

*Geophysical Research Letters*

Supporting Information for

**Has the Gulf Stream Slowed or Shifted in the Altimetry Era?**

Lequan Chi<sup>a</sup>, Christopher L.P. Wolfe<sup>b</sup> and Sultan Hameed<sup>b</sup>

<sup>a</sup>Skidaway Institute of Oceanography, University of Georgia, Savannah, GA 31411

<sup>b</sup>School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, NY 11790

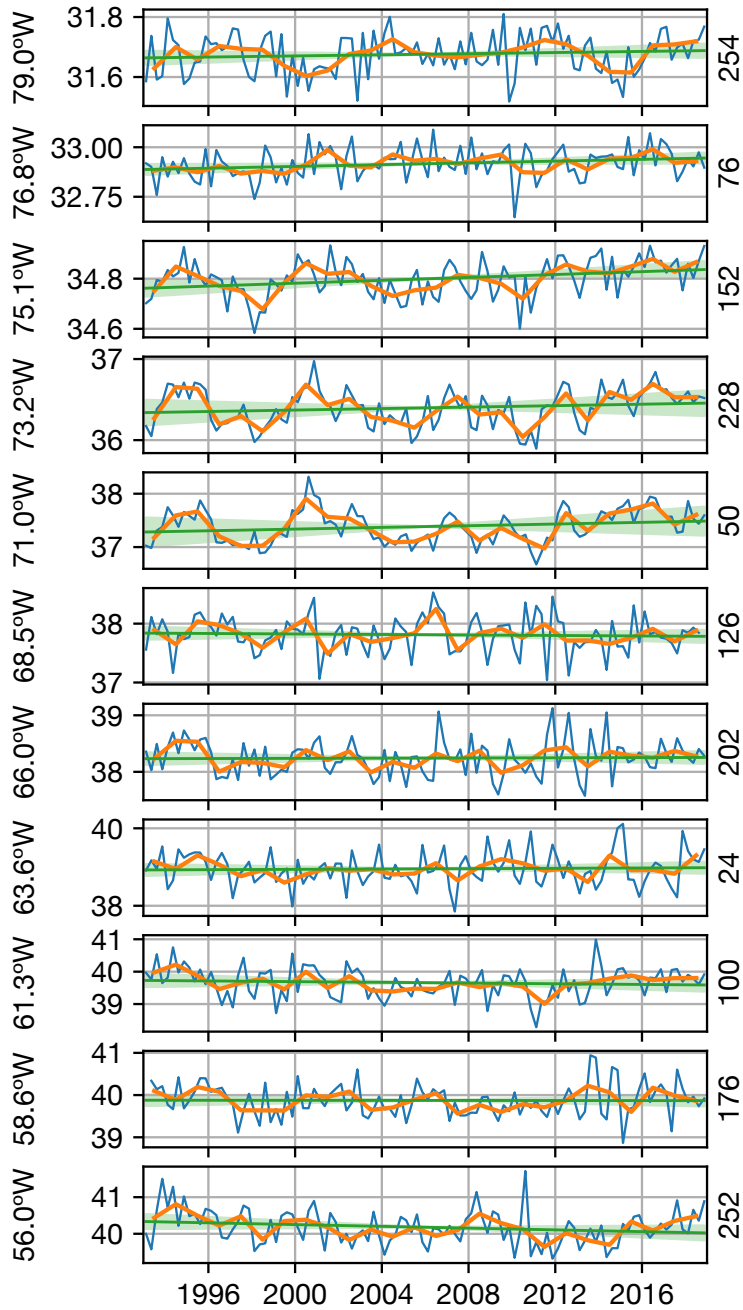
Corresponding author: Christopher L.P. Wolfe (christopher.wolfe@stonybrook.edu)

