Thermal stress in South Florida estuaries: A multi-sensor assessment

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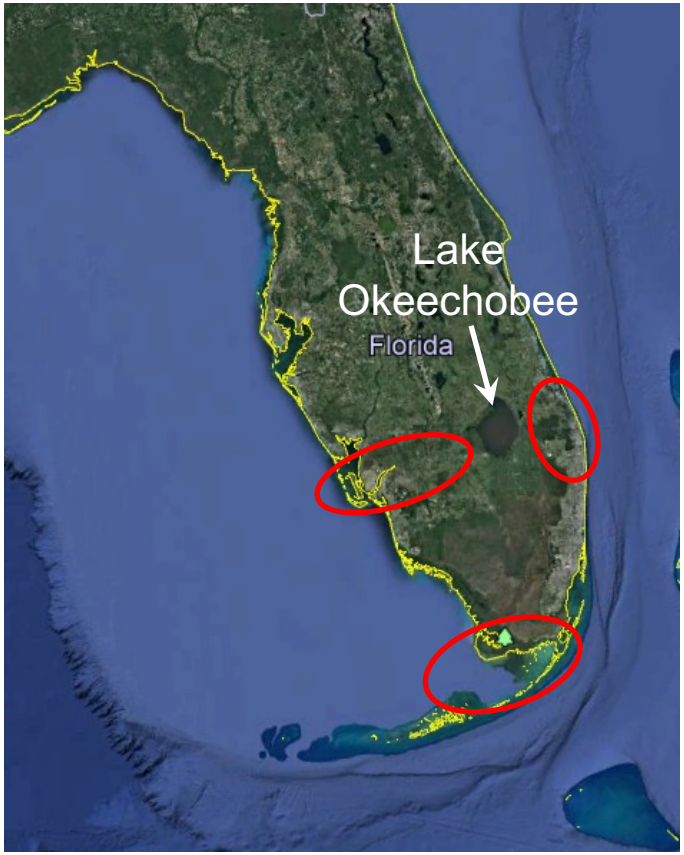
What's the problem?

SF estuaries faced environmental stress

- Harmful algae blooms
- Seagrass dieoffs



ECOSTRESS data over water

Evaluations

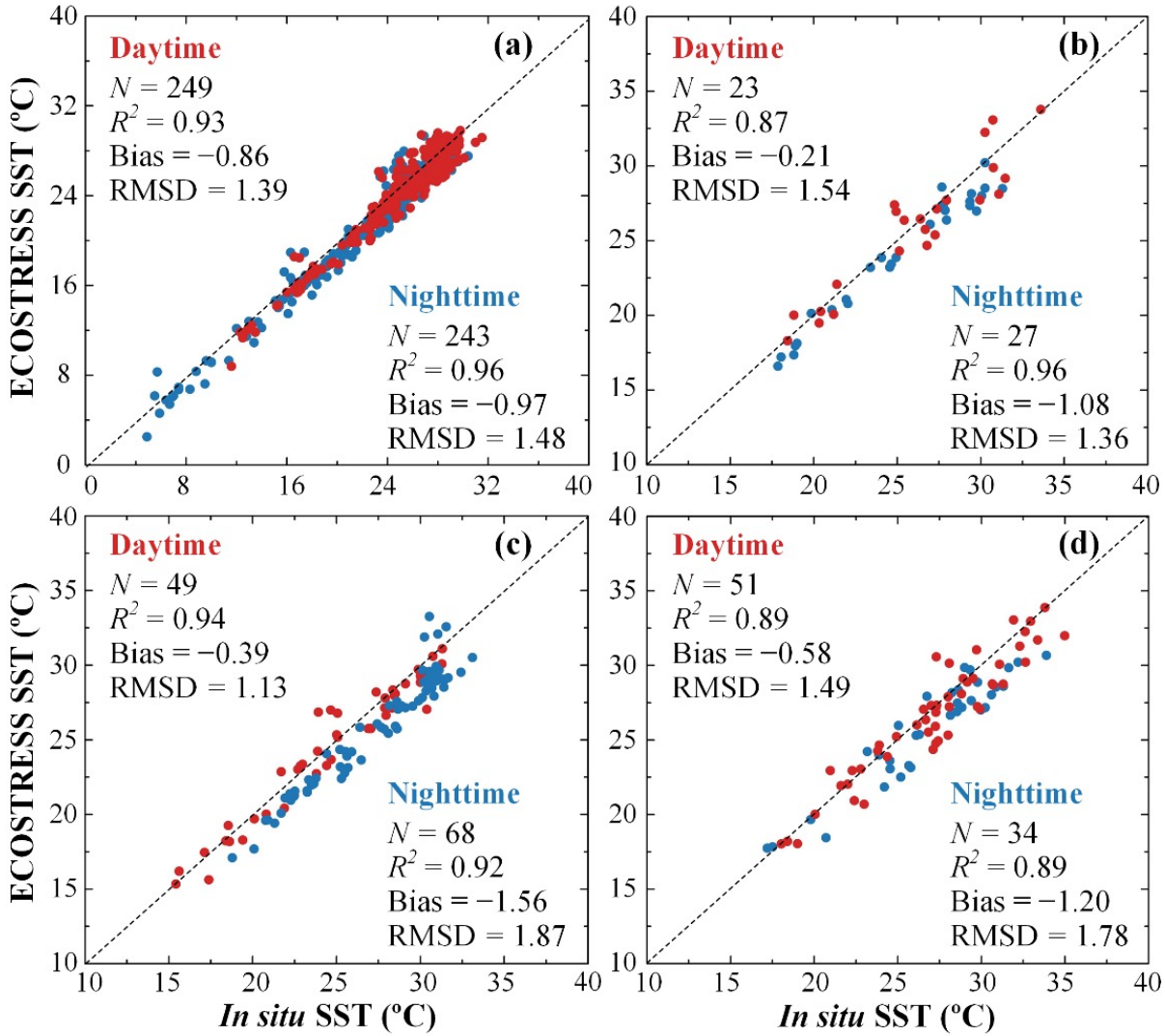
Statistics of ECOSTRESS-NDBC comparisons (Shi and Hu, 2021, *Sensors*)

