SnT 2025 8 SEPTEMBER ONLINE DAY 9 TO 12 SEPTEMBER AT HOFBURG PALACE, VIENNA & ONLINE
CTBT: SCIENCE AND TECHNOLOGY CONFERENCE

P1.2-373

Moho Depth and Average Lithospheric Structure Beneath the Beni Suef-Siwa Sector, Egypt

Mona Hamada and Hanan Gaber

National Research Institute of Astronomy and Geophysics (NRIAG), 11421, Helwan, Cairo, Egypt

INTRODUCTION AND MAIN RESULTS

We provide an average crustal and upper mantle structure beneath the study area from Rayleigh wave dispersion analysis and receiver function data along the Beni-Suef-Siwa district in the time period 2010 - 2021. Receiver function analysis reveals lateral variations in crustal thickness (29 - 35 km) and Vp/Vs ratio (2 - 2.2) along the investigated district. The inversion of the estimated phase velocities between the two stations indicates ~100 km thick lithosphere.

SnT 2025 8 SEPTEMBER ONLINE DAY 9 TO 12 SEPTEMBER AT HOFBURG PALACE, VIENNA & ONLINE
CTBT: SCIENCE AND TECHNOLOGY CONFERENCE

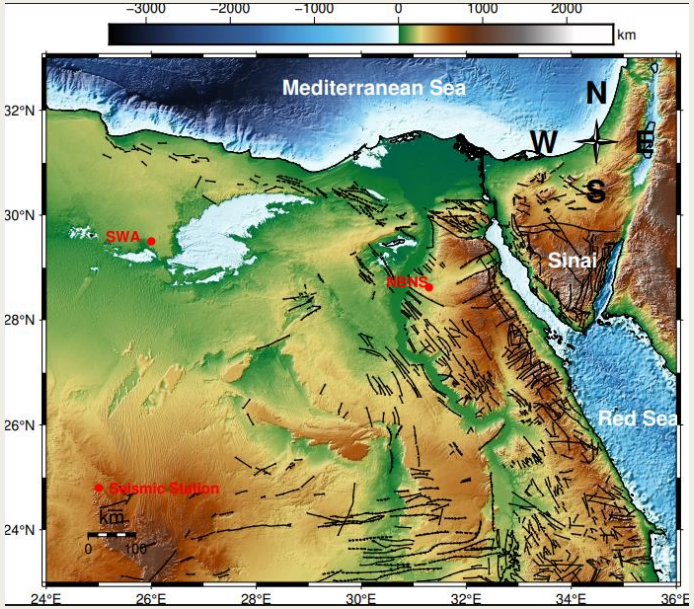
Moho Depth and Average Lithospheric Structure Beneath the Beni Suef-Siwa Sector, Egypt

Mona Hamada, Hanan Gaber

P1.2-373

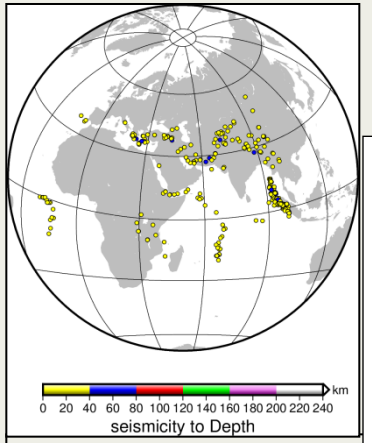
Introduction

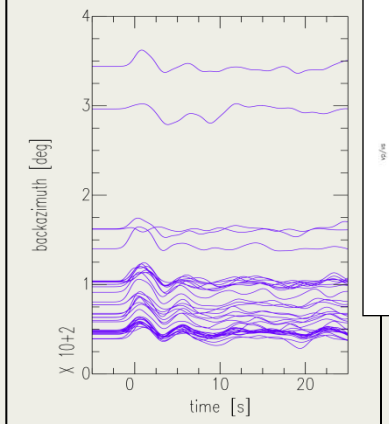
This study aims to estimate an average crustal and upper mantle structure beneath northern Egypt, focusing on determining the crust and upper mantle structure as well as the Moho topography between stations shown on Fig. 1. We employ the receiver function (RF) method is applied to assess the sharpness of subsurface interfaces, particularly the crust–mantle boundary. RF waveforms (RFs) are set of time series data generated by deconvolving the teleseismic horizontal component from the vertical component of recorded seismic waves. This process effectively removes the influence of the seismic source and propagation path.

