

# Pronounced Impact of Salinity on Rapidly Intensifying Tropical Cyclones

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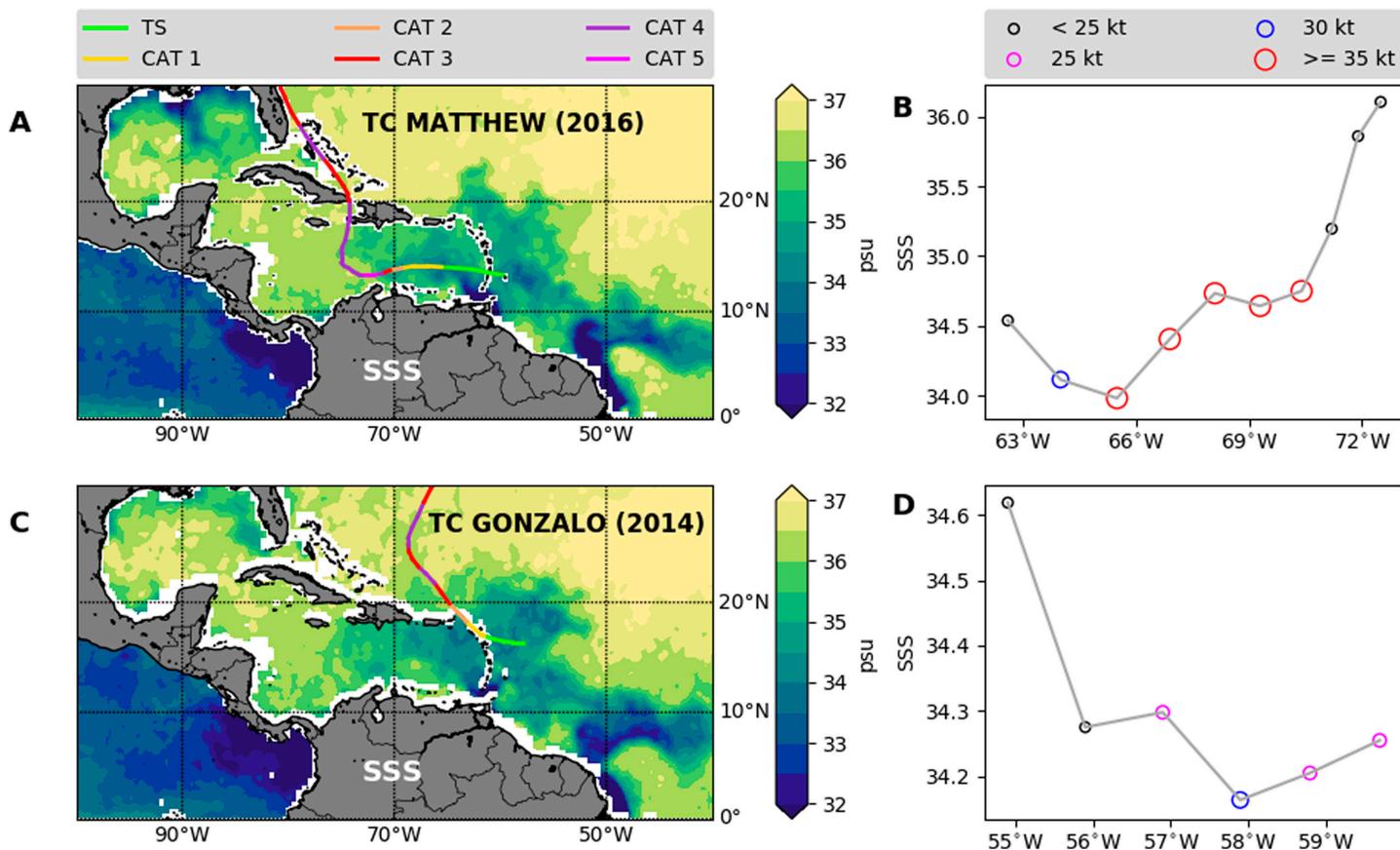


Fig. ES1. (a) Sea surface salinity (SSS; psu) averaged between 17 and 25 Sep 2016 from SMOS with the track of Tropical Cyclone (TC) Matthew, color coded by its intensity, overlaid. (b) Along-track SSS (psu) for Matthew. (c) SSS (psu) averaged between 2 and 10 Oct 2014 from SMOS with the track of TC Gonzalo overlaid. (d) Along-track SSS (psu) for Gonzalo. The circles in (b) and (d) represent the 24-h intensity change at various locations, with black denoting non-rapid intensification (RI) and color denoting RI. The legend shown above (a) corresponds to the strength of the TCs based on the Saffir–Simpson hurricane wind scale. The legend shown above (d) corresponds to the magnitude of 24-h intensity change experienced by the TCs.

