

Source Spectral Discrimination between Shallow Earthquakes and Quarry Explosions in Northern of Egypt

In this study, the P- and S-wave observed velocity and displacement source spectra from earthquakes and Quarry explosions with similar magnitudes were analyzed and compared. We have examined 1755 vertical component seismograms of 244 earthquakes and 239 Quarry explosions with magnitudes $M_d=1.5-3.3$ between 2009 to 2015 recorded by the Egyptian National Seismic Network (ENSN) in northern Egypt at epicentral distances of up to 200 km in order to develop a criteria for qualitative and quantitative discrimination between shallow earthquakes and quarry explosions based on differences in their spectral properties. The computed spectra were corrected for site, propagation path and instrumental effects for each recorded station. Based on omega-square fitting Brune's model, the source parameters of seismic moment (M_0), corner frequency (f_c) and moment magnitude (M_w) were determined from corrected displacement spectra then the quantitative analysis is performed. Results of this study show that the quarry explosions spectra decrease more sharply at high frequencies than earthquakes of the same estimated magnitudes, leading to lower corner frequency estimates. Moreover, earthquake velocity spectra contain high-frequency energy compared with the spectrum of the quarry explosions. A scaling relations were constructed between $M_0(P,S)-f_c(P,S)$, $f_c(P)-f_c(S)$ and $f_c(P)/f_c(S)-M_w(P,S)$; it reflect an effective separation between earthquakes and explosions.

Primary author: OTHMAN, Adel (National Research Institute of Astronomy and Geophysics (NRIAG))

Presenter: OTHMAN, Adel (National Research Institute of Astronomy and Geophysics (NRIAG))

Track Classification: Theme 3. Verification Technologies and Technique Application