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[Volume 14, Issue 12 \(December 1984\)](#)

Journal of Physical Oceanography

Article: pp. 1829–1841 | [Abstract](#) | [PDF \(1.01M\)](#)

Equatorial Velocity Profiles. Part I: Meridional Component

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(Manuscript received November 14, 1983, in final form September 22, 1984)

DOI: 10.1175/1520-0485(1984)014<1829:EVPPIM>2.0.CO;2

ABSTRACT

A time series or vertical profiles of horizontal velocity was collected in the western equatorial Indian Ocean during late spring of 1976. The meridional velocity component is examined here, the zonal component in Part II of this paper. The profiles have been normalized using a WKB approximation so that they can be analyzed in terms of their vertical wavenumber content and discussed in terms of vertical wavelengths. Autospectral analysis reveals an equatorial concentration of meridional kinetic energy, whose meridional trapping scale decreases as the vertical scale of the motion decreases. Calculations of dropped lagged coherence (DLC) show that the energy in certain wavelength bands is propagating vertically. By using the indicated periods and the linear dispersion relation for equatorial waves, we determine that the observed meridional motion in two vertical wavenumber bands is consistent with the dominance of two mixed Rossby-gravity waves. The first has a vertical wavelength of 1200 sm (stretched meters) propagating energy upwards, the other a wavelength of 450 sm, propagating energy downward. Estimated periods from DLC are 72 days for the 1200 sm wavelength, 57 days for the 450 sm. From the linear dispersion relation, the corresponding zonal wavelengths are ~ 300 and ~ 750 km, respectively.

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