Abstract View

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A Statistical Description of the Vertical and Horizontal Structure of Eddy Variability on the Edge of the Gulf Stream Recirculation

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ABSTRACT

The vertical structure of eddy variability on the southern edge of the Gulf Stream recirculation is presented as a number of different forms of empirical orthogonal modes. The velocity dot-product modes show more barotropic eddy variability than the MODE experiment which was 300 km to the south. Temperature modes are consistent with the velocity modes and indicate a rapid decrease in energy with increasing model index.

The empirical modes describing the variability within the lowest frequency bands that the measurements resolved (covering periods from 580 to 32 days) are consistent with simple wave dynamics. The dominant velocity component and temperature for the lowest frequency band are nearly in quadrature. The band that includes periods from 64 to 32 days has a barotropic velocity structure consistent with the topographic Rossby wave description deduced from SOFAR floats, but with a significant velocity-temperature coherence in the thermocline.

Time-averaged horizontal correlation functions of velocity are isotropic when normalized by the covariances at zero separation. At the same time the covariances have significant anisotropy, suggesting that the dominant scales are the same for each direction while the energy content and energy fluxes vary significantly with direction. Within the lowest two frequency bands, the horizontal structure again has strong signatures of wave dynamics.