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Wind-Driven Inertial Currents in the Magdalen Shallows, Gulf of St. Lawrence

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ABSTRACT

Power spectrum analyses of the residual current components from the Magdalen Shallows (autumn 1970) gave a prominent peak at the inertial frequency. Bandpass filtering showed that the inertial oscillations occurred in bursts of 2–3 days duration and with irregular intervals between bursts. The transient nature of the above behavior was consistent with the pulselike nature of the wind stress and a convincing linear correlation was found between the magnitude of the wind stress and the rms residual current. Using a simple slab model with a linear drag law, it was found that the transient response to a typical wind stress pulse was also pulselike, with a relatively small phase lag. The magnitude of the response was found to be a sensitive function of the duration of the wind stress pulse. Comparison of the theory with the experimental results indicates that the simple slab model is a good approximation. The results suggest that, on average, about 50% of the residual current speed was due to the local wind.

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