



A propagating freshwater mode in the Arctic Ocean with multidecadal time scale

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We apply Principal Oscillatory Pattern analysis to the Arctic Ocean fresh water content as simulated in a 500 year long control run with constant preindustrial forcing with the EC-Earth global climate model. Two modes emerge from this analysis. One mode is a standing mode with decadal time scale describing accumulation and release of fresh water in the Beaufort Gyre, known in the literature as the Beaufort Gyre flywheel.

In addition, we identify a propagating mode with a time scale around 80 years, propagating along the rim of the Canadian Basin. This mode has maximum variability of the fresh water content in the Transpolar Drift and represents the bulk of the total variability of the fresh water content in the Arctic Ocean and also projects on the fresh water through the Fram Strait. Therefore, potentially, it can introduce a multidecadal variability to the Atlantic meridional overturning circulation.

We will discuss the physical origin of this propagating mode. This include planetary-scale internal Rossby waves with multidecadal time scale, due to the slow variation of the Coriolis parameter at these high latitudes, as well as topographic steering of these Rossby waves.