*Geophysical Research Letters*

Supporting Information for

# Tropical Instability Waves and Wind-Forced Cross Equatorial Flow in the Central Atlantic Ocean

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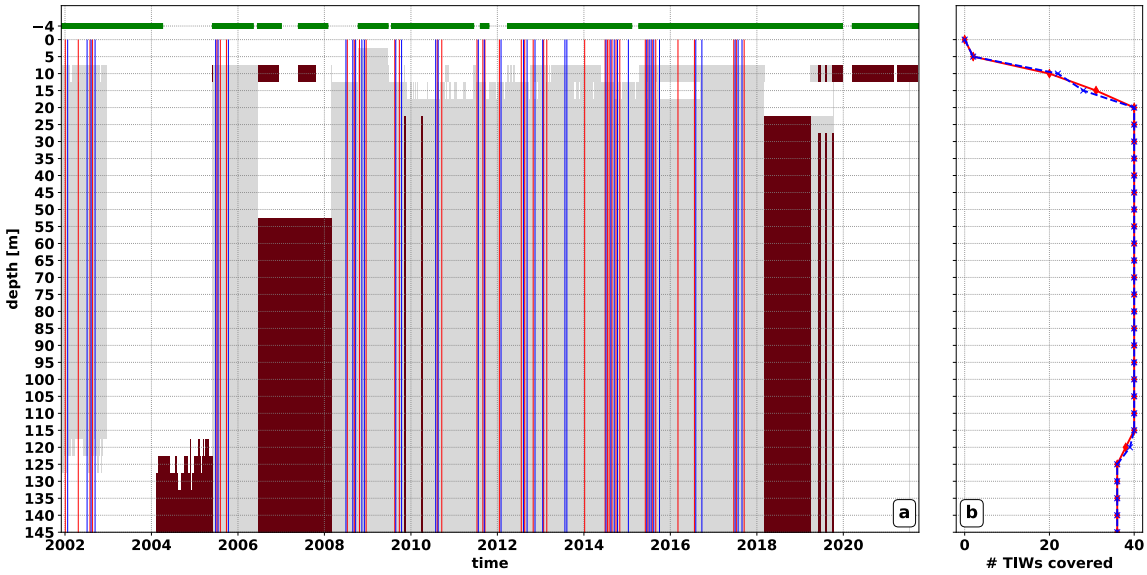


**Figure S1:** (a) Time depth coverage of the mooring wind and velocity data at 0°N, 23°W. Red shaded areas depict periods when data was rejected due to less than 75% data coverage in the upper 75 m. Red and blue vertical lines indicate occurrence of north-/southward TIWs (40 strongest of each kind) that were investigated in this study, respectively. Green line shows availability of 4-m PIRATA wind data. (b) Red and blue lines depict the number of TIWs covered by the available data as function of depth (max. 40)

