

The evolution and degradation of coastal and offshore permafrost in the Laptev and Eastern Siberian seas during the last climatic cycle

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ABSTRACT

We investigate the fate of permafrost since the last glacial maximum in the East Siberian Seas, a submergent coastal environment. The shelf here is up to 700 km wide and less than 80 m deep, so that a large area is highly sensitive to changes in environmental conditions. Climate and sea level histories, and the terrestrial and coastal geomorphology of the region are combined with direct observations from drilling campaigns to review existing notions on the distribution, thickness, physical state, and history of the development of terrestrial and offshore permafrost since the last glacial maximum. Drilling transects running perpendicular to the coast in the near-shore zone show that the interface between unfrozen and frozen sediments varies in its angle of inclination as a result of a number of factors primarily including coastal retreat rate. A conceptual model of permafrost development prior to submergence suggest that thermokarst and near shore processes are critical in altering the development of permafrost in the submarine environment.

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