



Flaw polynyas - is it a consequence or one of the reasons of the Arctic oscillation?

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It is demonstrated on the basis of the recent investigations that flaw polynyas are the most important link in formation of weather and climate in the Arctic. Energy that comes from the flaw polynyas in the atmosphere can significantly increase baroclinicity of the atmospheric synoptic eddies stimulating regeneration and stationary position of cyclones. Combined analysis of a sample of cyclone traces passing through the regions of localization of the flaw polynyas in cold seasons of the years 1978-2000 and degrees of polynya development allowed us to confirm the conclusion that in the region of the flaw polynyas cyclones can change their trajectory, can be stationary and become significantly deeper. Values of all the time periods for stationary state and regeneration degree are obtained for all the cyclones in the region of the flaw polynyas. It was revealed that intensity of the cyclone deepening in the region of the flaw polynya could in some cases exceed 1 HPa/hour. Moreover, a very important conclusion was obtained that intensive fluxes of heat and moisture from the polynya surface are capable to generate a local cyclogenesis. Moreover, even relatively small polynyas of the area from 5000 km² can generate, in some cases, air-mass cyclonic formations. Maps of separate seas with an image of real ice conditions and cyclone tracks are presented as an argument of this conclusion. Analysis of meteorological conditions, when cyclone generation in the region of the flaw polynya is possible, was conducted. Transformation of thermo-baric fields for the case of cyclone stationary position in the region of the flaw polynyas was considered. The according variations of climatology of synoptic perturbations associated with frontal zones, energy transportation, cloud fields and precipitation are responsible for behavior of atmospheric climatic structures. Cooling of the surface waters, young ice formation and salinization initiate convective processes and formation of intermediate waters of the "cold halocline" and the shelf water mass. Variations of radiant regime, ice floe state and

thermohaline structure cause the feed-back mechanism in the Arctic climatic system and multi-annual climatic changes. Therefore, the processes of atmosphere and ocean interaction connected with flaw polynyas generate "long-range" direct and feedback relations in the climatic system. Results of studies of inter-relationship of variability of temporal series of flaw polynya areas and temporal series of different indices characterizing climatic variations in the atmosphere and ocean - NAO, AO, index of the solar activity are presented. It was revealed that area variations of the polynyas and index of the Arctic oscillation were the most clearly connected ones. Their correlation coefficients exceeded the value of 0.6 - 0.7. Influence of the processes in the flaw polynyas on ice and hydrological conditions in the Arctic Ocean is of an inertial and cumulative character. Therefore, we have used the method of integral anomalies of flaw polynya areas. Use of this method allowed us to obtain a very significant result having a prognostic value. It was revealed that influence of area variations of the flaw polynyas lead the according variations of the AO index for one year. Cross-correlation of the according series revealed appearance of significant correlation coefficients (0.57 - 0.72) beginning from the fourth and fifth years of advancing, and the maximum correlation coefficient (0.97) was obtained by the shift of 1 year.