EOS’s broadband seismic network in Myanmar: installation, site classification, Local seismicity reports and velocity structure studies

Phyo Maung Maung
[ID: P1.2-325]

Research Associate
Earth Observatory of Singapore (EOS)
Nanyang Technological University (NTU)
Singapore.
Abstract

To study the earthquakes and better understanding the tectonic in Myanmar, EOS-Earth Observatory of Singapore has been collaborating with local seismic monitoring authority to install (30) broadband seismic stations. With the broadband collected data, we have used them to study the site classification, earthquakes relocation and constrain the velocity structure.

We defined our EOS’s broadband seismic stations site classes by using the H/V spectral ration (HVSR) method from ambient seismic noise. We clearly identified some of our stations on the rock site (EW01, M27) which have resonance frequency larger than 5.0 Hz and less than 1.6 Hz are defined as soft soil (EW05, M022). This classification is based on the NEHRP – National Earthquake Hazards Reduction Program (NEHRP) site classes.

From the initial automatic location that we have selected and relocated ~1000 earthquakes which we found that all these local earthquakes well defined the Indian slab beneath Myanmar region. Moreover, use selected teleseismic events located between 30-90 degree to image Moho beneath seismic stations using P-receiver function and H-K stacking technique to get crustal thickness and Vp/Vs ratio.
INTRODUCTION

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Phyo Maung Maung, Earth Observatory of Singapore (EOS), NTU
mmphyo@ntu.edu.sg / uphyommg@gmail.com

Seismotectonic of Myanmar

In seismotectonic map, Blue stars indicate epicenters of recent widely felt intensity earthquakes from 2016 to 2018 and red are historical destructive earthquakes and significant earthquakes epicenter since 18th century.

We can see clearly the subducted slab in the cross section of ISC-GEM seismicity which goes to 150 km depth deep. There are no deep earthquakes in the area of between Latitude 18 to 14 degree North.
EOS’s broadband seismic network in Myanmar

(a) Vault design for our broadband seismic stations by director of technical office
(b) and (c) are site installations photo by EOS, DMH and MEC
(d) Screen view of real time Earthworm monitoring software in EOS, Singapore.

All the EOS’s broadband seismometers used Quantera Q330S seismic recorder with 100 sampling rates per second.

20-stations are Streckeisen STS2.5 (Kinematic product) and another 10-stations are Nanometrics Trillium 120P sensor provided by Academia Sinica, Taiwan.
Empirical Vs30 Map from global topography [Wald and Allen, 2007; Allen and Wald, 2009] is available for Myanmar region and superimposed with our HVSR study results which is the horizontal to vertical spectral ratio (HVSR) method from ambient seismic noise of each EOS seismic station.

EOS broadband seismic stations EW01, M024 (rock site class SC1, A+B(NEHRP)) and M012, M022 with soft soil class SC4, E+F(NEHRP) by using 1-hour ambient noise from three-component broadband seismometer.

Each (60) seconds single trace of the resonance frequency and corresponding HVSR amplitude value can see in different random color pattern and thick solid line and dash lines are average HVSR and its 95% confidence level, respectively.
All the selected earthquakes (~1000 events) which detected from EOS broadband seismic network in Myanmar and each event has detected from at least minimum 10-seismic stations to do (HypoDD) double different earthquakes relocation.

Relocated events hypocenters from local seismicity are clearly show smaller size of magnitude earthquakes which detected from EOS networks are correspond to India slab pull in Myanmar region.
Crustal thickness beneath our EOS stations

(a) Moho converted (Ps) phases on the radial receiver functions (RFs)
(b) transverse receiver function with increasing ray back-azimuths for our broadband seismic station EW02.

HK stacking results of EW01 and EW02 (western coast of Myanmar [Zhu and Kanamori, 2000].

Preliminary crustal thickness (Moho depth) beneath the EOS’s broadband seismic stations in Myanmar and plotted together with Crust 1.0 global model in background.
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CONCLUSIONS

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• Moreover, use selected teleseismic events located between 30-90 degree to image Moho beneath seismic stations using P-receiver function and H-K stacking technique to get crustal thickness and Vp/Vs ratio.

Disclaimer: The views expressed on this poster are those of the author and do not necessarily reflect the view of the CTBTO.