Propagation of Long Baroclinic Rossby Waves in the Tropical North Atlantic Identified from Profiling Floats

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Abstract

ARGO float data (tracks and temperature profiles collected from April 04 through April 05) are used to detect signatures of the long Rossby waves in current velocities at 1000 m depth and temperature between the ocean surface and 950 m in the zonal band of 4^0N -24^0N of Tropical North Atlantic. Different types of long Rossby waves (with the characteristic scales between 1000 km and 2500 km) are identified in the western [west of the Mid-Atlantic Ridge (MAR)] and eastern [east of the MAR] sub-basins. Along-shore wind fluctuations and equatorial-forced coastal Kelvin waves excited the annual and semi-annual propagating Rossby waves in the eastern basin. These waves are transmitted along wave-guide formed by the shallow African shelf and the MAR. The speed of their propagation varies in magnitude and direction due to bottom topography and irregularity of the coastline. Unstable standing Rossby waves with the annual and semiannual periods are shown in both sub-basins. The decaying waves radiate shorter free Rossby waves propagating both westward and northwestward with speeds limited by 10 cm/s. The standing Rossby waves are probably excited by the wind-driven Ekman pumping alone or in combination with linear and nonlinear resonance mechanisms.