**Contents of this file**

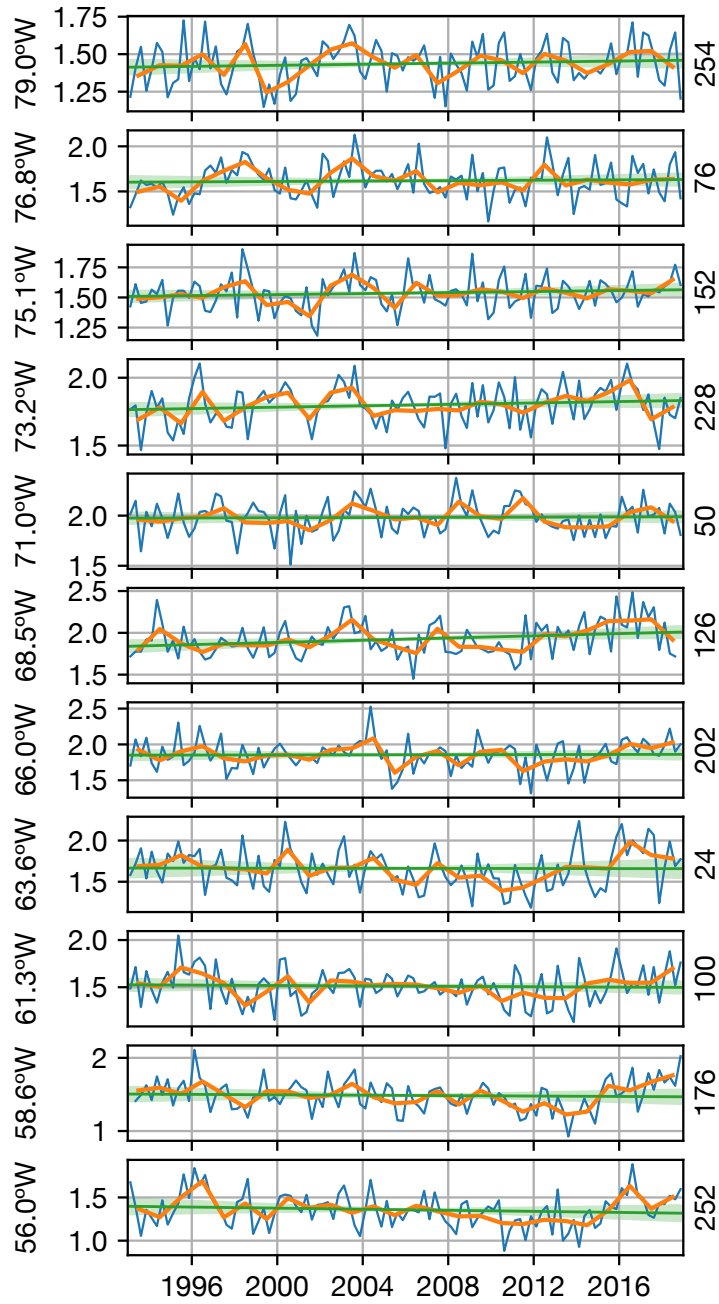
Figures S1 to S7

**Introduction**

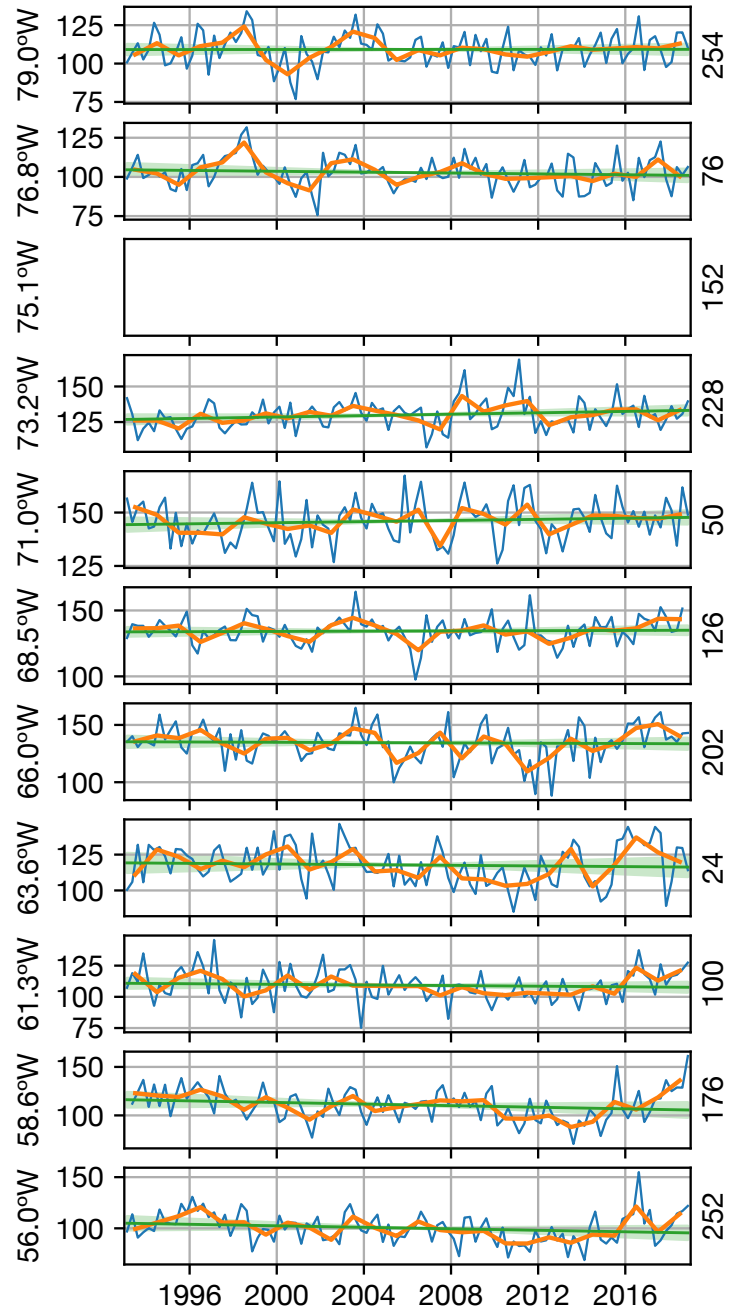
This supporting information provides additional details of the Gulf Stream properties and their statistical features. Fig. S1–S4 show time series of the Gulf Stream properties (latitude, downstream velocity, surface layer transport and width) derived in Section 2 of the manuscript. Fig. S5 show the decorrelation time used in the calculation of the confidence intervals for trends and Fig. S6 gives