



IDENTIFYING TWO TYPES OF THERMOHALINE CIRCULATION INTERDECADEAL VARIABILITY

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Decadal to interdecadal oscillations are widely found in ocean general circulation models, under constant heat or freshwater flux, and mixed boundary conditions (relaxation of surface temperature, constant freshwater flux). We demonstrate here that two types of mechanisms exist and we provide several means to distinguish them.

The differences between the interdecadal variability under mixed and constant flux boundary condition are investigated using an idealized coarse-resolution single-hemispheric ocean model.

First, using variance budgets, we show that the energy source sustaining both oscillations differs fundamentally: For constant flux boundary condition (the thermal mode), the downgradient meridional eddy heat fluxes in the western boundary current regions sustain the interdecadal variability. In contrast, for mixed boundary condition (the haline mode), the combination of the positive correlations between temperature (thus restoring surface heat flux) and salinity anomalies, and the convective adjustment is at the heart of the existence of the decadal oscillation.

These fundamental features should allow to identify which type of oscillation is at play in more complex coupled models.