Abstract View

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Application of Remote Wind-Forced Coastal Trapped Wave Theory to the Oregon and Washington Coasts

David S. Battisti and Barbara M. Hickey

University of Washington, Seattle, WA 98195

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ABSTRACT

The theory of coastal trapped waves generated by remote wind forcing (Clarke) is used to calculate coastal subsurface pressure (SSP) and longshore velocity along the Oregon and Washington coasts for three two-month periods: summer of 1972, summer of 1978 and winter of 1977. The response in SSP and longshore velocity is assumed to be dominated by the mode one wave. In every case, coherence squared between observed and modeled SSP is significant at the 95% level over the entire low frequency band ($\leq$ 0.2 cpd) with an average phase difference less than ±30°. Greater than 80% of the variance in coastal SSP is accounted for by the mode one coastal trapped wave (CTW). The SSP response off Washington and Oregon during summer is primarily ($\sim$ 35% of the variance) a result of wind forcing between San Francisco and Cape Mendocino, California. Wind stress in this region during summer is significantly larger than that off Oregon and Washington at low frequencies so that the CTW generated off California propagates northward with only minimal input from the local wind field. The local contribution to SSP off Oregon and Washington during summer is relatively small (<15%). The response during winter, on the other hand, is dominated by local wind stress, local winds being much more energetic than those to the south. Comparison between modeled and observed longshore velocity shows that at low frequencies a significant portion of the variance in longshore velocity on the Pacific Northwest shelf is also accounted for by the mode one wind forced CTW.