

Shallow gas hydrate occurrences and its related phenomena on the Sakhalin continental slope, Russia

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The Sakhalin continental slope has been a well-known gas hydrate area since the first finding of gas hydrate in 1980's. This area belongs to the southernmost glacier sea in the northern hemisphere, where sea ice covers most of the area in the winter time. High organic carbon content in the sediment, cold sea environment, and active tectonic regime in the Sakhalin slope provide a very favorable condition for shallow gas hydrate accumulation and gas emission phenomena. Korean–Russian–Japanese international research expeditions (CHAOS, SSGH-I, SSGH-II projects) have been conducted from 2003 to 2015 to investigate gas hydrate occurrence and gas seepage activities on the Sakhalin continental slope, Russia.

During the expeditions, near-seafloor gas hydrate samples were retrieved at more than 30 sites and hundreds of active gas seepage structures on the seafloor were newly registered by multidisciplinary surveys. Near-seafloor gas hydrates occurred at the various water depths from about 300 m to 1000 m, which were accompanied by active gas seepage-related phenomena in the water column, on the seafloor, and in the sub-bottom: well-defined hydroacoustic anomalies of gas emissions (gas flares), side-scan sonar structures with high backscatter intensity (seepage structures), bathymetric structures (pockmarks and mounds), very shallow SMI (sulphate-methane interface) depths and high methane concentrations in seawater. Exceptional findings from the expeditions are gas hydrate occurrences around 300 m in the water depth which is nearly closed to the upper boundary of gas hydrate stability zone in the area and a 2,000 m-high gas flare emitted from the deep seafloor.

Keywords: gas hydrate; gas seepage; Sakhalin continental slope; CHAOS; SSGH