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Estimating maximum seismic accelerations with micro-tremors - Maximum S and micro-tremors -

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[1]TRIES

In the last meeting of JPGU we reported apparent linear relations between the maximum amplitudes of acceleration of surface waves from the 2004 off the Kii-Peninsula and the 2007 Noto -Peninsula earthquakes and the micro-tremors at seismic stations developed by Tono Research Institute of Earthquake Science (TRIES) in Tono region, Central Japan. Based on this result we emphasized that largest amplitudes of seismic accelerations generated by future earthquakes at points of TRIES network will be predicted from the spectral amplitude of micro-tremors with high credibility. On the other hand largest seismic amplitudes appear by S waves from local earthquakes close to TRIES network. Thus we investigate the relations between maximum amplitudes of S waves from not only the foreshock of off the Kii-Peninsula as well as Noto Peninsula earthqquakes but six medium- and small-size earthquakes and averaged amplitudes of micro-tremors observed just before the six earthquakes. The spectral amplitudes are calculated from the Fourier Transform, and the averages of micro-tremors have been obtained from the simple sums of spectral peak values of each event in the frequency range from 2.0 to 4.0Hz, or simple means of all spectral peek values observed in the same frequency range. In the two cases of Kii-Peninsula and Noto-Peninsula earthquakes, original data of 7sec. from the onset of S wave are analyzed, while original data of 3 sec. are analyzed as the S wave oscillations in case of the six local earthquakes. The Hanning Weight is applied to reduce the truncation errors for the Fourier Transform in this case. Obtained results show clear linear relations between the maximum S amplitudes and the mean amplitudes of micro-tremors. Some network sites may be classified into the two special categories; one is the site where large mean amplitudes of micro-tremors are observed with rather small seismic maximum S wave amplitudes, and the other is the site where small mean amplitudes of micro-tremors are observed with large seismic S wave amplitudes. This tendency may be easily understood by the micro-tremor characteristics of the white noise of the power density spectra of statistical random process, and large amplifications of sinusoidal seismic oscillations of soft sedimentary layers in the basin of hard rock layers. These results indicate that the mean amplitudes of micro-tremors will be successfully applied as an convenient measure together with other information such as geography and geological information to predict maximum spectral seismic amplitudes and this method may be used for seismic hazard mitigation.

Keywords: S wave, micro-tremor, Fourier Transtrm, ground soil, seismic hazard, maximum amplitude