



## The Ice Complex of Western Taymyr, Russia

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The coasts of the Western Taymyr are underlined by perennially frozen ground. Erosion of the coast occurs only during warm period when sea ice retreats from the shore. Recent intensification of the coastal erosion processes resulted from the increase in a duration of ice-free period and increase of mean annual air temperature. Mean annual air temperature has increased by 0.3 deg. C since 1990 year, while mean summer temperature has increased by up to 2 deg. C.

The coasts of Yenisey and Yenisey gulf are mainly composed by fine marine and coastal-marine Quaternary sediments with a subdominant role of the parent bedrocks. Upper 10-15 m of the profile is composed by so called "ice complex". It is a horizon of very icy Pleistocene – Holocene continental sediments of polygenetic origin with an abundance of syngenetic ice-wedges. Investigation of coastal dynamics of the Western Taymyr coasts from Sopochnaya Karga Peninsula to Point Dickson have shown that retreat of thermoabrasive and thermodenudation coasts with an ice complex occurs at a rate of 3-7 m/year.

The ice complex is a unique feature. Numerous publications are dedicated to problems of its origin. Despite series of investigations of ice complex conducted in Yakutia, Chukotka and Alaska, there is no unified theory of ice complex genesis is developed up to date. This is mainly attributed to variety in poly-mineral fractions found in ice complex and differences in cryogenic features. Presently, majority of the scientists agrees that ice complex is polygenetic feature formed in Upper Pleistocene mainly because of eolian, fluvial, deluvial and solifluction processes.

Upper Pleistocene sediments of Western Taymyr coasts that can be classified as ice complex with some unique features were under investigation in 2004 – 2007 years. Sediments are characterized by high organic content (0.6 - 1.2%), mainly alevrite particles (up to 80%). Belt-shaped layered cryostructure and high soil moisture content (60 – 80 %) point on syngenetic conditions of sediment freezing.

Ice complexes are found at interfluves, slopes and old thermokarst drained basins and form the second alluvial terrace of Yenisey River at elevations around 10-15 m a.s.l. Ice wedges found in ice complex is an important indicator of paleo climatic conditions. Differentiation of ice-wedges isotope composition depending on ice age is widely known. Paleo-temperature reconstruction based on oxygen isotope method have shown that January temperatures during the wedge formation period were around -40 deg. C, which is 12-15 deg. C lower than contemporary January temperatures. These conditions occurred in Late Weichselian (Sartan) period around 18 kBP. Ice complex of the second fluvial terrace of Yenisey River had formed at the same time due to regression of Polar Basin more than 300 km north. The ice complex is contemporaneous to deposits of the Last Glaciation of Taymyr and hence is a good indicator of limited distribution of Sartan ice sheet in the region.