the statistical confidence of those trends. Fig. S7 shows the relative changes of the Gulf Stream properties over the 26-year observational record.



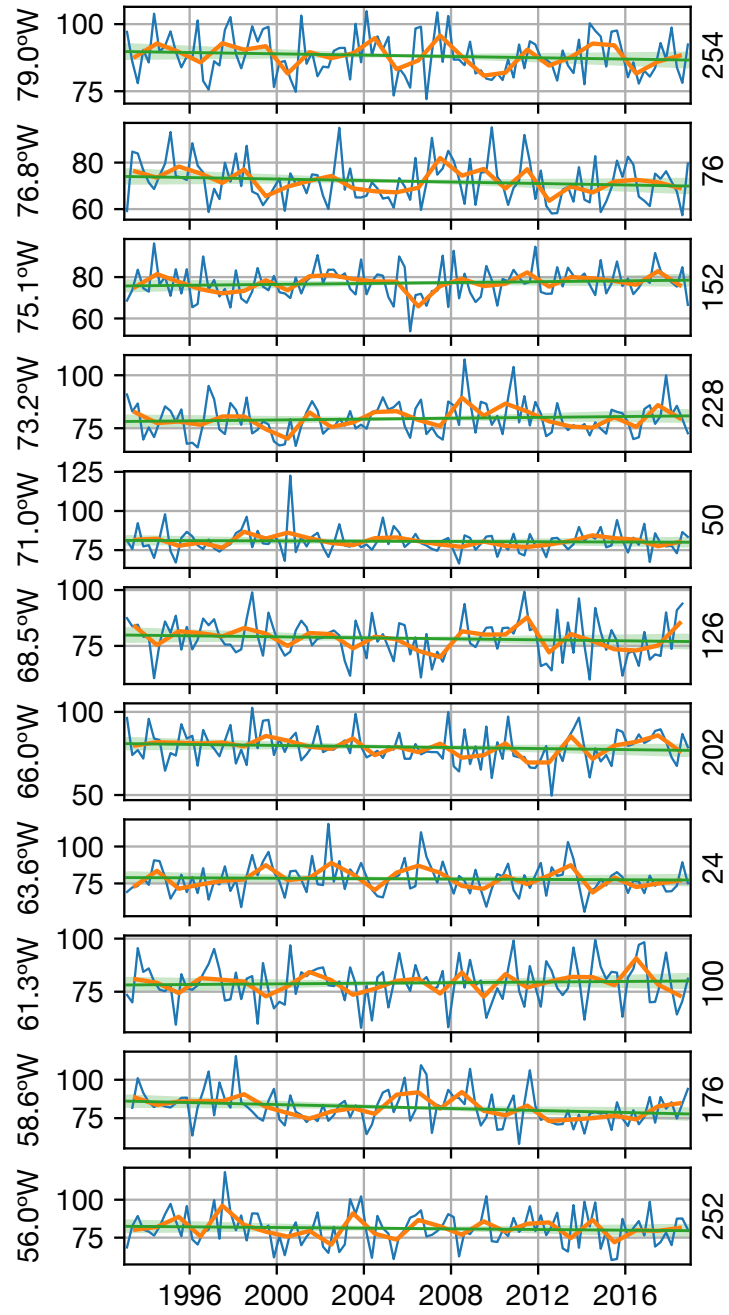
**Figure S1.** Time series of seasonally (blue) and annually (orange) averaged Gulf Stream latitude in degrees from along-track altimetry. The labels on the right and left give the track number and longitude where the track crosses the mean Gulf Stream axis. The green line and shading give the trend and its 95% confidence limits, respectively.



