Abstract Submitted
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Characteristics of turbulence in the bottom boundary layer of the coastal ocean ROI GURKA, Dept. of Mechanical Engineering, Johns Hopkins University, LUKSA LUZNIK, Dept. of Mechanical Engineering, Johns Hopkins University, ERIN HACKETT, Dept. of Earth and Planetary Sciences, Johns Hopkins University, JOSEPH KATZ, Dept. of Mechanical Engineering, Johns Hopkins University, THOMAS OSBORN, Dept. of Earth and Planetary Sciences, Johns Hopkins University — PIV measurements performed in the bottom boundary layer of the U.S. Southeastern continental shelf provide seven data sets, each containing 4000 pairs of 2-D vector maps. Each set consisted of two velocity distributions obtained at two magnifications, one with a field of view of 35 cm, and the other with 11.5 cm, with a gap of 83 cm between their centers. This arrangement enables measurements of spectra and structure functions covering two orders of magnitude of length scales, the smallest being close to the Kolmogorov scale. By combining the time series of data, the spectral range can be extended by additional two orders of magnitude, but this time with wave contamination. These data are collected within 3 m above the bottom, at Taylor microscale Reynolds numbers of 150-200. The flow consists of tidal currents and a strong oscillatory wave-induced motion. Spectral analysis reveals anisotropy at all scales. Vertical profiles of Reynolds stresses, dissipation and production rates are obtained. The dissipation estimates by fitting a -5/3 slope to the energy spectra, and by fitting the dissipation spectra to the universal plots for oceanic flows, are compared to values calculated directly from the measured velocity gradients. The results show good agreement. However, unlike isotropic turbulence, the dissipation is higher than that obtained from estimates based on the measured component of enstrophy.

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