

Submarine Slide on the Eastern Sakhalin Slope: Gas Seeps Setting and Age Determination

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Bathymetric, hydroacoustic, seismic and sonar investigations were performed on the Eastern Sakhalin slope in frames of international projects KOMEX, CHAOS and SSGH in 1998-2007. One of the targets of these investigations was to understand the relationship between methane seeps (representing a part of gas hydrate system) distribution and bottom structure. Summarizing of the data obtained justifies that within the most investigated part of slope between 53° 56'N and 54° 41'N the seeps generally develop in form of more-or-less isolated fields connected with a certain structures.

The largest among these fields corresponds to the submarine slide. Though the slide appearance is relatively weakly expressed and masked by sediments it has typical slide features: slide scars, pressure zone and sediment block zone. Inside the slide the seeps concentrate near gas conduits such as NW-striking slide scar and shallow reverse faults confined to NS-trending pressure zone. The third seeps trend has WE direction; it is probably connected with the shear zones.

An unconformity is clearly distinguished on high resolution seismic profiles as a strong reflector in the slide area. This unconformity subdivides the acoustically transparent cover and underlying bedded and deformed sediments and corresponds to the slide surface. The acoustically transparent layer becomes thinner down the slope with average thickness about 20 m. The rates of sedimentation on the Sakhalin slope are very high (more than 100 cm/kyr) and therefore the age of slide may be as old as 20 ka.

This age corresponds to the late glacial period when the sea level was lower. Dissociations of the gas hydrates at the base of the hydrate stability zone (HSZ) and release of methane during that time probably led to submarine slide forming. Thus we can suppose that seeps activity in this area started in the Late Pleistocene.

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Keywords: Eastern Sakhalin slope; geophysical investigations; submarine slide; seeps setting; age of slide and seeps.