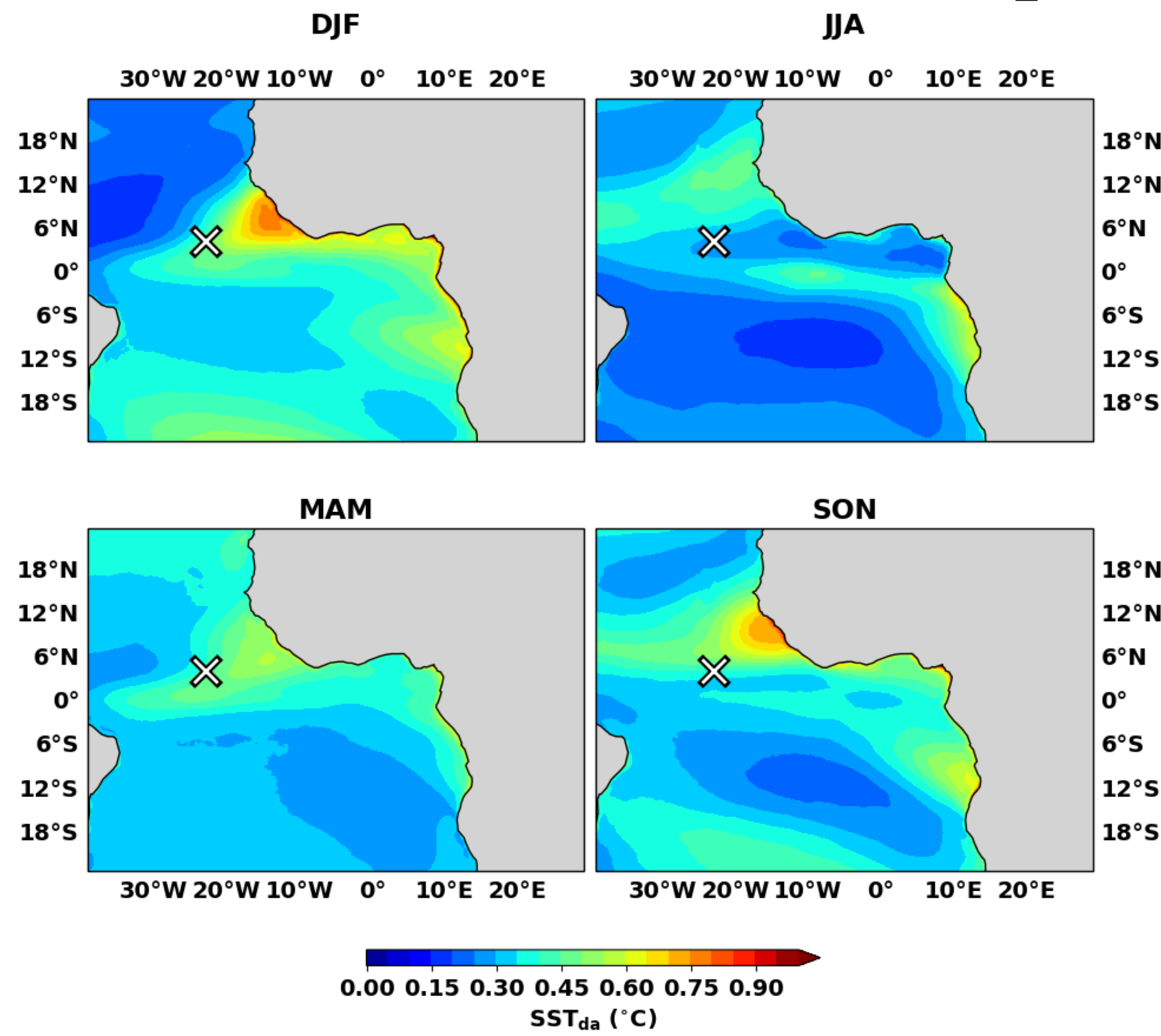


## 1. SST Diurnal Amplitudes

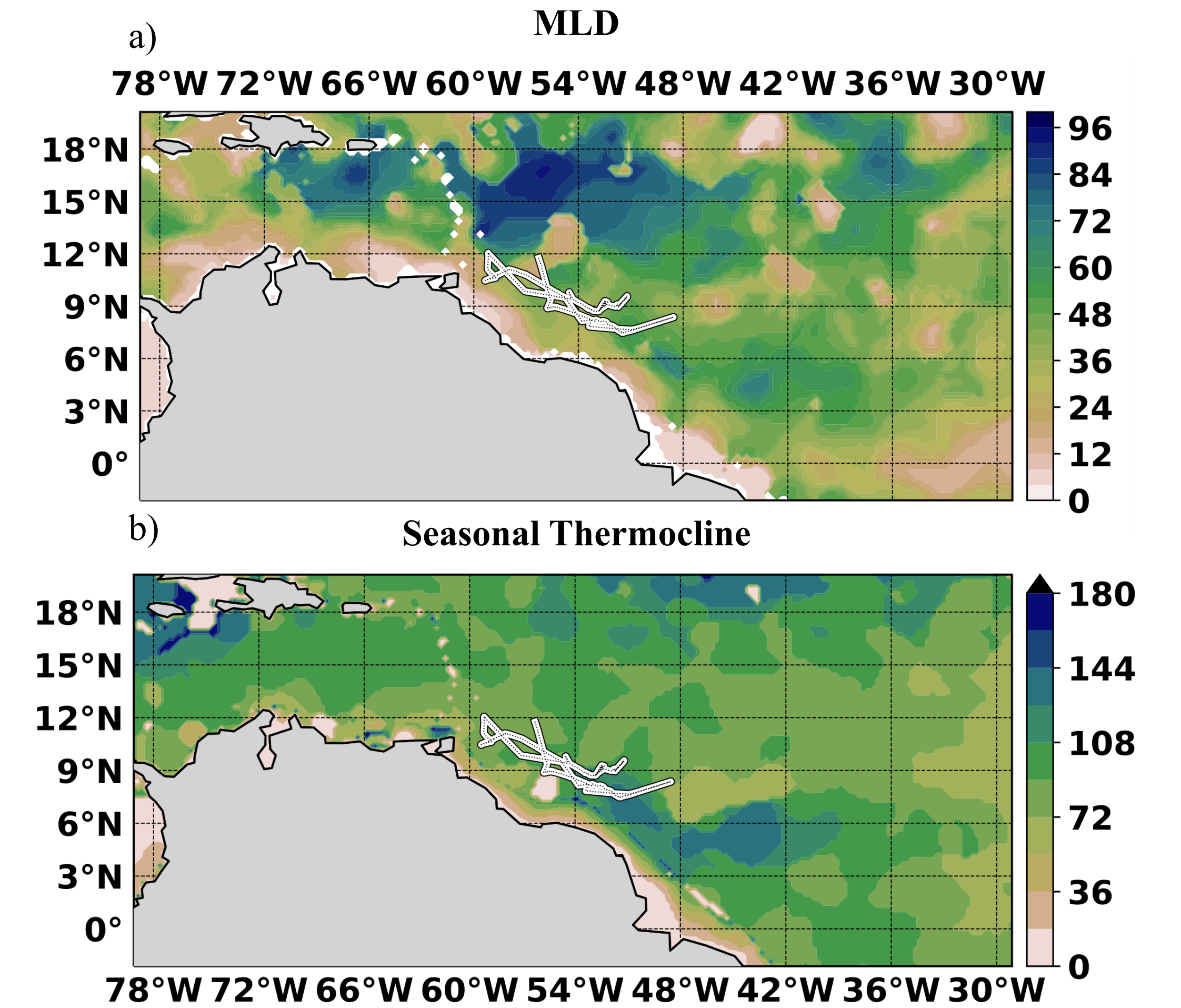


Seasonal composites of SST diurnal amplitudes ( $SST_{da}$ ) constructed from linear regression analysis between incoming solar shortwave radiation (SARAH) and wind speeds (CCMP). Enhanced  $SST_{da}$  exists at 4°N, 23°W during DJF and MAM.

