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Interannual climate variations in Arctic as driven by the Global atmosphere oscillation

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The present-day global climate change affects the Arctic basin substantially more because of the sea ice cover extinction and the permafrost melting. But there are essential variations of these effects from year to year. We believe that these variations might be a regional manifestation of a planetary-scale phenomenon named the Global atmospheric oscillation (GAO). GAO includes the well-known El Niño - Southern Oscillation (ENSO) process and similar processes in equatorial Atlantic and Indian Oceans within itself.
The goal of this report is to present some arguments to support this point of view. For this goal, we have studied some interrelations between the above-mentioned Arctic anomalies and GAO as seen in global re-analyses of the sea level pressure (SLP) and near surface temperature (NST) for the period of 1920-2013. The mean global fields of SLP and NST have been computed for all El Niño events falling into this time period, and separately, for all and La Niña events. As a result, two (for SLP and NST as well) global fields of the mean El Niño/La Niña difference were obtained.
Statistical significance of the non-zero values of these fields, i.e. the reality of GAO, was evaluated with the t-Student's test. It turned out that the main spatial structures of GAO, presented specifically by El Niño and La Niña events in Pacific region, exist at a very high level (up to 99%, t>4) of the significance. Therefore, one can conclude that the interannual-scale dynamics of GAO is actually reflected in the climate features of different regions of the Earth, including the Russian Arctic. In particular, when the boreal winter season coincides with an El Niño event GAO is indicative by a negative anomaly of NST (about -1°C) and a positive anomaly of SLP over the Arctic basin. In contrary, significant (about +1°C) positive anomaly of NST along with reduced SLP over the whole Arctic region is typical for any La Niña event (up to 95%, t>2).
To control the reliability of GAO, numerical modeling of the hydrophysical variability of the Barents Sea was carried out for the period of the strongest El Niño event during 1997-98. A complex analysis of the modeling results corroborated that:
- the shortage of the transportation of relatively warm and saline North-Atlantic water along with intensification of the encounter water flow of the Polar origin;
- a lowering of overall heat content of water, and a strengthening of vertical convection;
-a weakening of the water dynamic in the system of the general cyclonic gyre take place during the El Niño event.
It is appropriate mention here that the winter of 1997-98 accompanied by an enlargement of Barents Sea ice cover. Thus, a certain deviation from the mean climatic conditions within the marine area under investigation seems to be connected with GAO.