Sea Surface Temperature Diurnal Variability

Regional Extent – Implications in Atmospheric Modelling

Ioanna Karagali

DTU Wind Energy, Risø campus

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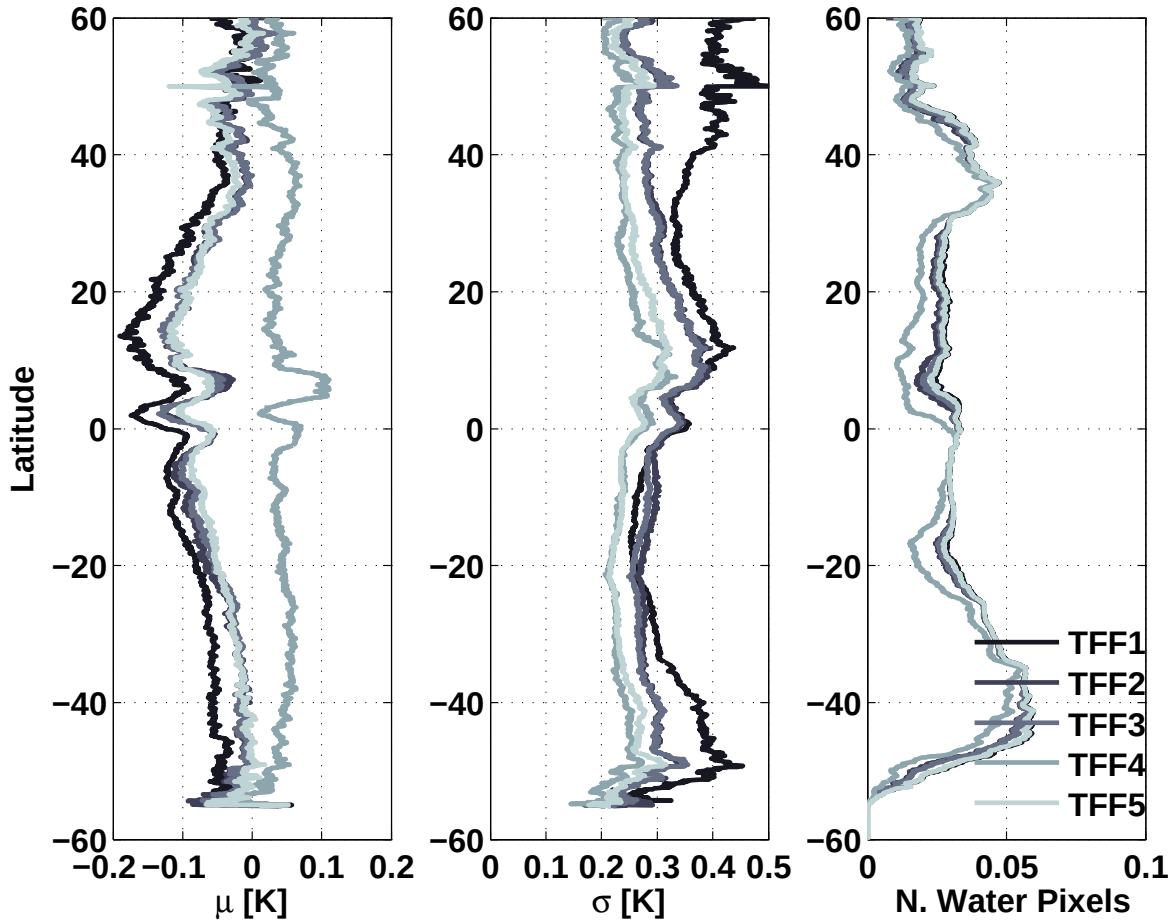
SSTDV:R.EX.-IM.A.M. Project Description

