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C41-04

Multifractal Properties of Low-Frequency Microseismic Noise in Japan, 1997-2008.

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The results of investigating properties of multifractal singularity spectra of low-frequency microseismic noise based on the analysis of broadband seismic stations F-net data in Japan, 1997 – June, 2008, are presented. Singularity spectra were estimated by DFA-method for vertical components with 1-sec sampling (LHZ-records) within adjacent time intervals of 0.5 hour length. Two parameters are analyzed: $\Delta\alpha$ – a width of singularity spectra argument interval and α^* – an argument providing maximum to singularity spectra. For each of 0.5-h time interval a median values (over all stations which have registration) of $\Delta\alpha$ and α^* were calculated forming an averaged time series of $(\Delta\alpha, \alpha^*)$–variations, gathering information from all stations. The time series of $\Delta\alpha$-variations has a statistically significant change of its mean value which began 0.5 years before Hokkaido earthquake M=8.3, 25.09.2003. Time series of α^* –variations estimated for seismic records after coming to 1 minute sampling has a 1-year periodicity before Hokkaido earthquake which disappears after this event. Using analogies with singularity spectra behavior of return-time sequences produced by a system of coupled chaotic oscillators these results are interpreted as a synchronization of low-frequency microseismic noise after Hokkaido event in 2003 which is continuing till now. A question arises whether Hokkaido 2003 earthquake could be a foreshock of future even more strong event in Japan?

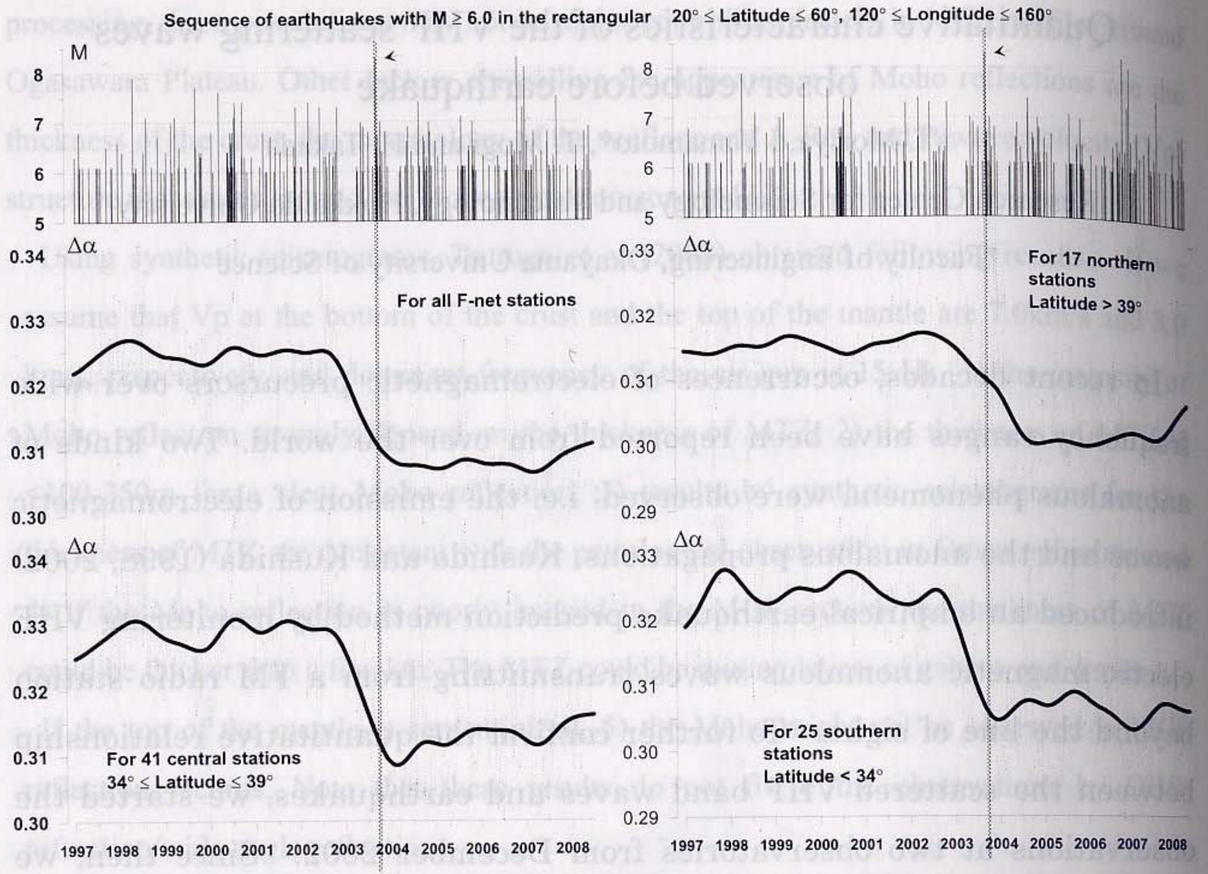

Fig. 1. Upper graphics: sequence of strong earthquakes, arrow indicates Hokkaido earthquake. Mean values: bold lines – computed by Gaussian kernel smoothing with radius 0.5 year, light grey lines – with smoothing radius 13 days, of medians of singularity spectra parameter $\Delta\alpha$ estimated for 1-sec seismic records for singular spectra estimated within adjacent time intervals of 30 minutes length.