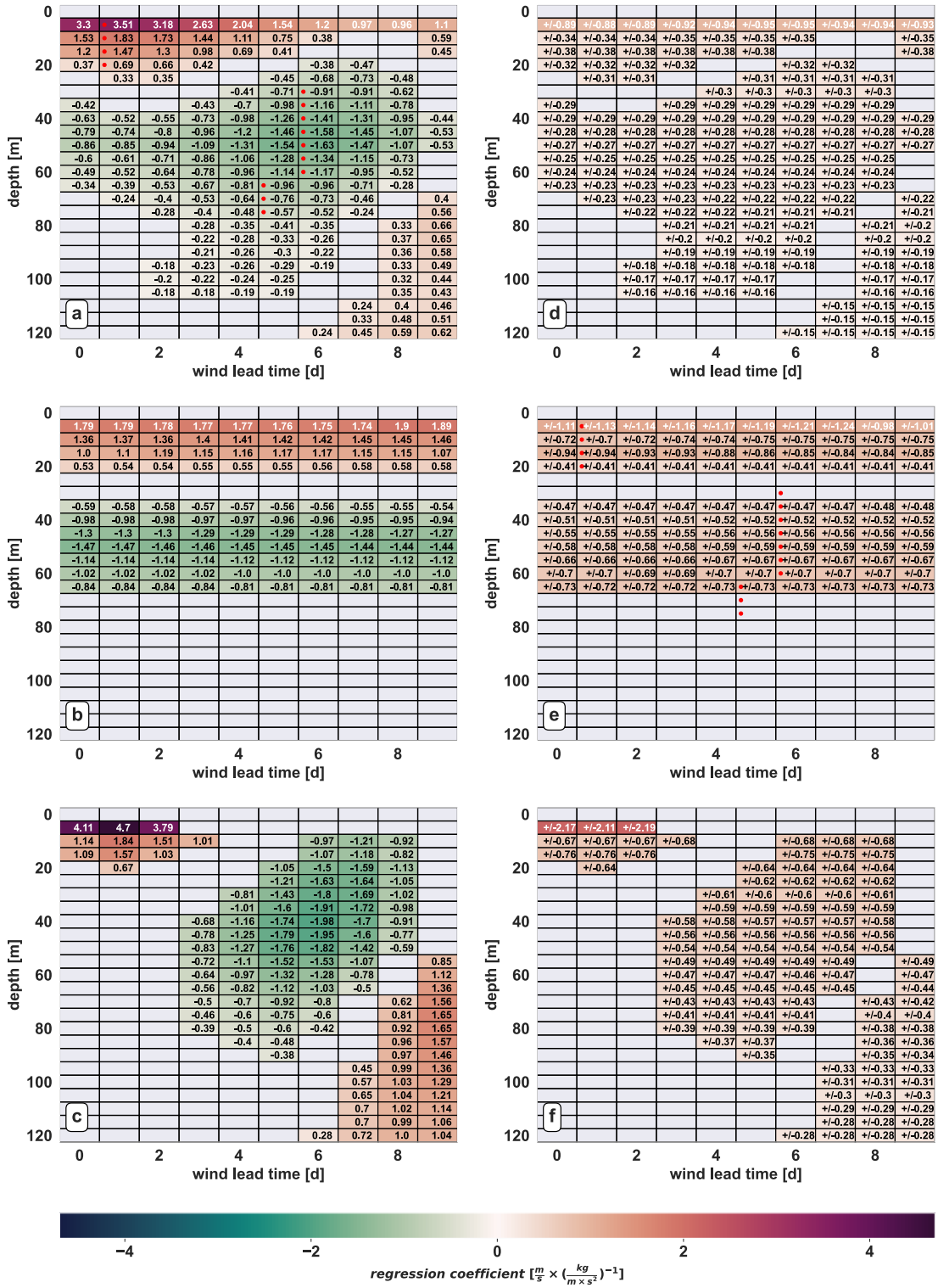


**Figure S2:** Full depth lag regression coefficients of meridional wind stress and meridional velocity. (a) regressions with all available (daily) wind-stress and meridional velocity data, (b) regression with low-pass filtered (cutoff period of 184 days, i.e. four times the lag-autocorrelation e-folding scale of the wind-stress), and 46-day subsampled wind-stress and meridional velocity data, (c) regressions of the residual data (original

wind-stress (meridional current) minus low-pass filtered (cutoff period 184 d) wind-stress (meridional current)). (d), (e), (f) depict the respective error of the regression coefficient (95% confidence interval based on a two-sided inverse students t-distribution). Grey cells indicate non-significant regression coefficients. Red dots in (a) denote the maximum regression at each depth level. Red dots in (e) indicate the error margins shown in Figure 2. Cells with red dots are taken as the regression depth profile to reconstruct the Equatorial Roll. Maximum regression coefficients with lag >= 7 days are ignored and not further considered.

