IP.

To this end, we deployed ten broadband stations in south IP since Nov. 2013, distributed at both side of the northeast extension of the Lishan Fault offshore Ilan Plain which connects with the spreading axes of the Okinawa Trough. The broadband array has recorded significant amounts of data from teleseismic events, mostly from the northeast and southeast quadrants. We apply receiver function analysis to examine the arrivals of P_S phase, the P converted to S phase at the Moho. The analysis is done by time-domain iterative deconvolution, which progressively subtracted from the radial-component seismogram with the convolution of vertical-component seismogram and updated receiver function.

Results of H-Κ stacking show that the five stations at south of the Lishan fault (SSE、DJE、LLK、SAJ、MSE) exhibit the most coherent energies with Moho depths. By contrast, rest 5 stations at north of the Lishan fault (SJY, DTE, NCH, NCE, DHE) without robust results of H-Κ stacking might suggest complicated Moho beneath or simply not enough data for stacking. So we estimated the average κ value of stations at north of the Lishan fault and found corresponding Moho depth for each station. The average κ value is 2.058 and the estimated Moho depth of north part is 26.1(SYJ), 27.3(DTE), 27.9(NCH), 27.7(NCE), 25.2(DHE) and south part is 27.8(SSE), 26.5(LLK), 30.3(DJE), 25.4(SAJ), 28.6(MSE).

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