Supporting Information for "From Shelfbreak to Shoreline: Coastal Sea Level and Local Ocean Dynamics in the Northwest Atlantic"

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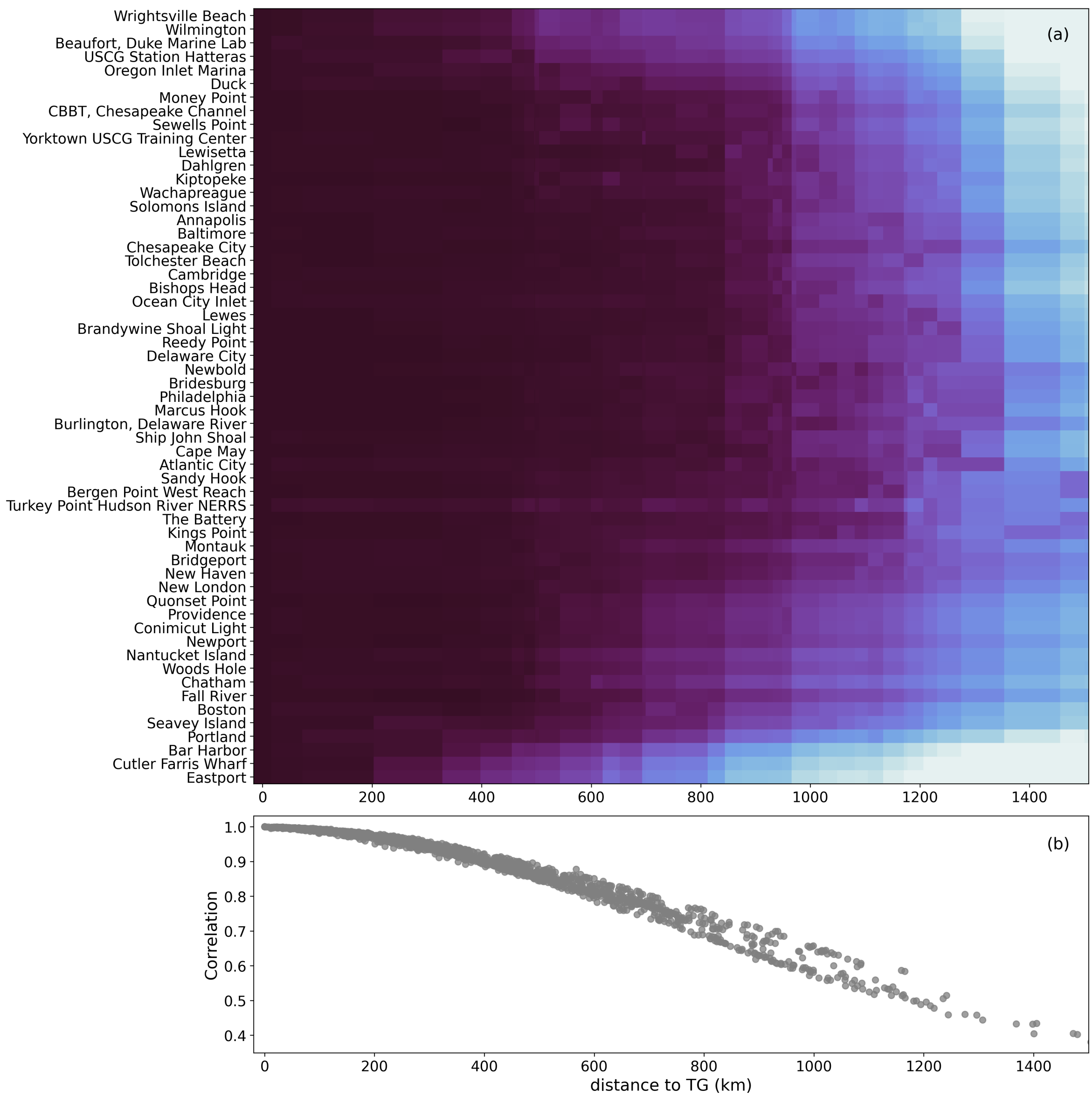

Figure S1. Pair-wise correlation between the atmospheric pressure at each tide gauge station. (a) Heat map and (b) scatter plot of the correlations versus distance between the tide gauges. Both plots highlight the spatial fingerprint of the atmospheric pressure: stations within 200km of one another have similar variability with the correlation falling below 0.5 for distances greater than about 800 km.