Chesapeake Bay

Lake Okeechobee

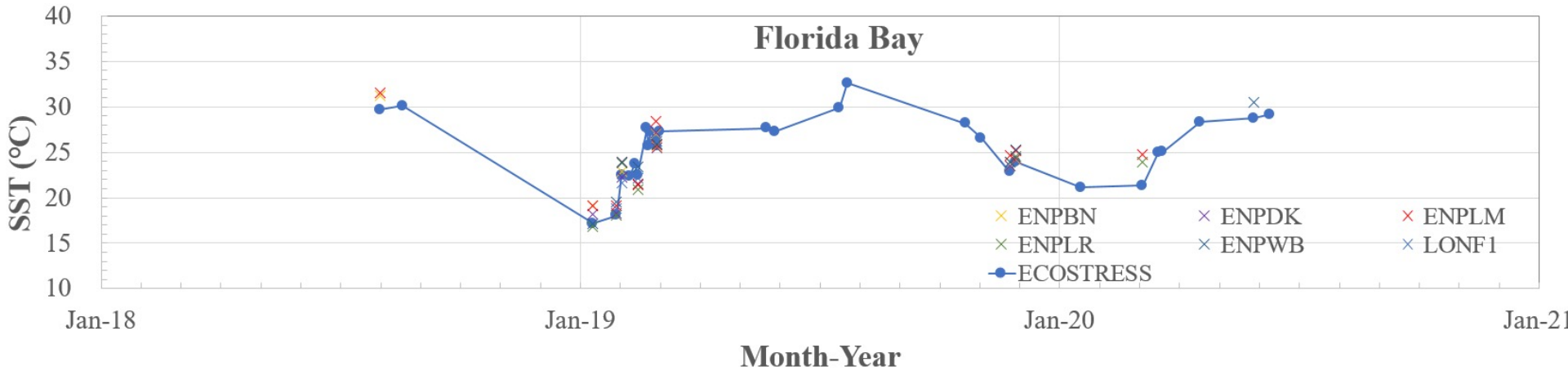
Caloosahatchee River estuary

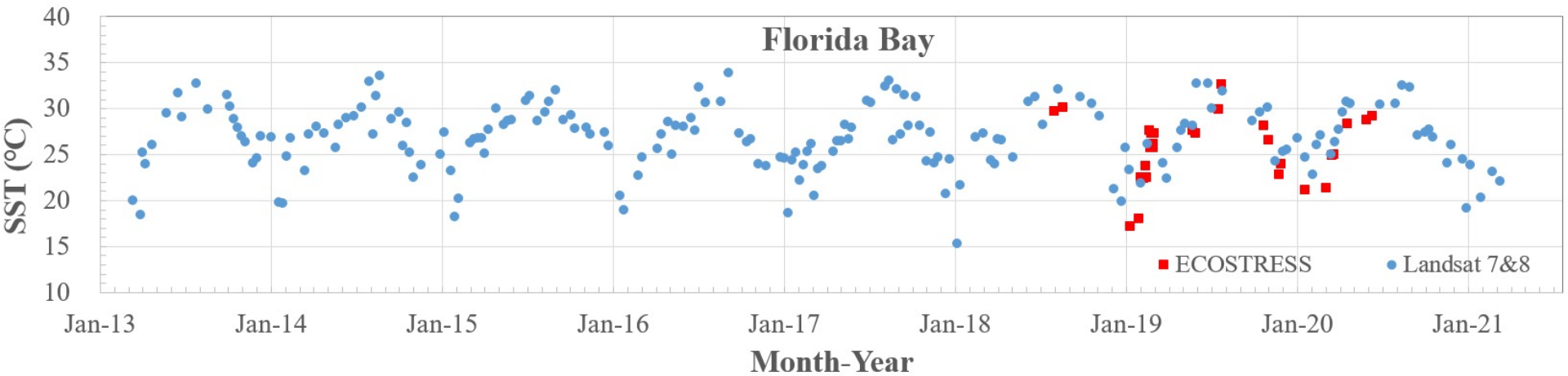