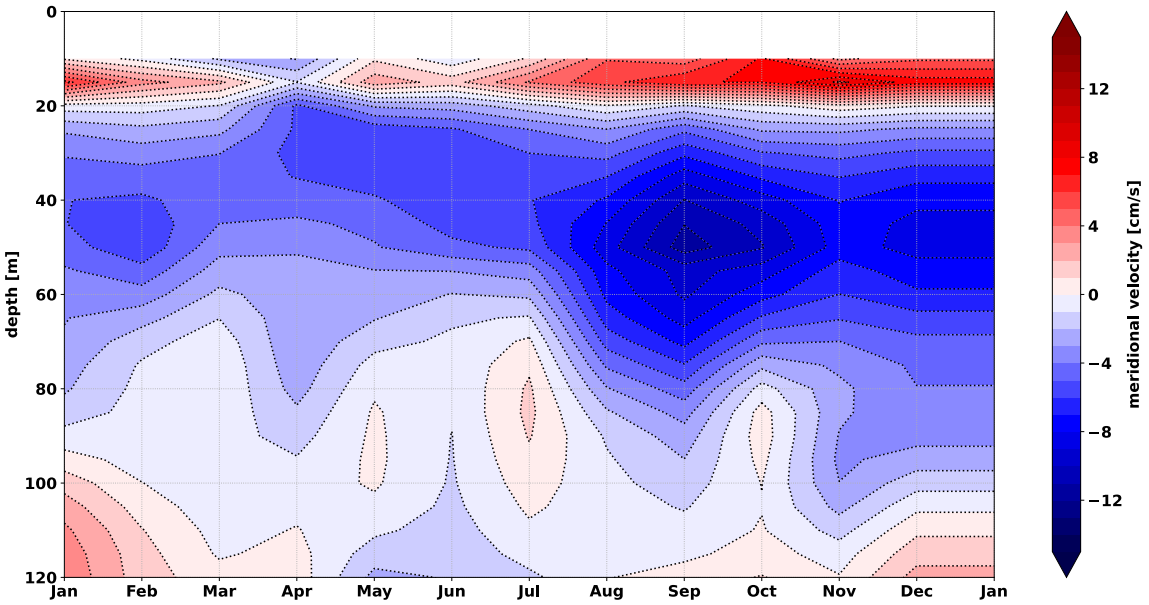


**Figure S3:** Monthly climatology of meridional velocity at the mooring site 0°N, 23°W.

| | Northward flow (0.2 to 0.4 m/s) | Southward flow (0.2 to 0.4 m/s) |
|---|---|---|
| *21 m* | 1.82<br>**2.40**<br>3.04 | 2.53<br>**3.27**<br>4.32 |
| *30 m* | 1.90<br>**2.77**<br>3.79 | 1.39<br>**1.74**<br>2.16 |
| *35 m* | 2.17<br>**2.66**<br>3.37 | 2.01<br>**2.46**<br>3.97 |
| *50 m* | 0.46<br>**0.71**<br>1.03 | 0.45<br>**0.58**<br>0.74 |
| *65 m* | 0.36<br>**0.52**<br>0.80 | 0.96<br>**1.25**<br>1.61 |
| *81 m* | 0.34<br>**0.73**<br>2.12 | 0.31<br>**0.37**<br>0.46 |

**Table S1.** Mean turbulent kinetic energy dissipation rate (ε) in the 0.2 m/s to 0.4 m/s meridional velocity bins for northward and southward flow in all available depth levels. Upper number represents lower 95% confidence interval, central bold number represents the mean, lower number represents upper 95% confidence interval. 95% confidence intervals were determined using the bias-corrected and accelerated bootstap method (Efron, 1982). All values are given in [$10^{-7}$ $m^2/s^3$].

**Text S1:** χ-pods are devices that provide a direct measurement of the small-scale temperature and velocity scales associated with the turbulence that leads to thermodynamic mixing. Equipped with two fast thermistors, pitot tube, pressure sensor and accelerometers, xpod measurements lead to estimates of turbulence kinetic energy dissipation rate, and turbulence diffusivity, among other parameters (Moum and Nash, 2009; Perlin and Moum, 2012).