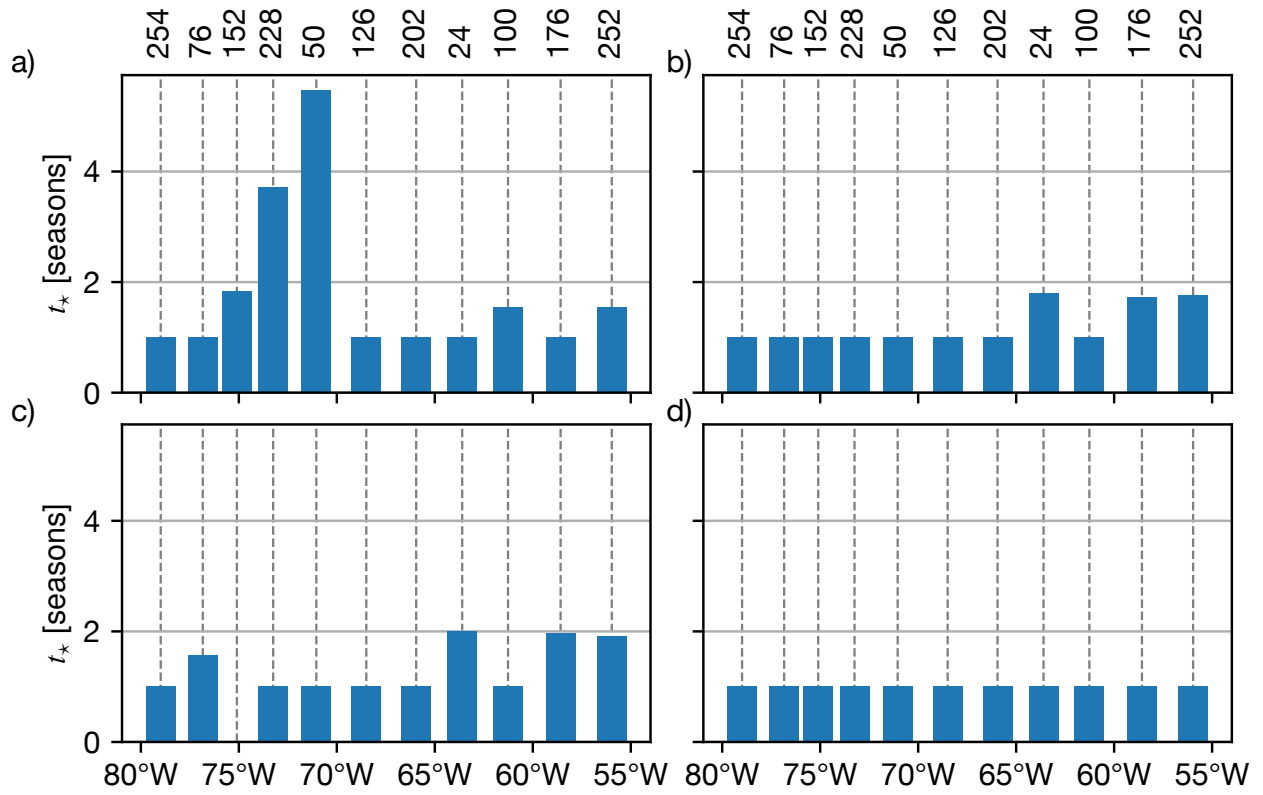
**Figure S2.** As with figure S1, but for downstream velocity in  $\text{m s}^{-1}$ .