Florida Bay



Time series analysis

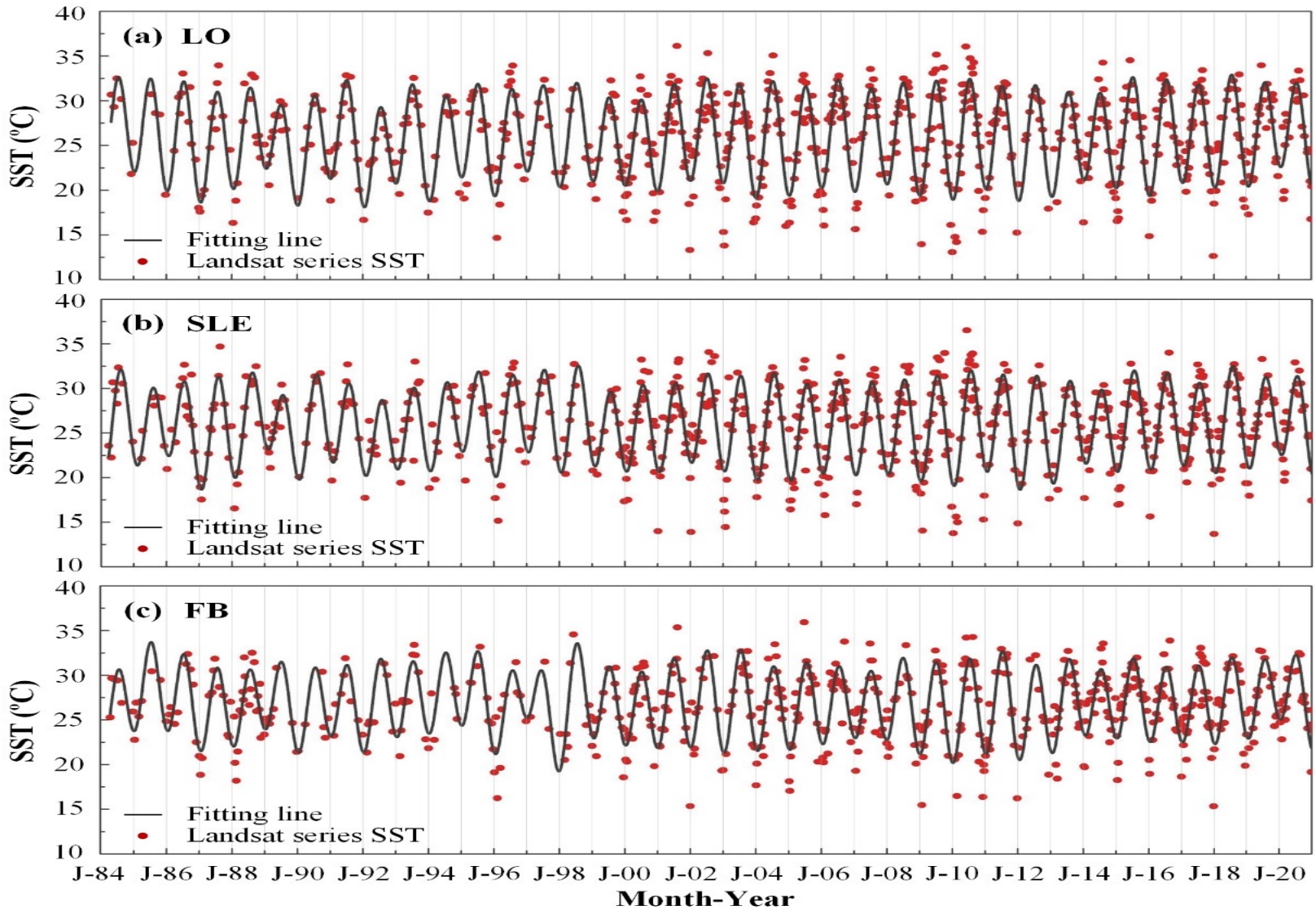
Multi-year SST patterns in Florida Bay





