Abstract View

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Currents through Torres Strait

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ABSTRACT

A five-month field study of the circulation in the Torres Strait was carried out. Baroclinic effects were negligible. The Arafura Sea and the Coral Sea forced a different tide on either side of Torres Strait, resulting in fluctuations of sea level difference of up to 6 m on either side of the Strait. The tidal dynamics in the Strait were controlled by a local balance between the acceleration, the sea level slope, and the bottom friction. Only 30% of the semidiurnal tidal wave was transmitted through Torres Strait. There were also fluctuations of the high-frequency sea level residuals (up to 0.8 m peak to trough) which appeared to be related to complex flows both through the Strait and across the Strait. Low-frequency sea level fluctuations were incoherent on either side of the Strait, and resulted in fluctuations of the low-frequency sea level differences on either side of the Strait of typically 0.3 m. These sea level gradients and the local wind forcing generated low-frequency current fluctuations through the Strait. These currents were small, being ≤ 0.1 m s^{-1}, because of the effect of friction which, at low-frequencies, was greatly enhanced by the nonlinear interaction between tidal and low-frequency currents. As a result, the Strait was also fairly impervious to long waves and there was only a negligible (for oceanic budget calculations) low-frequency transport through the Strait. The net current was only 0.01 m s^{-1} during the 5 months of observations, corresponding to a through-strait current of 10^{-2} sverdrups.