Salient Results OSTST 2020:
LuAnne Thompson, University of Washington: Mining seas surface height to improve understanding and predictability of mid-latitude air-sea interaction

Publications

1. Todd, R. E., et al, 2019. Global perspectives on Observing Ocean Boundary Current, *Front. Mar. Sci*., 6, p.423.
   Discussion of the importance of sea surface height in quantifying Western Boundary Current Extensions strength
2. Wills, R.C.J., D.S. Battisti, C. Proistosescu, L. Thompson, D.L. Hartmann, and K.C. Armour, 2019: Ocean circulation signatures of North Pacific decadal variability, *Geophysical Research Letters*, https://doi.org/10.1029/2018gl080716.
   Demonstrated one of the first usages of climate model sea surface height as a measure of circulation changes associated with decadal climate variability
3. Clayton, S., H. Palvesky, L. Thompson, and P. Quay. Multi-scale seasonal variability in Net Community Production and Chlorophyll in the Kuroshio Extension, submitted to *JGR Oceans. SLA (Sea Level Anomaly) is found to be key for identifying the processes that local control net community production within the Kuroshio Extension (the net amount of carbon that is removed from the atmosphere)*
4. Thompson, L and C. Proistosescu*,* The Effective Depth of Air-Sea interaction in the North Atlantic, in preparation for *Geophysical Research Letters.*
   The ratio of the atmospheric feedback to sea level and sea surface temperature anomalies scaled by the thermal expansion coefficient of sea water gives a measure of relative strength of oceanic heat transport processes and atmospherically driven air-sea heat fluxes in renewing mixed-layer heat content.
5. Thompson, L, M. Sonnewald, and P. Lavin, Provinces of Air-Sea interaction in the North Atlantic, in preparation for *Geophysical Research Letters.*
   Unsupervised machine learning using k-means clustering of the lagged correlations between sea level anomalies identifies the regimes of air-sea interaction. The three regimes are as follows
   1. *The interior subtropical gyre where SST/SLA anomalies are created by atmospheric variability, and then damped via turbulent flux of heat*
   2. *The Gulf Stream and recirculation gyres where SST/SLA anomalies are created by ocean heat transport convergence anomalies*
   3. *The subpolar gyre where SST/SLA anomalies are created by atmospheric forcing, and not damped locally by the atmosphere.*

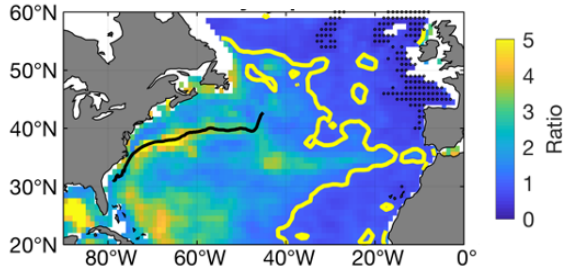

Figure 1. Shown is the ratio of the effective depth and the local maximum mixed-layer depth (from Thompson and Proistosescu, in preparation).

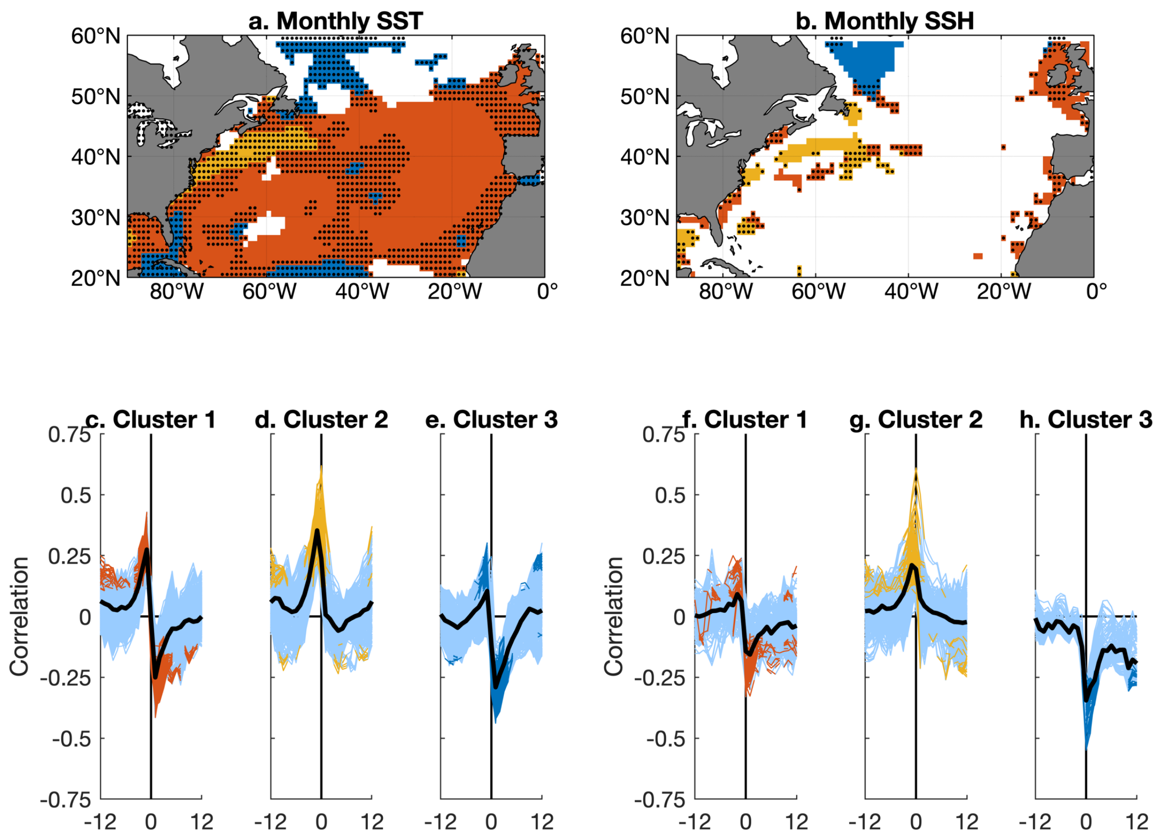

Figure 2. Results of the cluster analysis for the North Atlantic. a. The location for each dominant cluster in the North Atlantic for lagged correlations between SST and turbulent flux of heat. b. As in (a) but for SLA. Panel (c) shows the structure of the lagged correlation for the red location in panel (a). Light blue lines are insignificant correlations, and the dark black line is the averaged lagged correlation over all sample in the cluster. (d) as for (a), but for the yellow cluster, and (e) as for (d) but for the blue cluster. Panels (f), (g) and (h) as for (c), (d) and (e), but for SLA. (Thompson et al, in preparation)