Abstract View

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Wind-Driven Circulation on the North West Shelf of Australia

Ian Webster

The University of Western Australia, Nedlands, W.A., Australia 6009

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ABSTRACT

In this study, the wind-driven circulation of the North West Shelf of Australia is examined. Along its length, the offshore distance to the 200 m isobath is generally greater than 150 km, which means the shelf is relatively wide compared to other continental shelves. To study the circulation of the North West Shelf, two sets of data collected during 1981 and 1982 are examined. The cross-shelf structure of the circulation and the associated pressure field are determined from current meter and tide gauge data collected across the shelf. Meteorological data collected at three locations along the shelf are used to estimate surface wind stress. Empirical Orthogonal Analysis is applied to separate, in the frequency domain, the dominant modes of motion and the associated wind stress.

With these data, the dynamical balances on the shelf are examined. Generally, the cross-shelf force balances are geostrophic. For the alongshelf balances, all of the terms considered, namely acceleration, Coriolis force, alongshore pressure gradient, alongshore component of the wind stress, and bottom friction, prove to be important. The results of this analysis suggest that the dominant kinematic structures on the North West Shelf are principally due to mode 1 continental shelf waves and that the appropriate choice of the bottom friction parameter lies between 0.025 and 0.05 cm s^{-1} for this shelf.