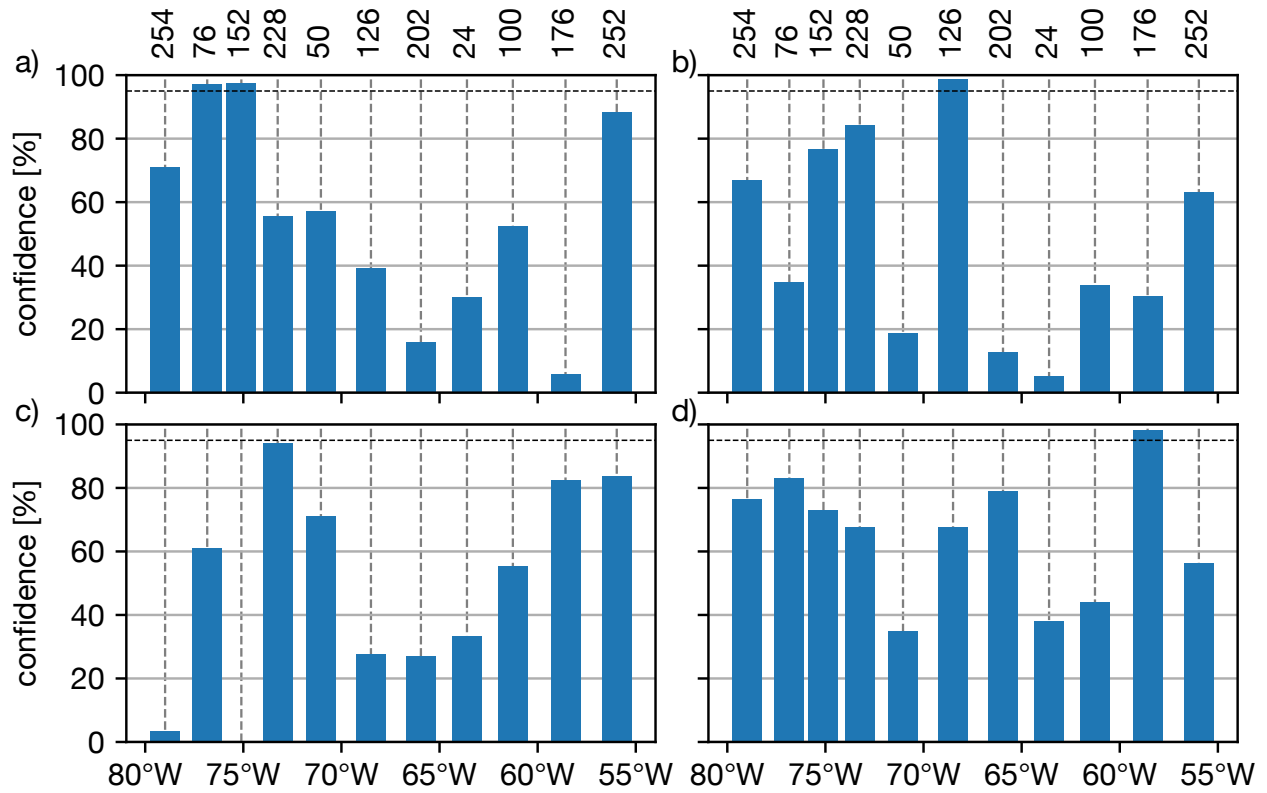
**Figure S3.** As with figure S1, but for surface layer transport in  $\text{Sv km}^{-1}$  ( $= 10^3 \text{ m}^2\text{s}^{-1}$ ). Note the Gulf Stream is too close to the coast at track 152 to accurately calculate transport.



