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Gulf Stream Ring Trajectories

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ABSTRACT

During the period 1976–78, the movement of 14 Gulf Stream rings, including two anticyclonic and 12 cyclonic rings, was measured with satellite-tracked free-drifting buoys. The buoys in the cyclonic rings showed a tendency to move out toward the high-velocity region of the ring and to remain there circling the center. One buoy stayed in a ring as long as 8 months and completed 86 loops. Periods of rotation ranged from less than 2 days up to 10 days. The movement of the rings was complicated and appears to be related to the Gulf Stream and strong topographic features such as the New England Seamounts. Rings that were not touching the Stream generally moved westward with typical speeds of 5 cm s^{-1} . Rings that were attached to the Stream generally moved downstream in the Stream with speeds up to 75 cm s^{-1} . Frequently rings coalesced with the Gulf Stream and one of the following three things seemed to happen: 1) the ring turned into an open meander of the Stream and was lost; 2) the ring was advected rapidly downstream in the Stream and was presumably lost; and 3) the ring became attached to the Gulf Stream and then split off again as a modified ring. The results of this study, that frequently strong interactions occur between rings and the Gulf Stream, are in contrast to my original view that rings slowly translate southwestward through the Sargasso Sea and gradually decay there.

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