Abstract View

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Subtidal Sea Level Variations in the Chesapeake Bay and Relations to Atmospheric Forcing

Dong-Ping Wang

Chesapeake Bay Institute, The Johns Hopkins University. Baltimore, MD 21218

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ABSTRACT

Subtidal sea level variations in the Chesapeake Bay were examined over a one-year period for evidence of wind-driven barotropic circulation. The major transport occurred at time scales of 3–5 days, whose magnitude was larger than the river runoff. It was driven by the east-west wind, as part of the coupled coastal ocean-estuary response. At shorter time scales, there was also large barotropic motion which, however, was driven by the local, north-south wind.

The variance of barotropic fluctuation was larger by a factor of 4 in winter than in summer, due to the increased cyclone activities. The coupled coastal ocean-estuary response was also more pronounced in winter. In contrast, the summer season was dominated by local forcing at time scales of 3–7 days.

The results suggest that the barotropic motion is an important component of the net circulation. The corresponding subtidal sea level change contributes significantly to the storm surge. Thus, the nature of barotropic response, particularly the coupled response, must be carefully examined for better understanding of the dispersion processes and storm surges in Chesapeake Bay.