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Human impact on the dynamics of the Russian Northern and Far East Coasts

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The northern coasts of Russia, which are composed of dispersive deposits, have poor erosion resistance qualities. In natural conditions such coasts may retreat with a rate of 1 to 5 m a year. Under the influence of human activities this rate can double and even triple.

Over the last twenty years the human impact on the natural coastal geosystems has noticeably increased due to the latest oil and gas developments on the sea shelf and coasts of the Russian North. A range of facilities – oil custody terminals for drilling and production platforms, submerged pipelines, ports and other industrial features and residential infrastructure – are currently being operated in the coastal and shelf zones. In most of the cases no morphodynamic or lithodynamic features of the coastal zone had been taken into account during the construction or operation of these facilities. This results in a disturbance of the sediment budget in the coastal zone, which triggers active erosion of both the shore itself and the coastal slope beneath. The operated facilities themselves are then threatened as their destruction is possible and often than no new facilities can be constructed in the area. The operating companies have to bear forced nonmanufacturing expenses to protect or move their facilities of oil and gas industry to new areas.

We may cite here three instances for Russia where human impact has already brought in negative effects.

One of the examples is Varandei coast of the Barents Sea. From 1979 to 2005 a deliberate destruction of the dune chain of the barrier beach by vehicle traffic and a removal of the beach material for construction needs led to a quick intensification of the coastal retreat here.

Let's move on to Kharasavei coast further east to the Kara Sea. A large-scale extraction of sediments from the coastal slope has resulted in a depletion of the material on the beaches and triggered a violent thermoabrasion of the coast in 1982-1985 and 2006-2008.

Chayvo coast of the Sea of Okhotsk is yet another example. Here the construction of a port and the related dredging activities out in the sea in 2003-2008 have induced a disastrous erosion of the coast so that the water ate away up to 20 m a year of the shore where a proposed oil pipeline intended to be built.

A truly responsible decision making towards the strategy of developing the northern coast of Russia and constructing new facilities is to be based upon an integrated knowledge of the ongoing environmental processes, in particular coastal dynamics. The ignoring of this issue may cause irreversible damage to both the coastal geosystems and the facilities themselves, which, once they are destructed, may drag in enormous environmental implications.