



Tidal Variations of Seismic Noise Observed Near the Junction of the Kuril-Kamchatka and Aleutian Arc

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The analysis of the data obtained during the last 30 years has revealed a number of features that indicate the modulation of high-frequency seismic noise (HFSN) by tides and connection of the HFSN with various geophysical processes, including changes in the stress state of the medium during the preparation of earthquakes. This work is not fundamental only, but also applied, which is related to the relevance of the seismic forecast problem. An important property of the tidal influence upon the HFSN was found: the HFSN response is not stable over time. In the 1990s, based on the results received in Kamchatka, a hypothesis about the connection between the variations in the phase of the tidal component of the HFSN and the geodynamic processes in the region was proposed. Later, on the basis of long-term field observations, it was shown that the tidal sensitivity of the HFSN is most stable and statistically significant during the preparation of large local earthquakes. The observed effect of synchronization of these processes is the basis for the technique of forecasting of large local earthquakes. The originality of this technique is the use of the Earth tides as the reference signal with known characteristics for studying the microseismic radiation features. The basic element of the methodology is experimentally revealed in 1992-1995 effect of stabilization of the phase shift $\Delta [U+F06A]$ between the selected wave of the tidal gravitational potential and the harmonic selected from the HFSN envelope with the same tidal period. Synchronization of the HFSN with the tides, manifested as stabilization of the phase shift, is considered as a predictive feature and is a new, previously unknown precursor of earthquakes [Saltykov, 2017]. HFSN observations continue in the south of Kamchatka for 30 years. Forecast estimates obtained by the above technique are used in the activity of the Kamchatka Branch of the Russian Expert Council on Earthquake Prediction. In 2017, the organization of seismic noise observations in the north of Kamchatka (near Ust-Kamchatsk) was started. This place is located as close as possible to the junction of the Kuril-Kamchatka and Aleutian Arcs. In recent years, seismic activation has been observed here. It may be reflected in the characteristics of seismic noise and its tidal component. Registration is carried out by two different types of equipment: narrowband ($f = 30$ Hz) and broadband ($f = 1-200$ Hz). The report presents materials related to the detection of tidal variations of seismic noise parameters. Of particular interest are data on changes in the behavior of the tidal component of seismic noise in the time zone of a local strong earthquake. This work was supported by the Russian Foundation for Basic Research (project no. 17-05-00185).