A comparison of transport and position between the Gulf Stream east of Cape Hatteras and the Florida Current

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Both the Florida Current (FC) transport and Gulf Stream (GS) are important components of the Atlantic Meridional Overturning Circulation (AMOC), transporting warm, saline waters from the U.S. east coast to Western Europe. Transport and position have been measured almost continuously for many decades in the Florida Straits at ~ 27°N and for the last 20 years at ~38°N along the Oleander line, respectively. Variations in both currents have been linked to the North Atlantic Oscillation (NAO); in particular various measures of the GS position show a high correlation with the NAO index and plankton abundance in various regions of the North Atlantic. Here we show five different proxies for the position of the GS near the Oleander line and find all five measures are internally consistent. Further, using a zonally averaged index, the local measurements prove to be good representatives of overall zonal shifting (sections between 65°W and 79°W). The second part of the study shows that the statistical relationship between the GS position proxies and the GS and FC transports, in turn, is inversely correlated with r values of ~-0.30, significant at 90% level. The GS and FC transport themselves, on the other hand, are not significantly correlated. Though both position and transport for the GS are shown to be linked to the NAO, the lack of a robust relationship between GS and the FC transport suggests that FC variability has limited latitudinal extent.