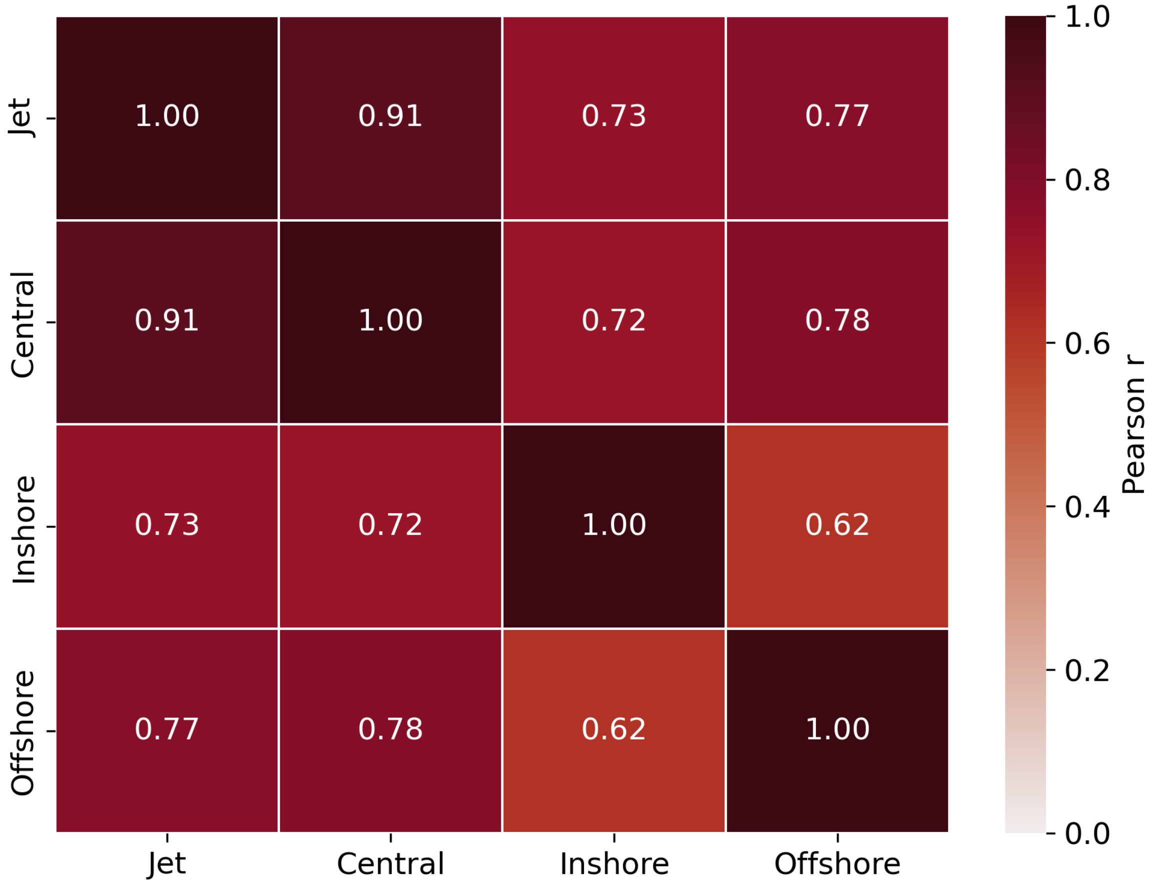

Figure S2. Heat map of the correlation between the regional composite of the jet and the three central moorings of the Pioneer Array. The highest correlation of the jet average is with the central mooring. The central mooring also has high correlation with both the inshore and the offshore moorings. The lowest correlation is between the inshore and offshore moorings, which are 14.3km apart (0.62).