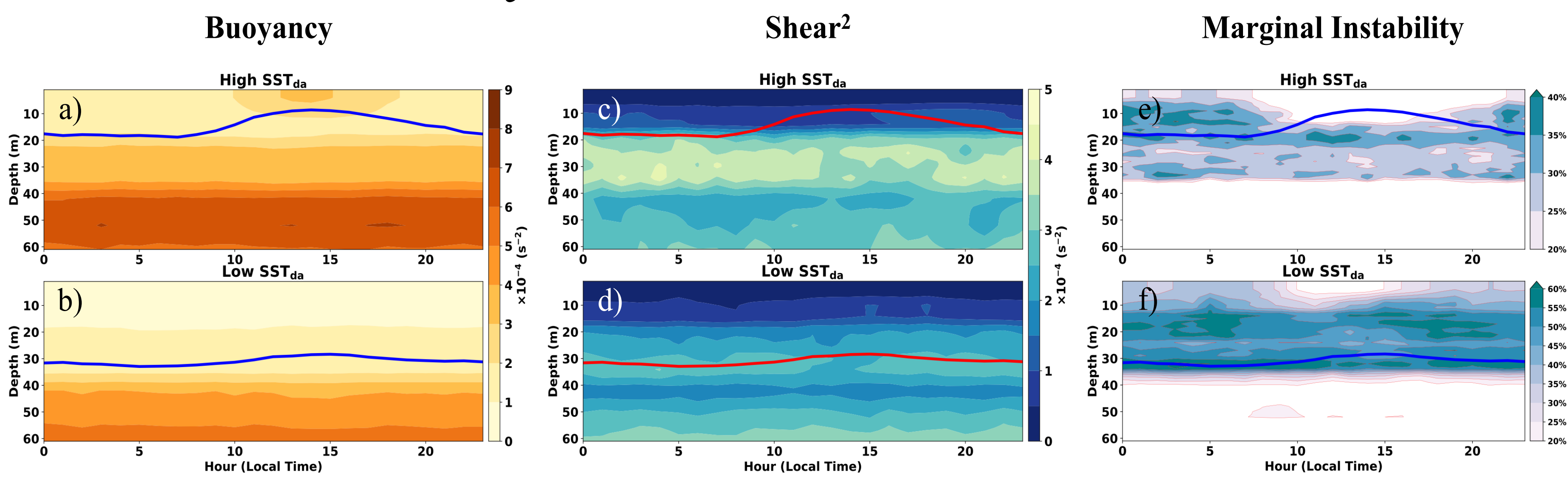
Thermodynamic and dynamic data from two deployments (March 2017 – March 2018 & May 2019 – May 2020) of the Tropical Atlantic Current Observation Study (TACOS; see Dr. Renellys Perez's poster for more details) is analyzed to determine how the thermocline and shear variance relate to mixing during high/low  $SST_{da}$ . It is found that on diurnal timescales the thermocline acts as a wave guide for internal tides that modulate shear variance, particularly during evening-early morning hours when the mixed-layer is deepest.

## 2. ATOMIC Saildrones

The seasonally-averaged mixed layer depth (a) and the seasonal thermocline depth (b) from WOA18 for January – March 2020 are plotted for the tropical Atlantic Ocean. White lines with black dots indicate the latitude and longitude tracks taken by a Saildrone during the Atlantic Tradewind Ocean-Atmosphere Mesoscale Interaction Campaign (ATOMIC, 2020). All four of the Saildrones used during ATOMIC had similar paths.