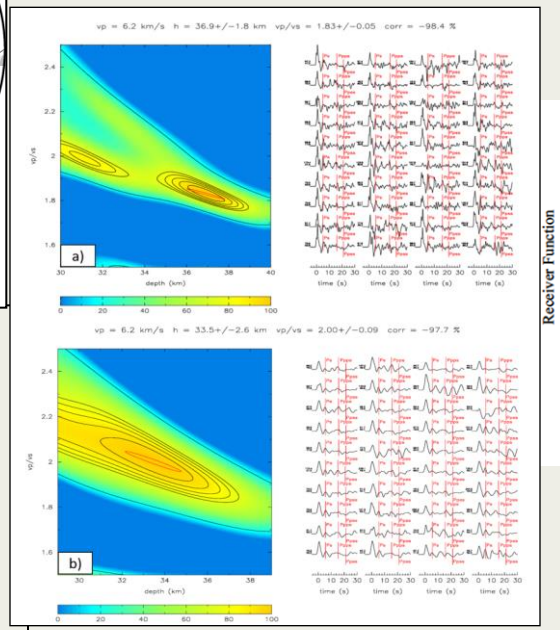


Methods/Data

Selected teleseismic events recorded between 2010 - 2021 are used to compute the RF waveforms. The RFs were subjected to H–K stacking scheme to estimate station-wise crustal thickness and Vp/Vs ratio, respectively. Moreover, we estimated phase velocities between the stations that are inverted for average 1-D Vs model for the entire lithosphere between the stations.

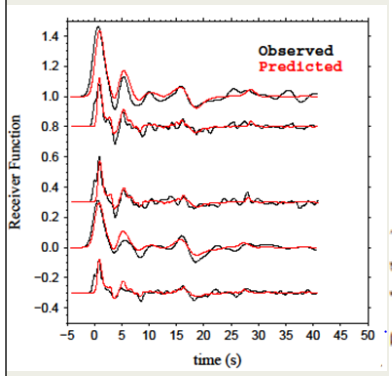


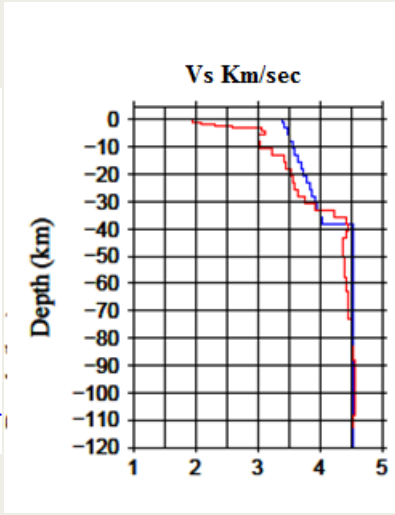




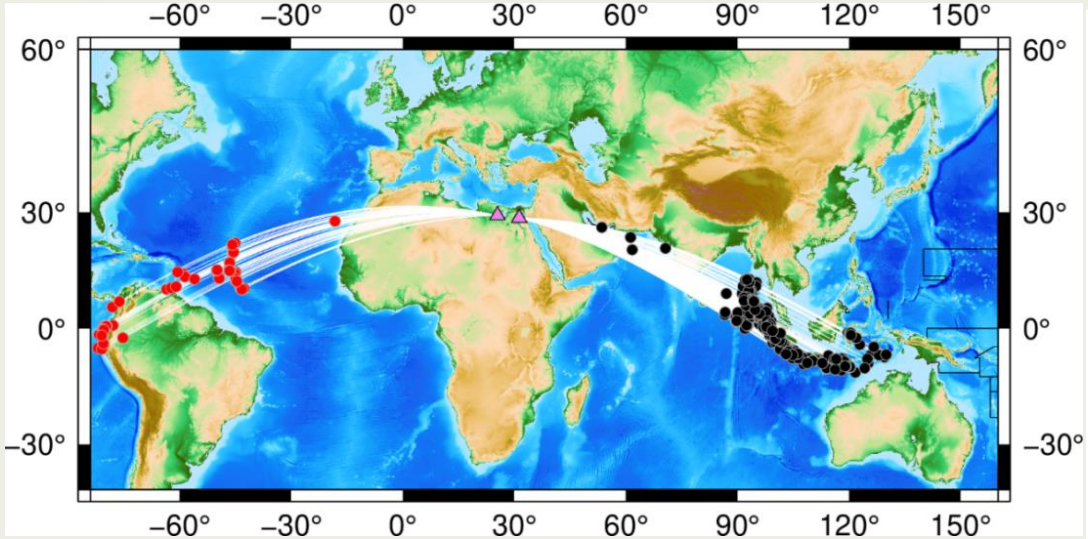
Results

Along the Beni Suef-Siwa district, the estimated crustal thickness vary between 29.2 +/-1.3 km (NBNS) - 33.5+/-2.6 km (SIWA) km, whereas the Vp/Vs ratio varies from 2.13+/-0.07 to 2.0 +/- 0.09 respectively. These values are significantly higher than the global average of 1.7, suggesting the presence of cracked, fructured and jointed limestone.The estimated 1D shear velocity model an average crustal thickness beneath the entire district of about 33 km while the lithopshere thickness is about 100 km.