Time series analysis

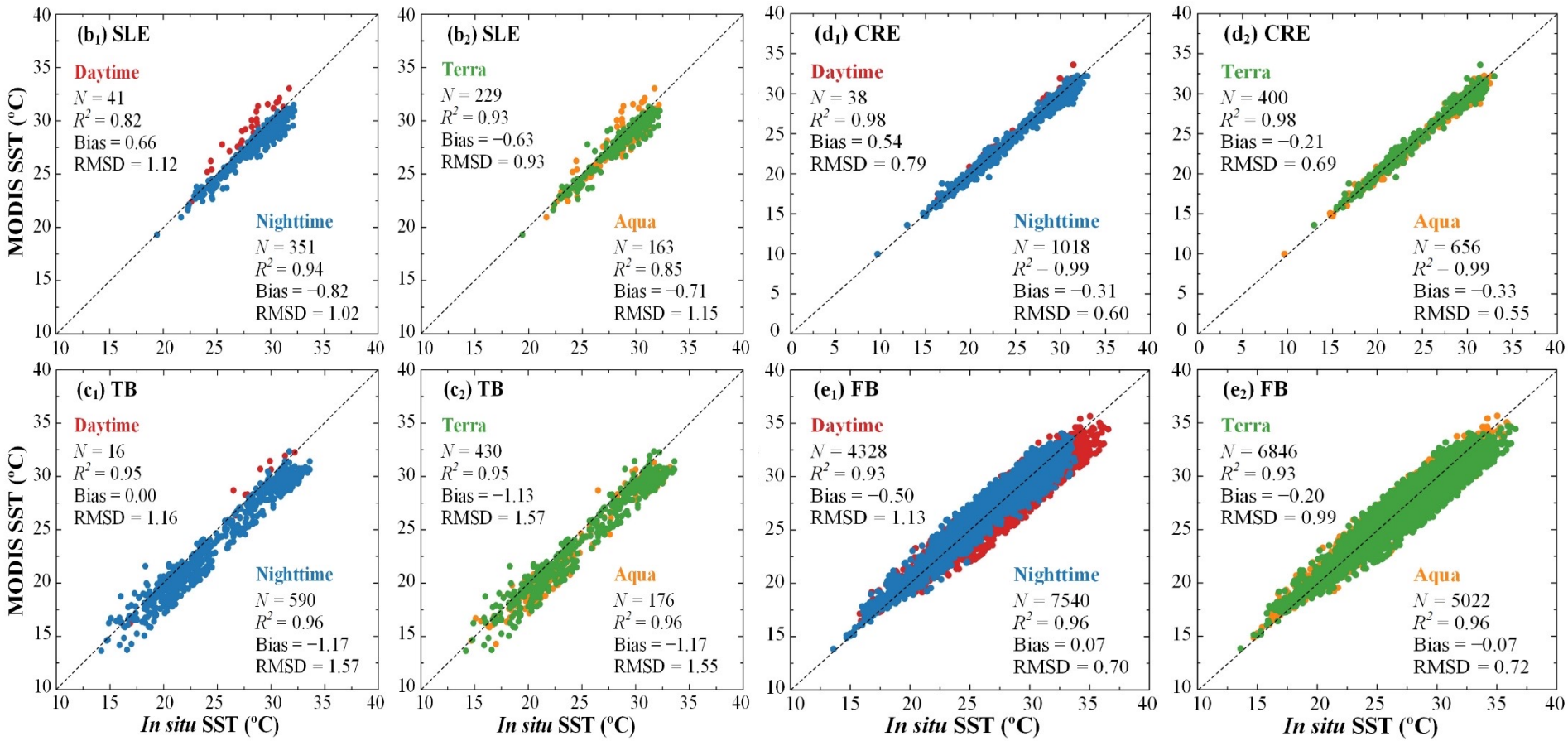
Multi-year SST patterns in several estuaries



