

# Crustal Thickness and Velocity Structure of Southern Peninsular Malaysia

ABDUL HALIM ABDUL LATIFF<sup>1</sup> & AMIN ESMAIL KHALIL<sup>2</sup>

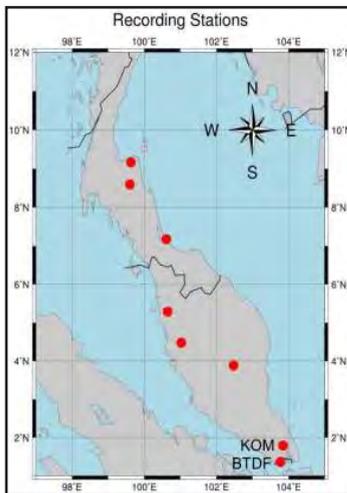
<sup>1</sup>Department of Geosicences, Universiti Teknologi PETRONAS

<sup>2</sup>School of Physics, Universiti Sains Malaysia

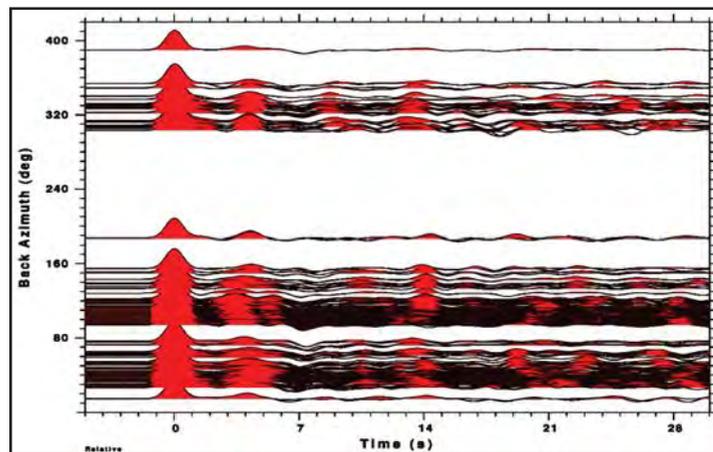
Email: abdulhalim.alatiff@utp.edu.my; amin\_khalil@usm.my

The tectonic setting of Peninsular Malaysia can be described by three distinctive stratigraphic belts, known as Western, Central and Eastern belts. These Western and Eastern belts which were formed during the Paleo-Tethys subduction process in the Late Paleozoic are separated by the Bentong-Raub suture zone. Although there are various study had evaluated this formation process, the geological detail of the region's crust is still unknown. The velocity and detail information of the Earth's crust is crucial in determining the earthquake's location and seismic hazard. Since the cost to conduct a large scale geophysical study to determine the Earth's structure is high, a better and efficient method is by incorporating the receiver function method. The receiver function is computed from the tele-seismic earthquake waveform which involve P-wave, P-S wave and pPpS + pPs multiple phases recorded by a three-component seismogram. In this work, the data recorded at the two

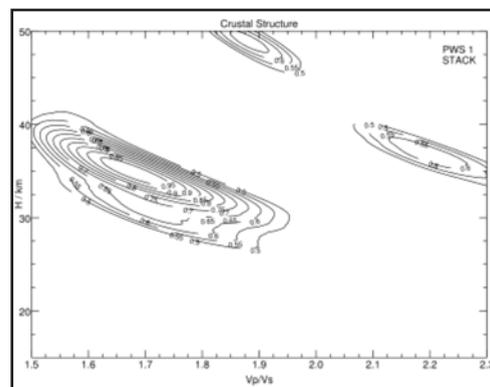
broadband seismometer stations located in Kota Tinggi, Johor (KOM station) and Singapore (BTDF station) (Figure 1), were investigated for the receiver function analysis, crustal thickness estimation through H-k method and waveform inversion for 1-D velocity. There are a total of 448 (for KOM station) (Figure 2) and 73 (for BTDF station) tele-seismic earthquakes which occurred in between 2005 to 2016, were evaluated for the crustal thickness and velocity structure analysis. From the H-k thickness analysis, the Moho boundary was found at 35km (Figure 3) and 30km for region beneath KOM and BTDF stations respectively, while the 1-D velocity profile indicate a gradual velocity increment from Conrad boundary (around 18km depth) to Moho thickness in both cases. The findings of these stations' crustal thickness are consistent with the past findings although it also indicates the thickness for southern Johor and Singapore is more similar to the Western belt of the Peninsular Malaysia.



**Figure 1:** The map of Malay Peninsula shows the location of broadband seismometer station (red dot) used for receiver function analysis.



**Figure 2:** Receiver function of KOM station as a result of waveform rotation and deconvolution process. There are 448 waveforms analyzed from tele-seismic earthquake in between 2005 – 2016.



**Figure 3:** H-k contour map indicates the thickness of crust-mantle boundary (y-axis) vs.  $k$ ,  $V_p/V_s$  ratio (x-axis). The thickness beneath Kota Tinggi region (KOM station) was found at 35km with  $V_p/V_s$  ratio at 1.68.