Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SSS30-15 Room:A05 Time:May 25 14:30-14:45

High-frequency falloff exponent of source spectra: Case of Fukushima-Hamadori and northern Ibaraki area

UCHIDE, Takahiko[1*] ; IMANISHI, Kazutoshi[1]

[1]Geological Survey of Japan, AIST

The moment spectra, often referred to as the source spectra, have been investigated to characterize the earthquake source processes. The omega-square model has often worked as the standard model for the source spectra. The model has flat spectra in the lower frequencies and the falloff proportional to ω^{-2}, where ω is angular frequency, in the higher frequencies. The corner frequency dividing those two frequency bands represents the inverse of the source duration and therefore indicates the source size and then the representative stress drop.

The high-frequency falloff exponent is also an important source parameter. Although 2 of the exponent is often applicable, the exponent other than 2 is sometimes reported [e.g., Venkataraman et al., 2006; Allmann and Shearer, 2009]. Uchide et al. [SSJ Fall Meeting, 2014] found 1.6 of it in Hamadori (Coastal area) of Fukushima Prefecture and northern Ibaraki Prefecture, northeast Japan, by the stacking method [Shearer et al., 2006], while 2 worked well in the Tohoku-oki area, northeast Japan [Uchide et al., JGR, 2014]. This result must be confirmed by other method, therefore we here study the spectral ratio between target events and smaller events nearby (hereafter referred to as ”empirical Green’s function (EGF) event”), focusing on the high-frequency falloff exponent.

In order to stabilize the result, we obtain the spectral ratios using multiple time window [Imanishi and Ellsworth, 2006]. In addition, we stack the spectral ratios from multiple stations and all three components by taking the median spectral ratio at each frequency. Then we grid-search the high-frequency falloff exponent in addition to the corner frequencies of both the target and EGF events, and the seismic moment ratio of those events.

In fact, it is difficult to constrain the high-frequency falloff exponent from a single spectral ratio, since there is the trade-off between the corner frequency and the falloff exponent. Therefore we simultaneously fit the spectral ratios between the specific target and different EGF events, assuming the common corner frequency of the target event and the common falloff exponent for the target and EGF events. The preliminary result implies the high-frequency exponent less than 2.0 for some events, while some other events prefer 2.0 of the exponent. Finally we will discuss the cause of the variation in the high-frequency falloff exponent.

Keywords: earthquake, spectral study, spectral ratio