Abstract View

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Low-Frequency Response of Wide Deep Estuaries to Non-Loca1 Atmospheric Forcing

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ABSTRACT

An analytic linearized continuously stratified model which explains low-frequency response of wide deep estuaries to non-local forcing is developed. The dynamic model used for the coastal ocean is similar to that of McCreay with the effects of vertical friction and vertical and horizontal diffusion included. The response in the estuary, to lowest order, is governed by the free-wave equations. In the present study, the channel is not assumed to be narrow when compared to the local internal Rossby deformation radii. Therefore, rotation is included in the dynamics in the estuary which allows the propagation or energy up-channel as a Kelvin wave. Once obtained, the oceanic solution is matched to that in the estuary using the Green's-function matching technique of Buchwald. The results show that the response in the estuary is geostrophically controlled by the flow on die continental shelf. Additionally, the adjustment is strongest in the entrance and consists primarily of the first baroclinic mode. A simulation for real winds is run and results compared to current meter data collected in the Strait of Juan de Fuca, Washington. The comparisons show good agreement between observed and simulated response in the fjord.