



Towards implementation of seabed seismological network in Laptev Sea and Mega seeps geo-structural study by 3D active nodal array.

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The current studies were conducted during the 73th scientific cruise to the Laptev Sea as part of the Russian Academy of Science Arctic Research Program onboard of R/V “Academic Mstislav Keldysh”. The network of broad band ocean bottom seismometers (BB OBS) with long term autonomy was installed in order to investigate the Laptev Sea seismic regime and its possible relation to the Laptev Sea shelf permafrost degradation; to detect and locate active tectonic faults and microplate boundaries within the investigation area and to perform deep sounding of the Laptev Sea earth crust by using tele-seismic events. The previous studies showed that the degradation of permafrost in the Russian Arctic seas represents one of the major fast-growing sources of methane emission at the Northern hemisphere. Such phenomenon dramatically affects the present-day climate change and global warming, especially in the Northern hemisphere. There are many observations in the Laptev Sea (mostly with multi-beam echo sounders) of so-called Mega Seeps, which are exhibited as methane gas chimney rising from the seafloor to the sea surface. Year to year observations in the Laptev Sea show a significant growth of the number of existing Mega seeps and their size. The imaging of the seafloor deep structure in the vicinity of the Mega seeps is an extremely important for understanding Mega Seep gas roots and genesis. The deployed array of 4C self-popup nodes and active seismic source was used to solve this problem. This was the first 3D/4C seabed seismic survey performed in the Russian sector of the Arctic.

The design of BB OBSs used for the current installation sustains more than one year of permanent recording and is based on previously developed self-popup OBS designed by the Russian Company GNS (OBS GNS). BB OBS has molecular electronic broad band seismometer (100 sec – 50 Hz frequency range) while also preserves all new advanced features of GNS OBS. GNS OBS were employed for active seismic seabed study of mega seep structure.

The presentation outlines the description of seabed instruments, survey details and results obtained during the performed marine studies.