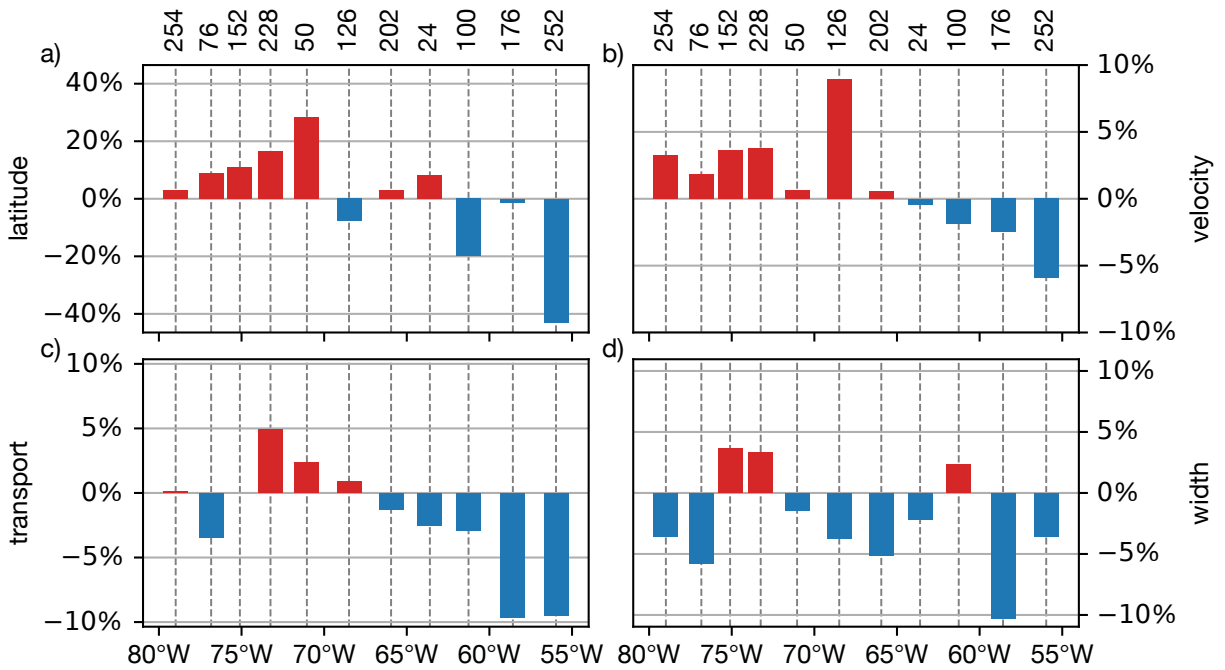
**Figure S4.** As with figure S1, but for width in km.



**Figure S5.** Decorrelation time,  $t_*$ , in seasons for the residuals after regression for (a) latitude, (b) downstream velocity, (c) surface-layer transport, and (d) width. The horizontal position of each point is the longitude that each track crosses the mean Gulf Stream axis. Track numbers are indicated at the top of panels (a) and (b).



**Figure S6.** Statistical confidence (i.e.,  $100\% \times (1 - p)$ ) that the trends in (a) latitude, (b) downstream velocity, (c) surface-layer transport, and (d) width shown in figure 2 are distinguishable from zero. The horizontal position of each point is the longitude that each track crosses the mean Gulf Stream axis. Track numbers are indicated at the top of panels (a) and (b).



**Figure S7.** Relative changes over the observational record (26 years) in (a) latitude, (b) downstream velocity, (c) surface-layer transport, and (d) width implied by the trends shown in figure 2 relative to their mean values at each track—the exception is latitude, which relative to the mean width of the Gulf Stream at the given track. The horizontal position of each point is the longitude that each track crosses the mean Gulf Stream axis. Track numbers are indicated at the top of panels (a) and (b).