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The Generation of Long Shelf Waves by the Wind

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ABSTRACT

Currents [$O(0.1 \text{ m sec}^{-1})$] and sea-level variations [$O(0.1 \text{ m})$] on the continental shelf can be produced when atmospheric disturbances pass by. Since the atmospheric systems have length scales large compared with the width of the shelf, a boundary-layer approximation can be made to the equations governing the local response to these forcing systems. The low-frequency response can be expressed as a sum of modes (continental shelf waves) and the amplitude of each mode is found to satisfy a first-order wave equation which can readily be solved. In a case where some details are worked out, the second mode's contribution to sea-level changes is only 25% of the first mode's and the third mode's contribution only 8%. Thus, given appropriate meteorological information, sea level changes can easily be calculated, and a prediction system is theoretically possible.

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