Abstract View

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Annual Cycle and Variability of the North Brazil Current

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ABSTRACT

Current meter observations from an array of three subsurface moorings located on the Brazil continental slope near 4°N are used to describe the annual cycle and low-frequency variability of the North Brazil Current (NBC). The moored array was deployed from September 1989 to January 1991, with further extension of the shallowest mooring, located over the 500-m isobath near the axis of the NBC, through September 1991. Moored current measurements were also obtained over the adjacent shelf for a limited time between February and May 1990. The NBC has a large annual cycle at this latitude, ranging from a maximum transport of 36 Sv (Sv $\equiv 10^6$ m^3 s^{-1}) in July–August to a minimum of 13 Sv in April–May, with an annual mean transport of approximately 26 Sv. The mean transport is dominated by flow in the upper 150 m, and the seasonal cycle is contained almost entirely in the top 300 m. Transport over the continental shelf is 3–5 Sv and appears to be fairly constant throughout the year, based on the available current meter records and shipboard ADCP surveys. The NBC transport cycle is in good agreement with linear wind-driven models and appears to be in near-equilibrium with remote wind stress curl forcing across the tropical Atlantic for much of the year. However, the mean transport of the NBC is 15 Sv larger than can be explained by wind forcing alone, indicating a strong thermohaline component. Mesoscale variability in the region is dominated by fluctuations with periods near 25–40 days and 60–90 days. The 25–40-day fluctuations are strongly surface trapped and are most energetic in early summer during the acceleration phase of the NBC. The lower-frequency fluctuations have a deeper reaching baroclinic structure, are present year-round, and are associated with the propagation of large anticyclonic eddies northwestward along the coast. It is hypothesized that these features

may serve as a catalyst for the eddy shedding process seen in the NBC retroflection in earlier observations.

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