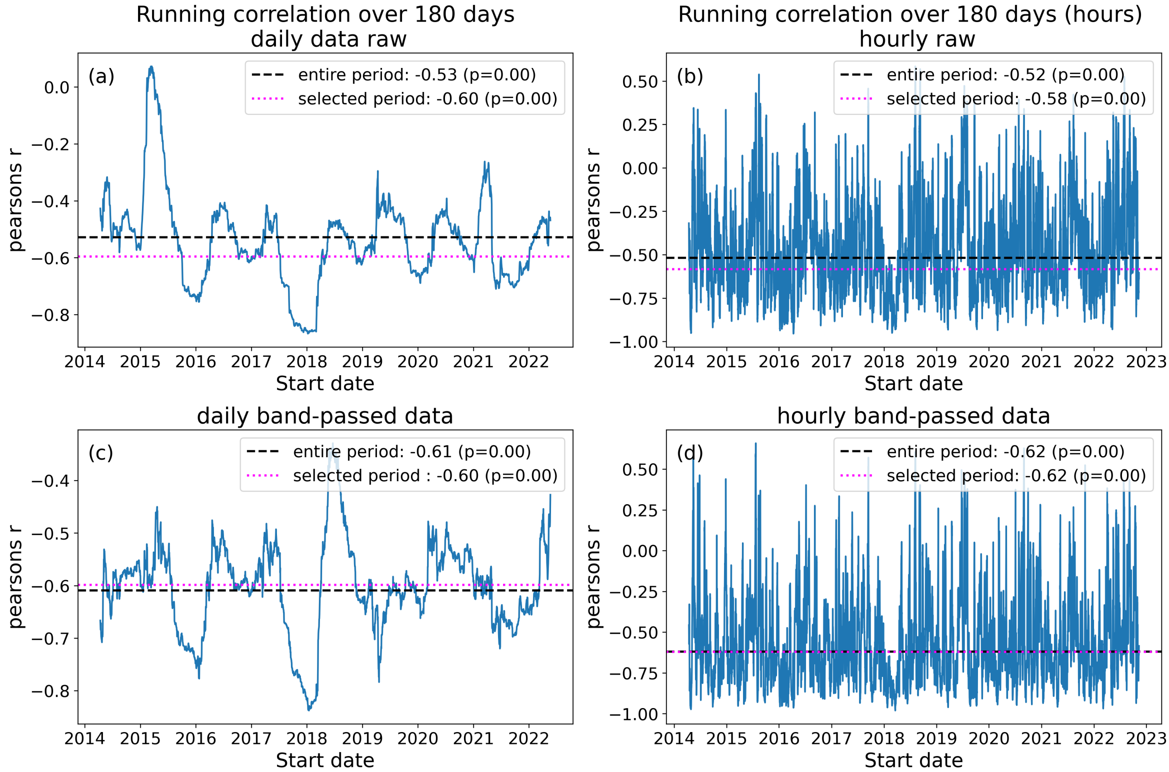

Figure S3. 6-months running correlation between the coastal sea level along Southern New England and the Shelfbreak Jet transport, for daily raw data (a), hourly raw data (b), daily 1–15-day band-passed data (c) and hourly 1–15-day band-passed data (d). Black dashed line indicates the correlation for the entire time series, and pink dotted line the correlation for the selected period shown in Figure 3b,f.

Table S1. Metadata table of tide gauge stations used in this work. Completeness level refers to gaps in the sea-level height data between April 2014 to November 2022. Note that a larger gap will influence the degrees of freedom of the spectral analysis and its significance level. For example, the coherence of a complete time series has a 95% confidence level of 0.014, while Seavey Island has a confidence level of 0.05, using blocks of 360 segments for averaging.

