



## Wind-driven zonal jets in the South Pacific Ocean

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While there is no doubt that the large island groups of the western tropical Pacific interrupt the SEC and produce narrow "Island Rule" westward jets at their tips, that appears to be only part of the explanation for the South Pacific jets. Detailed structure of the mid-Pacific winds breaks the SEC into several bands of stronger flow as far east as 120°W, according to linear Sverdrup dynamics (Fig. 1). Perhaps coincidentally, these bands occur close to the latitudes where the Island Rule jets have been noted; therefore, a complete description of the jets requires consideration of the details of the wind described here.

The reason for the seemingly-minor meridional variability of the mid-basin winds remains unknown. Although this pattern appears to have preferred locations over the 13 years of scatterometer wind records, there is substantial time variability. The possibility should also be considered that the wind structure might be an artifact of the satellite scatterometer data processing algorithms, which must account for partly-sampled atmospheric contamination of the signal by water vapor and other problems. However, the fact that the wind variations seem to be fairly accurately imprinted on the independently-observed oceanic currents suggests that this is a real phenomenon.

A further unknown is the adjustment process by which the ocean responds to this element of forcing by producing eastward flows at great depth, well below the thermocline that would be expected to feel the wind variations most straightforwardly. Clearly, ocean adjustment at these depths is slow, and must involve basin-scale dynamics along three-dimensional ray paths.

Curl and Sverdrup U. ERS winds 1991–2000

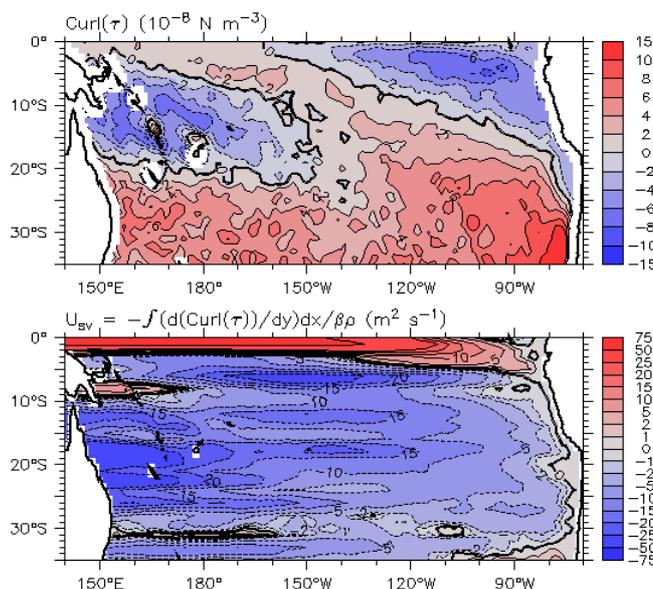


Figure: (a) Mean  $\text{Curl}(\tau)$  ( $10^{-8} \text{ N m}^{-3}$ ) from ERS winds over 1991-2000. (b) Zonal Sverdrup transport ( $\text{m}^2 \text{ s}^{-1}$ ) calculated from the ERS curl using (1). The three large island groups of the southwest Pacific are indicated in the bottom panel, however, the calculation of the Sverdrup transport assumed that the islands were absent (the curl was linearly interpolated across the gaps).