Coastally Trapped Waves as Observed by the Topex/Poseidon Altimeter

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A new altimetry based method is developed to detect trapped long wavelength baroclinic waves propagating along continental coastlines. The method involves: 1) extraction of one dimensions] arrays of sea surface height (SSH) measurements taken both within sufficiently short time intervals (10 days) and along specific paths (isobaths or coastlines); 2) accumulation of a time series of such arrays for all consecutive 10 day intervals within a given period (a season or a year). The resulting two dimensional array is then employed to estimate the spatio-ternporal autocovariance function W(s,t) of SSH variations (where s is the distance along the path). Coastally trapped waves then reveal themselves as propagating ridges in the graph of W(s,t). This function allows one to evaluate the wave propagation velocity along paths, the characteristic wave amplitude and the wavenumber-frequency spectrum of SSH variations. Repeating this analysis for several parallel paths we find that the wave amplitude decreases as a function of offshore distance - as prescribed by the theory of coastally trapped waves. Finally, wc show that seasonal and geographic variations of wave properties contain information about wave energy sources, stratification and other features of coastal waters.

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