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Semidiurnal perturbations to the surge of Hurricane Sandy

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Hurricane Sandy drove storm surges throughout the eastern seaboard of the United States, from Miami to Maine, at the end of October 2012. The surge was particularly high (>3 m) in coastal New York. In the southeastern United States, the surge was <1 m but had striking semidiurnal perturbations that reached a range of $\sim$0.5 m in northern Florida and southern Georgia. These oscillations are typically not considered in surge forecasts and therefore, it is essential to understand their origin for future forecasts. Analytical and numerical approaches indicated that semidiurnal perturbations arose from an interaction between astronomical tide and atmospheric forcing from wind and barometric pressure. This combination of forcing caused phase shifts between incident and reflected tidal waves that customarily produce quasi-standing tidal conditions in the area. Atmospheric forcing of sufficient strength, which threshold remains to be established, disrupted such quasi-standing tidal behavior and triggered the semidiurnal perturbations.