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Gulf Stream Fluctuations and Meanders over the Onslow Bay Upper Continental Slope

David A. Brooks and John M. Bane Jr.

Texas A&M University, College Station, TX 77843

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ABSTRACT

Gulf Stream fluctuations observed over the 200 and 400 m isobaths off Onslow Bay, North Carolina have a prominent weekly time scale. The principal fluctuations observed during the 4-month winter experiment are consistent with Webster's (1961a) description of downstream propagating, skewed, lateral meanders of the Gulf Stream over the upper continental slope. The subtidal velocity fluctuations were highly coherent over the vertical extent (~ 120 m) and over the horizontal extent (64 km) of our array. The implied downstream propagation speed was ~ 30 km day⁻¹ for the weekly period meanders. Concurrent satellite images of a sea surface temperature (SST) meander pattern indicate that subsurface temperature, salinity, velocity and relative-vorticity maxima occurred as meander crests (shoreward SST-front excursions) passed over the experiment site. The meandering currents were not coherent with nearby wind stress or coastal sea level fluctuations. Eddy-flux estimates indicate energy conversion from the fluctuations to the mean Stream.

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Headquarters: 45 Beacon Street Boston, MA 02108-3693
DC Office: 1120 G Street, NW, Suite 800 Washington DC, 20005-3826
amsinfo@ametsoc.org Phone: 617-227-2425 Fax: 617-742-8718
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