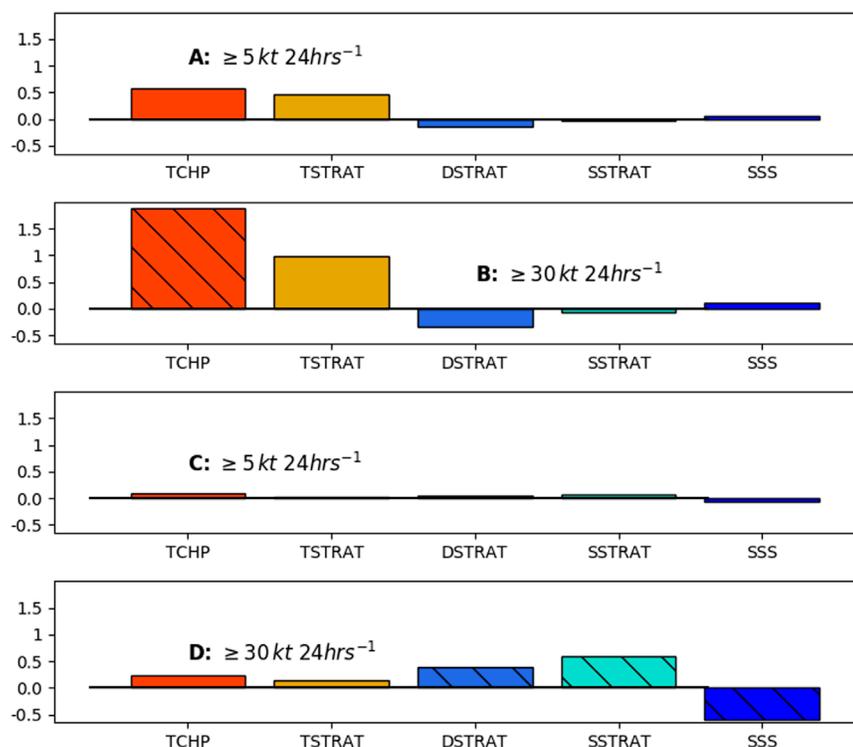


Fig. ES2. Anomalous mean tropical cyclone heat potential (TCHP;  $\text{kJ cm}^{-2}$ ), temperature stratification (TSTRAT;  $^{\circ}\text{C}$ ), density stratification (DSTRAT;  $\text{kg m}^{-3}$ ), salinity stratification (SSTRAT; psu), and SSS (psu) in the (a),(b) western region and (c),(d) eastern region for cases where the 24-h intensity change is greater than or equal to (a),(c) 5 kt ( $1 \text{ kt} \approx 0.51 \text{ m s}^{-1}$ ) and (b),(d) RI. The western region corresponds to  $10^{\circ}$ – $30^{\circ}\text{N}$ ,  $70^{\circ}$ – $100^{\circ}\text{W}$ , and the eastern region corresponds to  $10^{\circ}$ – $30^{\circ}\text{N}$ ,  $40^{\circ}$ – $70^{\circ}\text{W}$ . For each parameter, when the mean of the subsampled data is statistically different from the total mean at the 95% level, it is indicated with hatching. Analysis based on SODA ocean reanalysis.

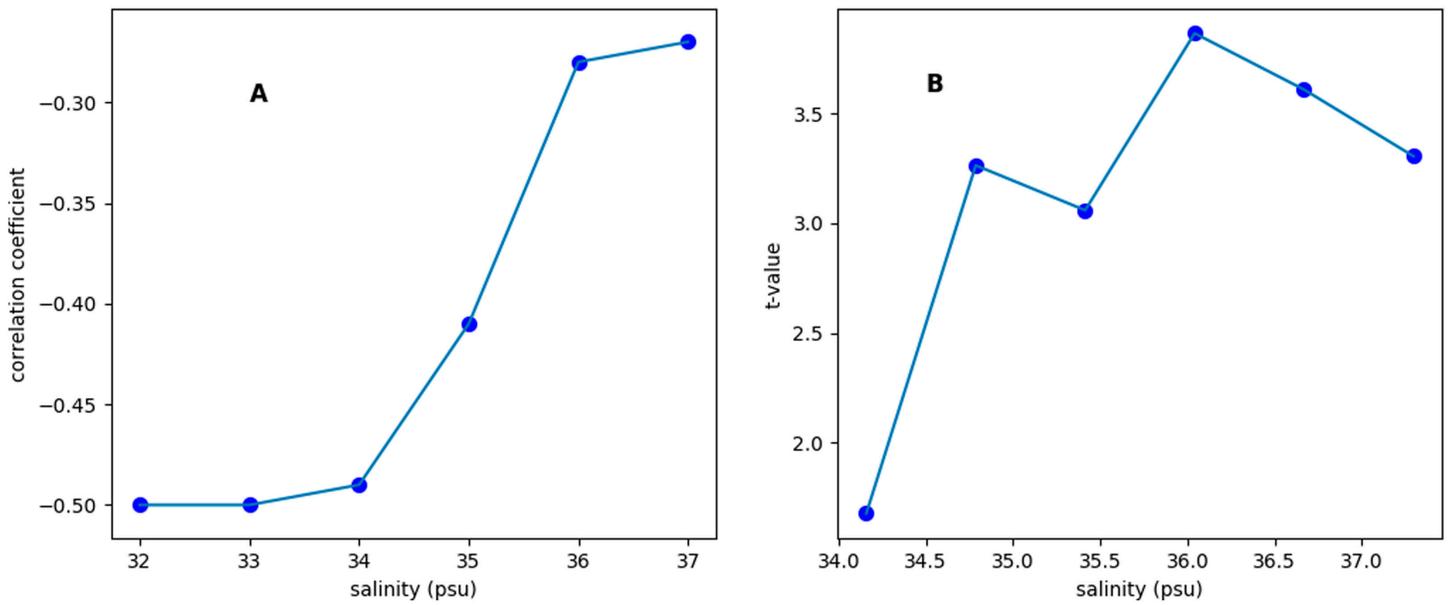


Fig. E53. (a) Correlation between SSS and upper-ocean density stratification for various salinity thresholds. For each value of threshold, data are considered only where SSS exceeds that value. SSS and ocean stratification are based on HYCOM. (b) The  $t$  value for the difference between means of SSS values for RI and non-RI locations. For each value on the  $x$  axis, SSS values higher than that value are set to the maximum. SSS from SMOS is used for this analysis.