The role of wind stress in the Arctic and North Atlantic freshwater covariability

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Motivation

The freshwater content anomalies of the Arctic Ocean, and the Subpolar North Atlantic and the Nordic Seas show a significant anti-correlation. Their size and timing suggest an oscillation (Horn et al. in review).

The evolution of liquid freshwater content in the Subpolar North Atlantic correlates with time series of cumulative AO and NAO indices (Horn et al. in review).

Observed freshwater content anomalies in the Arctic and North Atlantic oceans:

How robust is the link on a longer time scale?

Is there really a link between them?

What is the role of atmospheric forcing?

Methods

Liquid and solid (as sea ice) freshwater content

Lateral fluxes across sections bordering their domains

Redundancy Analysis (RDA)

A technique for identifying pairs of patterns through a regression model.

The method is similar to Singular Value Decomposition (SVD) that maximizes the cross-covariance, but in RDA, the linked patterns are selected by maximizing the predictand variance, as properties of the predictors (i.e. the variable they represent) are irrelevant to the problem.


Example of application followed here: Kauker and Mein (2003)

Results