

Abstract

Possible Effects of Sea Ice on Concrete Used in Arctic Conditions [†]

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Abstract: The Arctic region is receiving an increasing attention due to the diminishing area of the permanent ice and easing access to various natural resources including especially oil, gas and rare metals. The nearest future will require building a significant number of new harbors and other structures related to sea operations and exploration. Harsh weather conditions including especially extreme freezing temperatures, snowfall and ice formation impose demanding requirements, which must be taken into account while designing, building and maintaining those structures. Concrete is the main construction material used for harbor structures. Unfortunately, the usage of Portland cement, which is the main cementitious binder used for concrete, it involves hardening processes, which are controlled by the hydration reactions. The hydration needs water and temperatures above freezing point, which impose serious limitations in the arctic environment. Furthermore, later exposure to the arctic conditions and especially to ice may impair its long-term durability and thus the sustainability of built structures. The present work focuses on characterization of properties of sea ice forming in harbors located in the Arctic region and on identification of possible implications on concrete material during the construction phase but also in long-term exploitation.

Keywords: sea ice; arctic conditions; concrete; sustainability



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