Abstract View

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The Kinetic Energy on a Continental Shelf from Topographic Rossby Waves Generated off the Shelf

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ABSTRACT

Over a deep barotropic ocean an isolated pressure cell, producing a wind stress curl, generates topographic Rossby waves which are incident on a continental shelf with a simple exponentially varying slope. It is shown that this energy appears as a distinct peak at low frequency on the energy spectrum on the shelf. A peak at 0.05 cycles per day (cpd) in the spectrum from data of Smith (1974) for the Oregon shelf is consistent with this effect. For the case where topography dominates the beta effect off the shelf, general equations are found to estimate the frequency and dominant wavelength of the energy peak. An interesting result of this analysis is that, for all parameters being equal, this frequency should be lower on an eastern shelf than a western shelf in the Northern Hemisphere due to the beta effect. The variation of the magnitude and frequency of this peak with the location on the shelf, the distance of the center of forcing from the shelf, and the scale of the pressure cell is then investigated for the Oregon shelf in particular.