Abstract View

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Anticyclonic Rings in the Gulf of Mexico

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ABSTRACT

Using the historical data set, this study describes the anticyclonic rings that separated from the Loop Current in the eastern Gulf of Mexico. Six quasi-synoptic data sets are used to describe the evolving circulation of the Gulf of Mexico from October 1966 to September 1967, showing the separation and movement into the western Gulf of three anticyclonic rings. The historical data are used to determine that these rings typically translate to the west at a mean speed of 2.1 km day^{-1}. Their length scale as defined by their rms radii is 183 km. An estimate of ring life-span, as defined by an *e*-folding time, is one year.

Within the context of the Gulf's water property distributions, these rings appear as warm salty bodies. The heat and salt added by one of these rings after separation are estimated to be 7×10^{9} J m^{-2} and 17 g cm^{-2}, respectively. The heat and salt added by one of these features play an important role in the heat and salt budget of the western Gulf. The latter indicates that about one ring per year must advect into the western Gulf to balance the western Gulf's salt budget.

Past studies (e.g., Behringer *et al*., 1977) have attempted to track the rings into the western Gulf by identifying their presence in the water property data using the high-salinity core of the Caribbean subtropical underwater. It is shown that this high-salinity core is transformed into Gulf of Mexico common water by convective mixing during the winter months.

It is concluded that any attempt to define the forcing mechanism for the western anticyclonic cell described by Nowlin and McLellan (1967) must take into account the westward moving rings.

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