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The Ob Estuary (Kara Sea) Coastal Dynamics Interannual Variability Assessment

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There are several promising gas fields in the Ob Estuary. For their development comprehensive research, including coastal dynamics assessment, is required. To estimate current and speak about future coastal dynamics rates we need to investigate its interannual variability connecting it with variability of major coastal dynamics factors. It is known that in this region one of the main coastal dynamics factors is wave action, which, in turn, depends on wind velocity and direction. Wind data for ice-free period were derived from nearby hydro-meteorological stations.
The research was conducted for two sections of the Ob Estuary coast. One section is located on the eastern coast of the estuary (Taz peninsula); the other is located on the western one (Yamal peninsula). Each of these sections is 10 km length. For key-sites of the coast wave-dangerous rhumbs were determined. For ice-free period of each year accumulated summer storm duration (ASSD) – number of hours with strong winds ($\geq$10 m/s) from wave-dangerous directions – was calculated for both sections of coast. Supposing that coast retreat rate is proportional to number of hours with strong winds from wave-dangerous rhumbs, we can approximately assess interannual variability of coast retreat rate.
Our research revealed that:
1)There are significant (from hours to a few hundreds of hours) differences in ASSD from year to year due to short ice-free period and high variability of wind velocity and direction. So, we can expect sharp interannual differences in coastal retreat rate.
2)The duration of strong winds from wave-dangerous rhumbs during ice-free period is more on the eastern coast of the estuary than on the western. This goes from the predominance of northern and northwestern winds during ice-free period. These winds cause waves leading to coastal erosion on the eastern coast of estuary and don't cause such waves on the western one. However, we can't draw conclusions about the comparative rates of coastal erosion on the western and eastern coasts of the estuary, because they are significantly different in morphology and lithology.
3)The specific years with frequent strong winds from wave-dangerous rhumbs during ice-free period on the western and eastern coasts of the Ob Estuary don't concur. That means, that in the same year, we can see accelerated retreat rate on the one coast of the estuary and stabilization on the other.