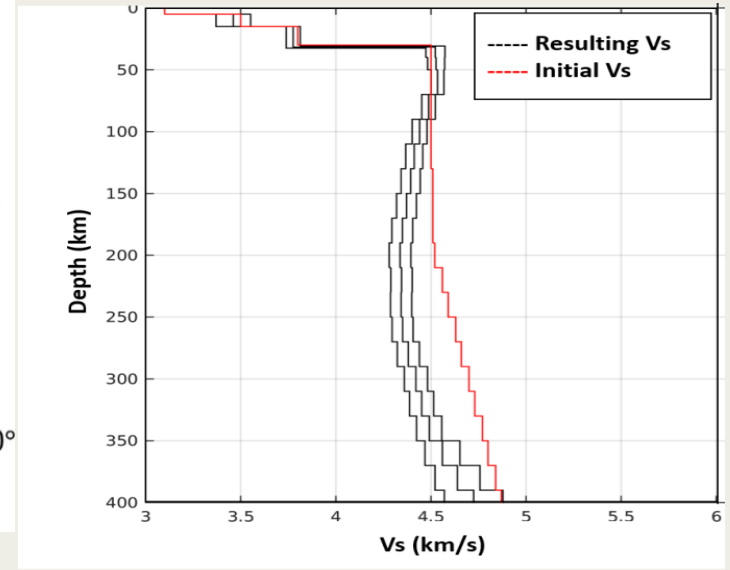




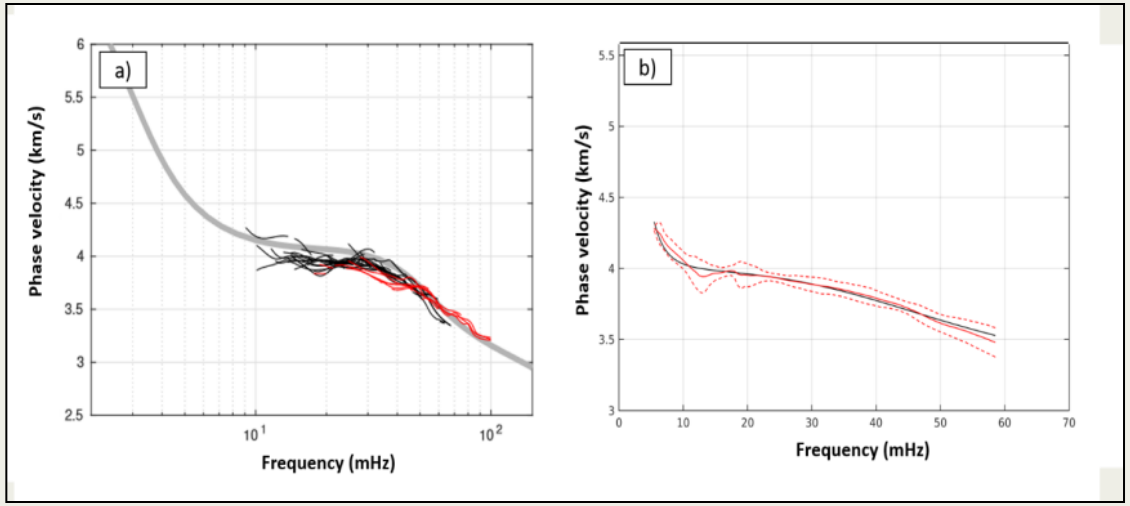
P1.2-373



Earthquakes distribution along great circles between the epicentres and the stations for events used to analyze the propagation of the fundamental mode surface waves. Black and red dots indicate the events from different propagation direction recorded by stations NBNS and SWA.



Final lithospheric 1-D model obtained by the inversion of the measured average phase-velocity curve (thick black lines) for the path NBNS-SWA.



Conclusion

RFs crustal structure velocity models beneath the seismic stations are computed including the crustal thickness of each layer beneath the station and the Moho discontinueity beside the vp/vs for the crustal collumn.It shows 29.2+/-1.3 km in crustal thickness,2.13+/-0.07 in vp/vs ratio and 31 km for Moho Depth and 33.6+/-2.6 km in crustal thickness, 2.00+/-0.09 for vp/vs ratio and 35 km of Moho Depth for ENBS and SWA stations respactively.

In case of Applying the phse velocity dispersions between the selected stations in the same great circle we estimate the inverted 1 D shear velocity model of the structure between NBNS and SWA with lithospher thickness of 100 km and Moho Discontiuiety at 35 km.

According to the new delta project in northern Egypt it is crucial to understanding the subsarface structure and thelithospheric nature in the north western desert.

Outlook- Future work

- Joint inversion of RFs and Dispersion curves
- Adding more stations in the northern Egypt