Geophysical Research Abstracts,
Vol. 10, EGU2008-A-10210, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-10210
EGU General Assembly 2008

Spectral analysis of seismic waves in natural and artificial events in the Earth crust

A. **Kholodkevich E.D**, B. Dolgikh G.I., C. Navrotsky V.V.

V.I.Il'ichev Pacific Oceanological Institute FEB RAS, Russia

(helen@poi.dvo.ru

| Phone: +7 4232 31 25 68)

Analysis of the Earth crust microdeformations measurements carried out with the help of a laser strainmeter at the Japanese Sea shore let us to determine as common so some individual properties of different seismic events in the Earth crust. As a common property we can indicate very narrow range of periods (frequencies) of seismic waves (SW) propagating for long distances from their sources. That can be caused by mechanical properties of the Earth crust (cascading cracks in time of earthquakes) and by resonance mechanism of SW propagation, the Earth crust from surface till the Mokhorovichich boundary being the resonator.

For spectral analysis we used mainly Hilbert-Huang method for analysis of non-stationary and nonlinear processes with Hilbert transform of orthogonal empirical modes of the registered data. The SW frequency reveals itself as a maximum, after which a sharp decline of deformation energy is observed. As a rule, the SW energy is not related to the energy of large scale deformations, which also form maxima in the Hilbert-Huang spectra and can have different origin. In the case of Tsunami (December 26, 2004) we observed coincidence of times for a large scale disturbance and a SW packet, that can be explained by the fact that SW are generated by loading and by striking effects of tsunami wave on shores. In cases of ordinary tidal waves the striking effect is absent and SW are not generated.

The rate of change of deformations energy with time is in most cases higher in the

range of long periods, than in the range of short periods, but no continuous flux of energy along spectrum, characteristic for hydrodynamical turbulence, was revealed. Integral energy in most cases fluctuates with different time scales, but seismic waves do not contribute considerably into these fluctuations.

Artificial disturbances like the explosion in the North Korea on September 9, 2004 can be identified using the following indications: 1) excess of the excited SW energy over the background is negligible or absent; 2) the SW packet length is small; 3) amplitude and frequency fluctuations inside the packet are small; 4) SW attenuation is quick. Naturally, these indicators will not work where an artificial explosion can trigger a natural earthquake.