Response of the nonlinear-nonstationary internal tide to the spring-neap cycle of the barotropic tide

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Data from bottom-moored ADCPs and thermistor chains deployed in the Mid-Atlantic Bight near 39.3 N, 72.7 W, offshore of the New Jersey Coast, are analyzed to reveal the dependence of semidiurnal baroclinic energy in shelf waters on changes in the barotropic forcing. The semidiurnal band is defined between 1.76 -2.48 CPD. Baroclinic semidiurnal current speeds are mostly below 5 cm s^{-1}, but they can reach 10-18 cm s^{-1} during spring and neap tides. Coherence between the M2 barotropic and baroclinic tide at the shelf location (ADCP-3, at 80 in) is weak (~ 0. 15) but above the 95 significance level. The total energy of the semidiurnal internal tide usually represents less than 20% of the total baroclinic energy present in the ADCP record at this location. This percentage can increase from 40% up to 80% for periods of 1-2 days. Maximum in PE energy and KE are 0.5 and 3.5 J m^{-3}, respectively. Both values are observed at the pycnocline (~30m) during neap barotropic tides. Empirical Mode Decomposition (EMD) and Hilbert Huang Transform (HHT) analysis are applied to the data. This approach is effective for the analysis of nonstationary-nonlinear internal tides. The technique reveals KE values above 22 J m^{-3} near the bottom (60-20 m) during spring tides in contrast with our previous estimates.

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