On integral description of an individual atmospheric vortex systems: an application to blocking anticyclone in the Arctic

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The task of vortex boundaries setting is one of the most complexes in examination of factors influencing on the vortex (circulation system) development and destruction. In this study a new approach of vortex analysis as a whole system is proposed. It is based on vorticity equation where vorticity (left part of the equation) is defined as time coefficients of EOF-decomposition, which is integrated indexes characterizing individual vortex dynamics. Right part of the vorticity equation depicts internal and external factors influencing on the vortex. It's approbation is done on the example of an arctic-subarctic circulation system including blocking anticyclone in winter 2012 which persisted for a long time over the Atlantic sector of the Arctic and led to the formation of the largest positive air temperature anomalies and the minimum ice cover area in the Barents and Kara seas in the entire history of regular observations. It is shown that the main factor in long-term maintenance of the blocking anticyclone over the Arctic was vorticity advection, which was stabilized by horizontal heat advection.

References
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