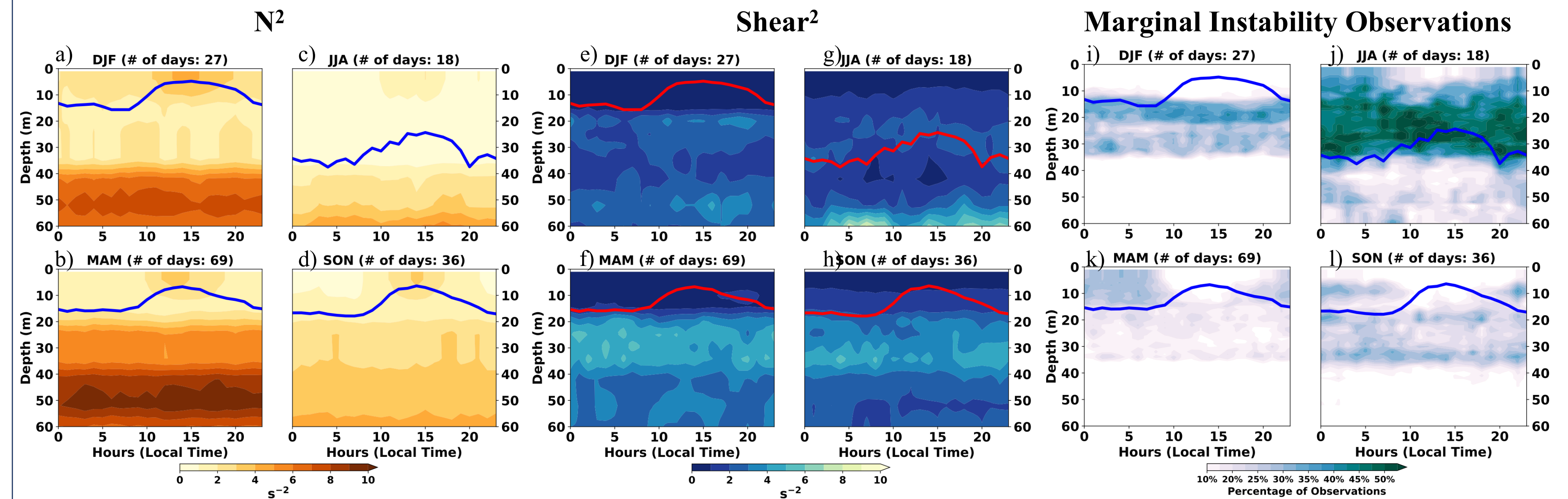


## 3. Observed Buoyancy, Shear-Squared, and Marginal Instability From TACOS and ATOMIC



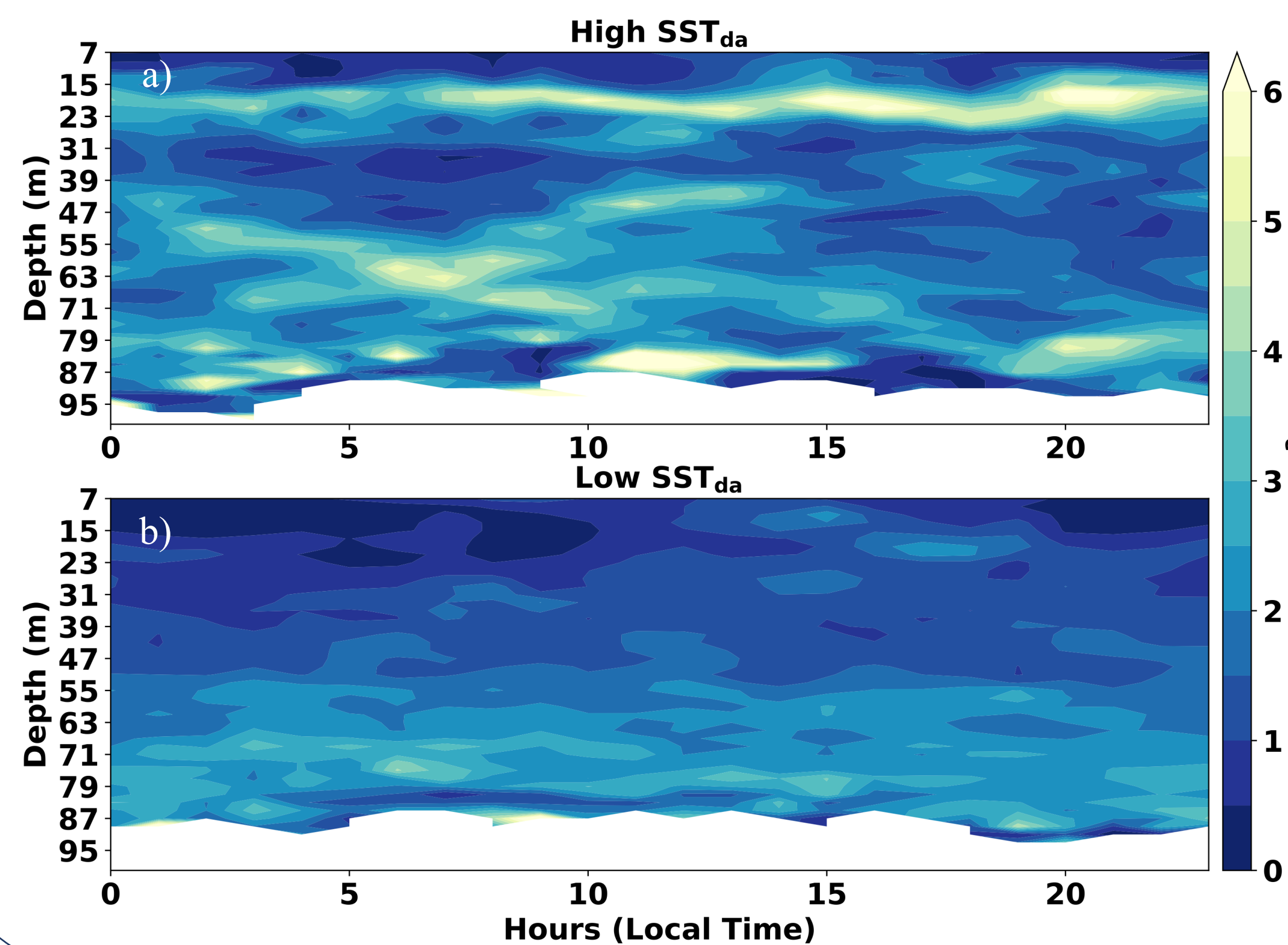
The composited buoyancy ((a) - (b)), composited shear-squared ((c) - (d)), and percentage of positive marginal instability events ((e) - (f)) are shown over the course of a diurnal period for high and low  $SST_{da}$  events as observed from the TACOS mooring. Strong stability at the surface is seen during the afternoon for high  $SST_{da}$  (a). This corresponds to a shoaling of the composited mixed layer depth (blue line) and low percentage (< 10%) of positive marginal instability events (e).

