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Tidal Motions in the Florida Current

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ABSTRACT

A linear relationship exists between sea level and the north component of the depth-averaged tidal velocity in the Straits of Florida. This relationship is used as a one-dimensional model to predict barotropic tidal currents across the Straits near 27°N. Predictions are independent of the choice of a sea-level reference site between Key West and Patrick Air Force Base. The model, when compared with three sets of depth-averaged velocity obtained from current profilers, can account for at least 70% of the variance in the diurnal and semidiurnal tidal bands. The predicted diurnal tidal current is dominant and can account for more than 80% of the predicted tidal energy. Twice a year the one-dimensional model yields a maximum amplitude of $12 \text{ cm s}^{-1} \pm 3.5 \text{ cm s}^{-1}$ (rms). This corresponds to a tidal transport of $5.1 \times 10^6 \text{ m}^3 \text{ s}^{-1} \pm 1.5 \times 10^6 \text{ m}^3 \text{ s}^{-1}$ (5.1 Sv).

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