

Massive ice contribution to the coastal dynamics at Oyuyacha River mouth, west coast of Baydaratskaya Bay, Kara Sea

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The cryolithological composition and in particular the presence of massive ice in coastal bluffs influences significantly the morphology and evolution of the Arctic coasts. Study area is located on the western coast of Baydaratskaya Bay, Kara Sea, at the coastal section between Torasovey and Levdiev islands. Coastal erosion rates were obtained based on field observations at coastal dynamics monitoring network (1988-2012 yrs) and also as a result of multitemporal aerospace imagery analysis (1964-2005) [Kamalov et al., 2006; Ogorodov et al., 2011; Belova, 2012]. Data on coastal bluff retreat rate were compared with cryolithological parameters and height of the bluff.

Coasts of the study area are represented by the Late Pleistocene-Holocene lake-alluvial plain with altitudes up to 25 m a.s.l. The studied coastal section is characterized by relatively strong longshore wave energy flux. The unidirectional flow of the wave energy begins at the southern end of the Torasovey Island and gradually increases to the southeast. The coast is open for wave and ice impacts from the Kara Sea. On the west coast of Baydaratskaya Bay near the Oyuyacha River mouth the highest mean annual rate of coastal erosion is confined to the coastal section with massive ice deposits. The coastal bluff average retreat rate is 0.8-0.9 m/year (data on 41-year period

1964-2005). Coastal retreat rate increases up to 2.1 m/year (1964-2005) at the sections with massive ice beds outcrops, i.e. here the erosion rate is 2.4 times higher than the average along the coast. In some decades similar coastal retreat rates (2.2-2.5 m/yr for 25 years period 1988-2012) have been recorded at low laid with ice wedges network. Sections of the coast with massive ice beds outcrops should be classified as unstable as for in some years the retreat rates increase dramatically after new exposure arisen.

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References

1. Belova NG. 2014. Massive ice beds of the southwestern coast of the Kara Sea. MAKS Press, Moscow (in Russian).
2. Kamalov AM, Ogorodov SA, Birukov VYu, Sovershaeva GD, Tsvetsinsky AS, Arkhipov VV, Belova NG, Noskov AI, Solomatin VI. 2006. Coastal and seabed morpholithodynamics of the Baydaratskaya Bay at the route of gas pipeline crossing. The Earth Cryosphere X, 3: 3-14 (in Russian).
3. Ogorodov SA, Belova NG, Kuznetsov DE, Noskov AI. 2011. Using multi-temporal aerospace imagery for coastal dynamics investigations at Kara Sea. Earth from Space 10: 66-70 (in Russian).