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Large-Scale, Low-Frequency Response on the Continental Shelf Due to Localized Atmospheric Forcing Systems

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ABSTRACT

The first-order wave equation model of Gill and Schumann, which describes the flow induced on the continental shelf by the longshore wind stress, evaluated at the coast, is extended in three ways. First, we relax the nondivergent approximation and hence are able to estimate the response in the Kelvin wave mode. Second, we include the full wind stress forcing, and allow for an offshore variation in the wind stress. We also include a representation of pressure forcing. Thus we are able to describe the response due to localized forcing systems. Third, we consider the coupling of the deep-ocean region to the shelf region across a continental slope region, modeled as a discontinuity in depth at the shelf break. The results are applied to the response on the shelf due to a localized forcing system, either traveling longshore parallel to the coast, or traveling offshore normal to the coast.

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