

EDDY IMPACTS ON THE FLORIDA CURRENT

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ABSTRACT. The Gulf Stream in the Atlantic carries warm water northwards and forms both the return closure of the subtropical gyre as well as the upper limb of the meridional overturning circulation. At 26°N, the Gulf Stream is confined to the Florida Straits between Florida and the Bahamas islands, where daily transport estimates have been made since 1982 using a submarine cable. Recent time series recorded east of the Bahamas at 26°N indicate that contrary to past measurements, from May 2009–Apr 2011, the northward flowing Antilles Current covaried with the Gulf Stream in the Florida Straits—the Florida Current—even though the Florida and Antilles Currents are separated by banks and islands spanning 150 km. The peak-to-trough amplitude of transport variations during this period was $9 \times 10^6 \text{ m}^3 \text{ s}^{-1}$ for the FC and $25 \times 10^6 \text{ m}^3 \text{ s}^{-1}$ for the AC, at timescales of 50 to 260 days. From satellite observations, we show that these fluctuations in both the Florida and Antilles Currents are driven by eddy activity east of the Bahamas. Since the Florida Current time series is a critical time series for the state of the oceans, and often compared to climate models, this newly identified source of variability needs careful consideration when attributing the variability of the Florida Current to changes in the larger scale circulations (gyre and overturning) or wind forcing.