# Nontectonic seismicity on cryolitosthere

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In recent years, the interest to the Arctic region has been growing, both in Russia and abroad. The number of seismic stations installed in the Arctic archipelagos has increased significantly. A detailed study of seismicity in the cryolithozone allowed to identify a new sources for the generation of seismic signals that are not related to tectonic activity in the earth's crust. It was found that cryolithosphere destruction processes, such as crevassing, abnormally rapid surging of pulsating glaciers, marginal collapse of outflowing glaciers (calving) overlying to the sea surface (tidal glaciers) generate seismic signals named as a special class seismic events - the "icequake". Part of seismogenic processes causes acoustic emission. Seismoacoustic emission generates 2 types of waves - seismic, propagating in the earth's crust, and acoustic, propagating in the atmosphere. In the spectrum of acoustic waves there are infrasonic waves, which, due to their low frequency, are able to propagate over considerable distances. Integrating seismic and infrasound monitoring can increment scientific knowledge on the mechanisms of geosphere interaction and advance in solving applied problems in the field of life safety and environmental management in glacier areas, in particular, to improve the monitoring systems of dangerous glacial movements on the Arctic coast and the icebergs formation on maritime communications in the Arctic.

The Spitsbergen archipelago (Svalbard) is an ideal territory for studying the processes associated with the movement of glaciers. There are more than 100 glaciers of varying thickness, most of which are pulsating (i.e., subject to short-term movements). At the same time, the archipelago has a good network of seismic stations, both Russian and international, and it is well-accessible for organizing expeditions. The long-term experience of the seismologists of the Russian Geophysical Survey in this archipelago made it possible to identify the main patterns of the occurrence and evolution of seismic processes in the cryolithosphere, to develop original algorithms for detecting and locating seismic events.

The main results of seismoinfrasound monitoring on the Spitsbergen archipelago are follow:

1. Seismic emission generated by glaciers has a seasonal periodic. Activation is observed in the second half of the summer and continues until the end of September.

2. The diurnal variation of seismic emission coincides with diurnal variations in air near surface temperature.

3. After sufficiently intense seismic events caused by calving, aftershock sequences are observed, corresponding to the Guttenberg-Richter law.

4. Seismoinfrasound events generated by glaciers were recorded in the Spitsbergen archipelago by the first time. All events at the edges of the glaciers are generated by calving. If the edge of the glacier located at sea (tide glacier), such collapses lead to the formation of icebergs. Events that occur away from the edges are associated with the formation of cracks (crevassing). To detect and determine the coordinates of seismoinfrasound events, a technique based mainly on the use of seismic records and infrasound monitoring data has been developed.