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The sea ice drift structures in the Arctic ocean, based on the satellite data (1979-2017)

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The Arctic sea ice area decreasing and its dramatical minimums in the 2007 and 2012 has attracted great scientific interest in the last decade. The thermal factor impact to these processes is undoubted. The task of the authors was to reseach the dynamic factor contribution for the sea ice regime variability.
The use of long-term satellite data series of the sea ice circulation fields (Pathfinder, Ifremer) made it possible to illustrate the significant interannual variability of large-scale drift structures. The main large-scale structures of the Arctic sea ice drift are Transpolar drift and Beaufort gyre. These elements have time cycles with a predominance of different frequencies in the Eurasian and Amerasian parts of the Arctic basin. The intensity and the position of the Transpolar drift and the center of the Beaufort gyre is changing from year to year, creating the conditions for various ice distribution and ice removal. Asynchronous variability in the large-scale structures intensity may lead to the anomalies in the drift fields, where the conditions of multi-year ice formation may vary.
Based on the analysis of the constructed unique drift maps, three main types of ice circulation were identified: 1) with a pronounced Beaufort Gyre occupying a large part of the Arctic Ocean (contributes to the accumulation of ice), 2) with an intense Transarctic Current (creates conditions for the sea ice removal via the Fram Strait), 3) transitive "separating" type. The transitional type of drift contributes to the emergence of the ice opposition, reducing the dynamic interaction between the subbassins – the outflow from the Laptev Sea to the straits of the Canadian archipelago locks the ice in the Amerasian basin, while freeing the Eurasian seas from ice. The condition of ice formation and the temporal structure of ice cover variability are not homogeneous in different parts of the ocean.
Different types of sea ice circulation are formed under the influence of atmospheric pressure over the Arctic ocean. The survey of predominant synoptic types in each year was made for allocation of the types, that can create the conditions for ice accumulation (at an agreeable temperature range), for ice removal and for the sea ice opposition formation.
Using the vectorial-algebraical method the total dispersion, stability and oblongness of an ellipse of the ice drift speed were analyzed in Amerasian and Eurasian subbasins. The highest variability of the sea ice drift characteristics was observed in the Cape Barrow and the Fram Strait, which respond to changes in large-scale sea ice circulation.
Thus, along with the influence of air temperature trends, variations in the structure of the sea ice drift fields in the Arctic Ocean plays an important role in the formation of conditions for the sea ice buildup or dissolving.