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Gulf Stream-related warm filaments inshore of the Charleston Bump

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As the Gulf Stream flows along the shelfbreak of the southeast US it is prone to frontal instabilities. Warm filaments often form along the shelfbreak, extending equatorward from the onshore crests of meanders. Moored current profiler observations, shipboard towed body and current profiler observations, and glider observations collected over the first few months of 2012 are used to describe the structure of energetic warm filaments off the coast of northern South Carolina, USA, inshore of the deflection region of the Gulf Stream known as the Charleston Bump. These filaments were found to extend to more than 100m depth, translate southwestward, and produce strong SW currents (>0.6 m/s at the surface), in contrast to previous studies which documented shallower, non-translating, filaments with weaker currents to the northeast of the study area. Filaments strongly influence the mass field on the outer shelf and upper slope, causing a depression of isosurfaces, possibly enhancing near-bottom offshore flow in frictional boundary layers. A simple geostrophic representation of the near-surface properties of a filament is compared to the observations.