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Crustal thickness estimates beneath four seismic stations in Ethiopia inferred from p-wave receiver function studies

Moho depths beneath four Ethiopian Seismic Station Network (ESSN) are estimated from P-wave receiver functions (RF). We used high quality seismic data recorded at ANKE (Ankober), DILA (Dilla), HARA (Harar) and SEME (Semera) stations for earthquakes located at epicentral distances ranging from 30 to 100° with magnitude mb ≥ 5.5. We applied a frequency domain deconvolution technique to remove source and propagation path effects. The minimum number of teleseismic earthquakes used is 14 for HARA while the maximum is 39 for SEME station. We achieved a reasonably good fit between the observed and synthetic RFs. The lowest Moho depth is observed at Semera station which implies a thinned crust while the highest crustal thickness is observed at Ankober, which lies along the North western plateau margin. Our results agree with previous observations which strengthen the hypothesis that Moho depths estimated for stations that lie within the rift and rift margins are lower than those located in the plateaus. Our RFs inversions show a low velocity gradient at about 16 km depth at Semera station, interpreted as evidence for lower crustal storage of partial melt.

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