Station	Latitude [°]	Longitude [°]	Completeness [%]
Eastport	44.90	-66.98	100.0
Cutler Farris Wharf	44.66	-67.20	100.0
Bar Harbor	44.39	-68.20	99.0
Portland	43.66	-70.24	100.0
Seavey Island	43.08	-70.74	28.0
Boston	42.35	-71.05	100.0
Chatham	41.69	-69.95	82.0
Nantucket Island	41.29	-70.10	100.0
Woods Hole	41.52	-70.67	100.0
Fall River	41.70	-71.16	100.0
Newport	41.50	-71.33	100.0
Montauk	41.05	-71.96	98.0
New London	41.36	-72.09	99.0
New Haven	41.28	-72.91	100.0
Bridgeport	41.18	-73.18	99.0
Kings Point	40.81	-73.76	100.0
Sandy Hook	40.47	-74.01	100.0
Atlantic City	39.36	-74.42	100.0
Cape May	38.97	-74.96	100.0
Brandywine Shoal Light	38.99	-75.11	81.0
Lewes	38.78	-75.12	100.0
Ocean City Inlet	38.33	-75.09	100.0
Wachapreague	37.61	-75.69	100.0
Kiptopeke	37.17	-75.99	100.0
CBBT, Chesapeake Channel	37.03	-76.08	65.0
Duck	36.18	-75.75	100.0
Oregon Inlet Marina	35.80	-75.55	99.0
USCG Station Hatteras	35.21	-75.70	99.0
Beaufort, Duke Marine Lab	34.72	-76.67	100.0
Wrightsville Beach	34.21	-77.79	97.0
Wilmington	34.23	-77.95	100.0

Table S2. Previously reported values of SBJ transport (Q) used to obtain the width scaling factor (W'). The width scale of 40km used here is the average of all W', obtained by diving transport Q by the mean depth-integrated velocity of our jet velocities (6.8 $m^2.s^{-1}$). Note that most of the studies focused on the jet farther south than our study region, offshore of New Jersey. Forsyth et al. (2020) provides measurements in both Eulerian and Stream coordinates, indicated by superscript ^{e} and ^{s}. For comparison, we also have the reported widths of each study (W), defined by Forsyth et al. (2020) and Flagg et al. (2006) as the e-folding width of the jet, and as the contour of half of the maximum surface velocity by (Linder & Gawarkiewicz, 1998).

Reference	Year	Location	Q (Sv)	W' (km)	W (km)
Linder and Gawarkiewicz (1998)	1900-1990	Nantucket Shoals	0.24	35.2	21
Linder and Gawarkiewicz (1998)	1900-1990	New Jersey	0.16	23.5	19
Forsyth et al. (2020)^e	1994-2018	New Jersey	0.21 ± .02	30.8	50
Forsyth et al. (2020)^s	1994-2018	New Jersey	0.37 ± .04	54.3	40
Flagg et al. (2006)	1994-2002	New Jersey	0.4	58.7	30

References

Flagg, C. N., Dunn, M., Wang, D.-P., Rossby, H. T., & Benway, R. L. (2006, June). A study of the currents of the outer shelf and upper slope from a decade of shipboard ADCP observations in the Middle Atlantic Bight. *Journal of Geophysical Research: Oceans*, *111*(C6), 2005JC003116. doi: 10.1029/2005JC003116

Forsyth, J., Andres, M., & Gawarkiewicz, G. (2020, September). Shelfbreak Jet Structure and Variability off New Jersey Using Ship of Opportunity Data From the *CMV* Oleander. *Journal of Geophysical Research: Oceans*, *125*(9), e2020JC016455. doi: 10.1029/2020JC016455

Linder, C. A., & Gawarkiewicz, G. (1998, August). A climatology of the shelfbreak front in the Middle Atlantic Bight. *Journal of Geophysical Research: Oceans*, *103*(C9), 18405–18423. doi: 10.1029/98JC01438