Abstract View

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Interannual Baroclinic Rossby Waves in the Midlatitude North Atlantic

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ABSTRACT

Twenty-six year time sequences of upper thermocline temperature block-averaged in 5-degree latitude and longitude squares reveal strong, in-phase vertical coherence and low to moderate horizontal coherence over 550 km.

Least-squares fitting theoretical cross spectra from a stochastic, first baroclinic mode Rossby wave model to cross spectra of the temperature–time sequences yields several best-fit wavenumber vectors that conform to the dispersion relation of first baroclinic mode Rossby waves in a flat bottom ocean with no mean current. The slope of the midocean ridge, which is as important as midlatitude beta, and the mean circulation were ignored. About 25%–55% of the cross-spectral energy can be attributed to the best-fit waves.

A composite spectrum of the baroclinic potential energy of all the demonstrated Rossby waves is qualitatively similar to the spectrum of North Pacific first baroclinic mode Rossby waves, showing a peak around 6–7 years, but is 30 times larger in magnitude. The geographic distribution of wave energy is curiously congruent with the shape of the midocean ridge.