Performance of MODIS SST

2000-present, 1 km resolution

Statistics of MODIS-NDBC comparisons

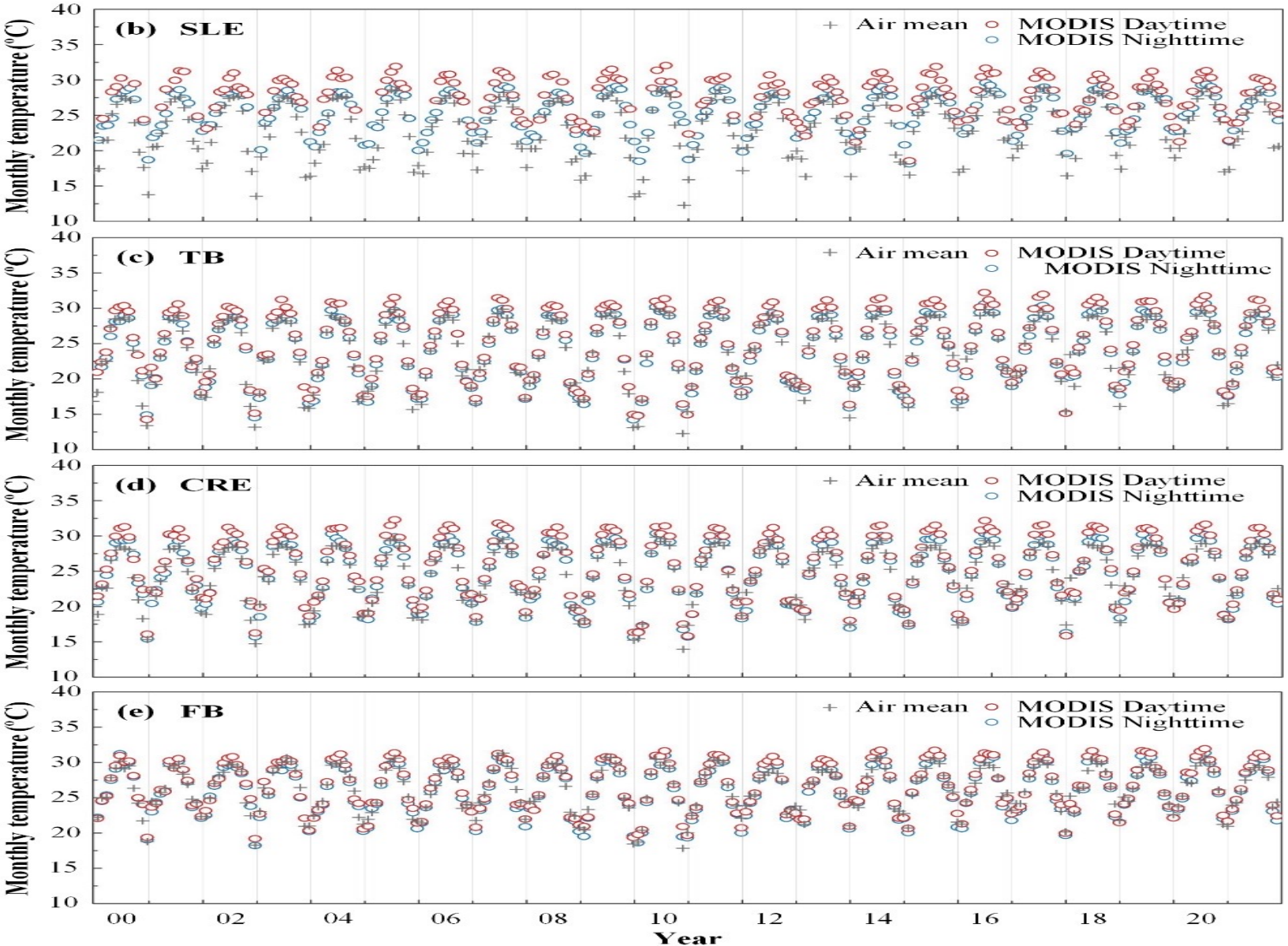


Method:

- For January-February, July-August, using qual_sst=0&1&2, then followed by view-by-view manual cloud masking to remove the effects of residual clouds and cloud shadows.
- For other months, use qual_sst=0&1 directly.

