Propagation of temperature anomalies along the North Atlantic Current

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Abstract:

A simple 2-box model

Figure 1 shows the phases of the NAO forcing for the period of the NAO-like forcing. For very short periods (2 years) a phase delay is observed, similar to that of a second NAO-like forcing. For longer periods the temperature anomalies are advected by the mean currents. The free parameters of the model are the heat fluxes in the southern and northern boxes. For the 8 year period the advection in the northern box is not offset by the local response to the forcing.

Figure 2:

Figure 3:

Figure 4:

Summary

One set of experiments has shown that NAO-like wind and radiation anomalies are able to propagate temperature anomalies in the North Atlantic current. However, the amplitude of the temperature anomalies is strongly reduced. The response timescales are very short for NAO-like forcing periods. For shorter periods (less than 2 years) a phase delay is observed. For longer periods the temperature anomalies are advected by the mean currents. The response is determined by the heat fluxes in the southern and northern boxes, the advection velocity, and the damping timescales.

Abstract:

Formation and Propagation of temperature anomalies

Figure 2 shows the upper 440m heat content and components contributing to its formation and propagation. The anomalies are advected by the mean currents. The oceanic heat transport (which is obtained from the model) is used to determine the five unknowns of the box model: the heat fluxes in the southern and northern boxes, the advection velocity, and the damping timescales.