



Numerical modelling of the Atlantic Water inflow in Arctic Ocean and Beaufort Gyre fresh water content climatic variability

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Numerical experiments with eddy-permitting model of North Atlantic (from 20°S), Arctic Ocean and Bering Sea (INMOM model, 0.25° spatial resolution, 27 sigma-levels, original splitting algorithms) were performed for the period 1958-2006. Climatic variability of the ocean circulation, temperature, salinity, density, sea surface height, mass transports by main currents and through key straits were investigated. The results were compared to observations and other model output.

Increasing Atlantic Water inflow in Arctic basin through the Fram Strait and Barents Sea was revealed since the beginning of 1990s and in 2004-2006. The relationship between Atlantic Water inflow in the Arctic Ocean and the NAO index variability was shown. Positive trend of Atlantic Water inflow in the Arctic basin through Fram Strait was estimated as 0.061 Sv/year. Beaufort Gyre (BG) fresh water content evolution was analyzed. It has three periods of increasing values synchronous with anti-cyclonic vorticity in the BG: 1960s, 1980s and since 1999 till now.

Mean statistical time scale of the fresh water increase-decrease cycle of in BG is 16 years, what is close to existing estimates. Anti-cyclonic current vorticity forwards BG fresh water layer thickness with 1.75 year time lag. Positive trends of the fresh water content and BG anti-cyclonic vorticity were revealed since the middle of 1970s till now. During this period modelled sea ice area in the Arctic Ocean decreased in accordance with satellite observations.