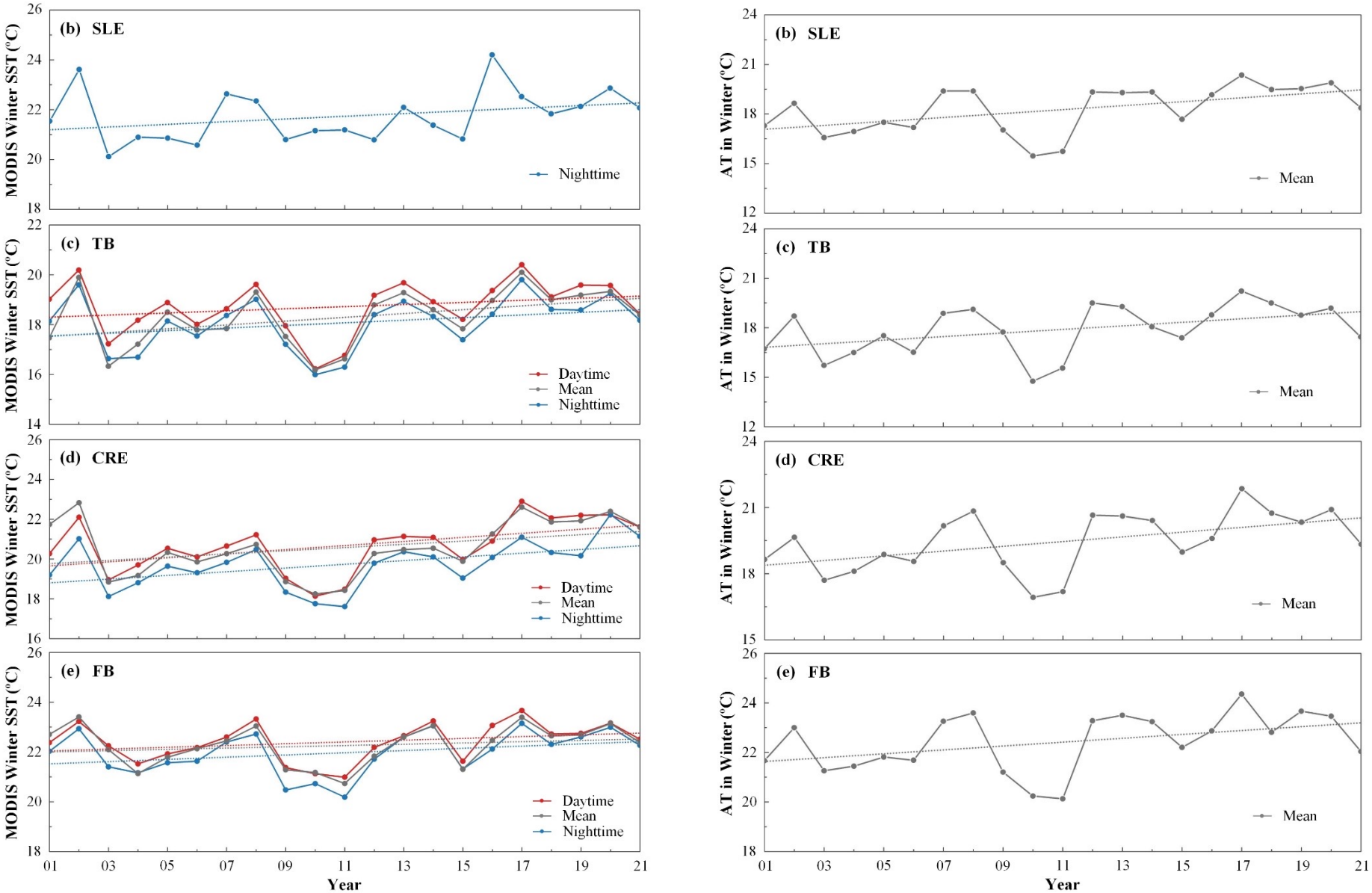
MODIS 20-year time series

Both Aqua and Terra, daytime and nighttime



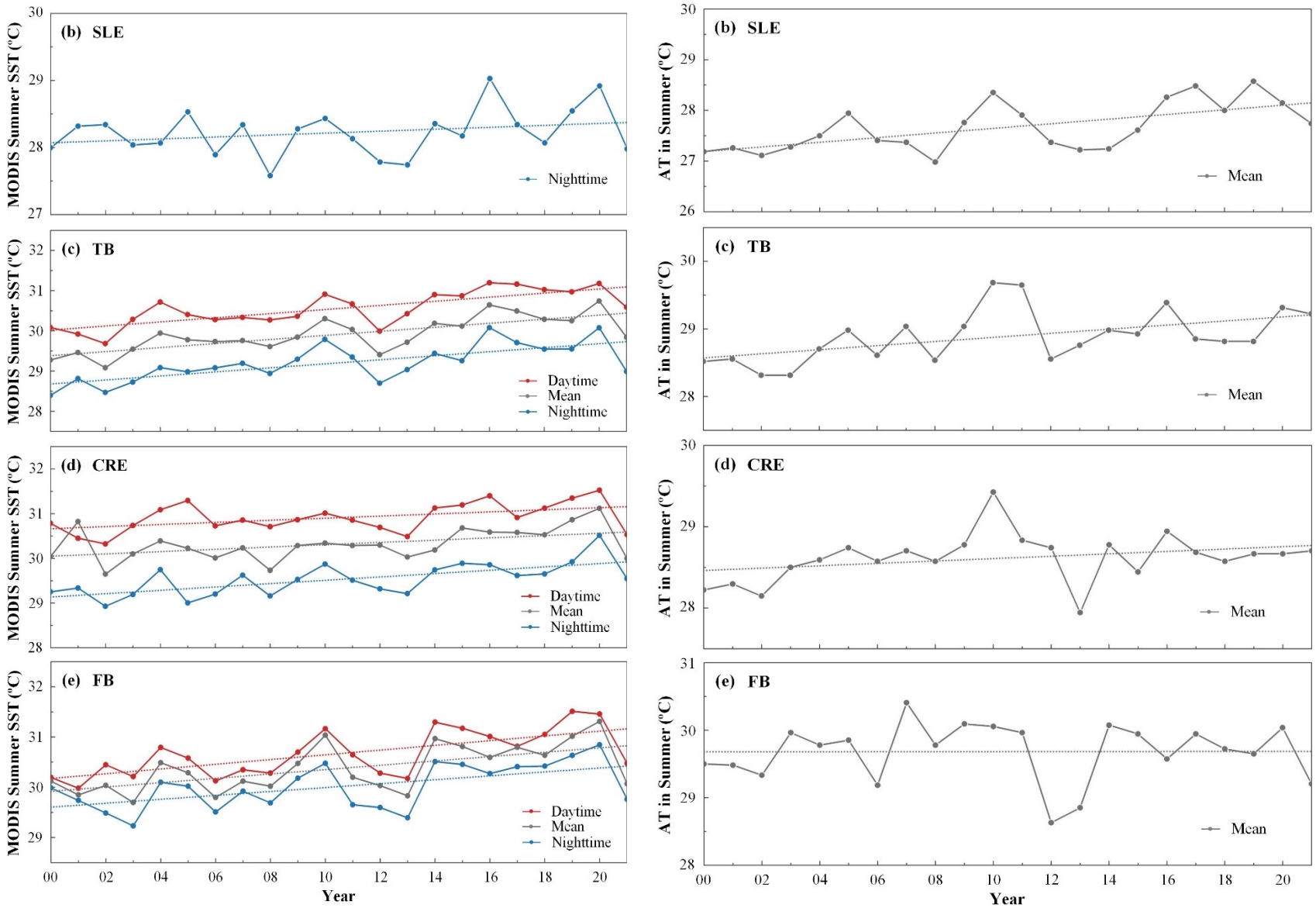
Trend analysis

Winter (December-February)



Trend analysis

Summer (June-August)



Summary

- ECOSTRESS LST accuracy over estuaries verified with in situ data – adequate for time-series analysis
- Performance comparable with Landsat SST, but they both lack temporal coverage for the last decades
- MODIS SST validated for time-series analysis after removing cloud contaminations
- Most estuaries show statistically significant SST trends in both summer and winter months.