## 4. Seasonal Buoyancy, Shear-Squared, and Marginal Instability from TACOS

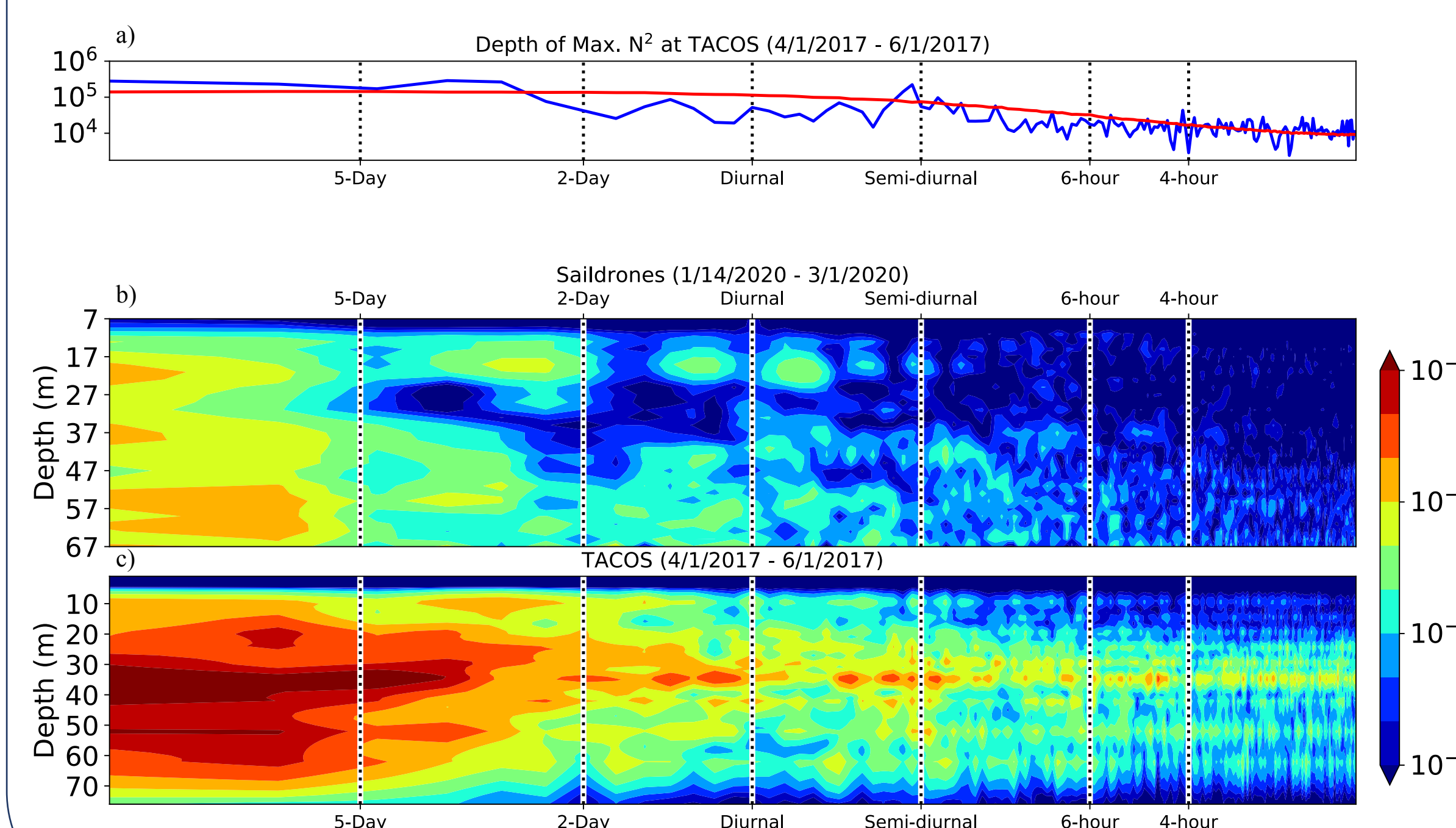


Diurnal composites of the MLD, buoyancy ( $N^2$ ), shear-squared, and the percentage of marginal instability occurrences per hour are shown for high  $SST_{da}$  per each season. Both MAM and JJA feature strong shear variance above the thermocline, which is associated with higher occurrences of mixing.

## 5. Semi-diurnal Internal Tides



Diurnal composites of the shear-squared averaged over all Saildrones used during the ATOMIC field campaign from January 2020 – March 2020. Significantly enhanced shear-squared during the early morning hours at around 60 meters is similar to what is seen at TACOS at 30 meters.



Spectral analyses were computed to further investigate the interplay between the buoyancy gradient and shear-squared at TACOS (a; c). Power spectra of the maximum buoyancy depth (a) shows significant peaks at the semi-diurnal period.

The power spectra of shear-squared was computed for the Saildrone observations (b) and the TACOS mooring observations (c). Relatively large power occurs at sub-inertial frequencies for Saildrones at 45 meters and at 35 meters for TACOS.