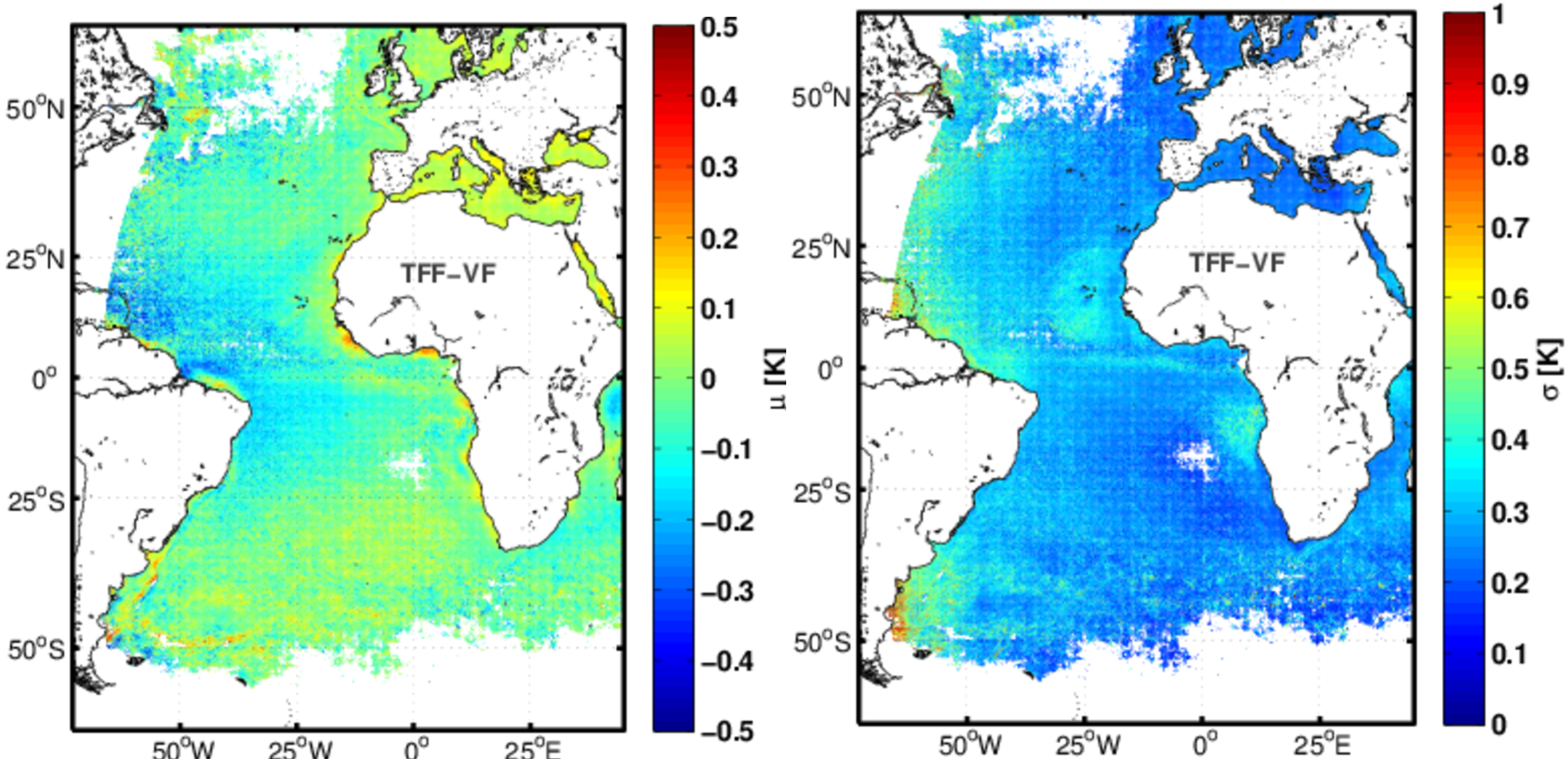
- WP1. Regional extent of diurnal warming
  - T1.1 SEVIRI vs AATSR
  - T1.2 Foundation Fields: Sensitivity Tests, Validation & Quality Control
  - T1.3 Characterization of regional diurnal warming
- WP2. The General Ocean Turbulence Model
  - T2.1 Sensitivity Tests
  - T2.2 GOTM at point locations: In Situ, SEVIRI, GOTM comparison
  - T2.3 GOTM in the North Sea/Baltic: SEVIRI, GOTM, parametrizations comparison
- WP3. SST and Atmospheric Modelling
  - T3.1 SEVIRI hourly SST in WRF
  - T3.2 WRF diurnal parametrizations
  - T3.3 Validation and error estimates (10m wind, heat fluxes)

Methodology & Statistics

- TFF1: LT 00–04, QF 3–5, ± 3 days
- TFF2: LT 00–04, QF 1–5, ± 0 days
- TFF3: LT 00–04, QF 3–5, ± 0 days
- TFF4: LT 00–04, QF 5, ± 0 days
- TFF5: LT 00–06, QF 3–5, ± 0 days
- VF: Last pre-dawn (LT), QF 5



TFF vs Pre-Dawn SST



Monthly mean ΔSST

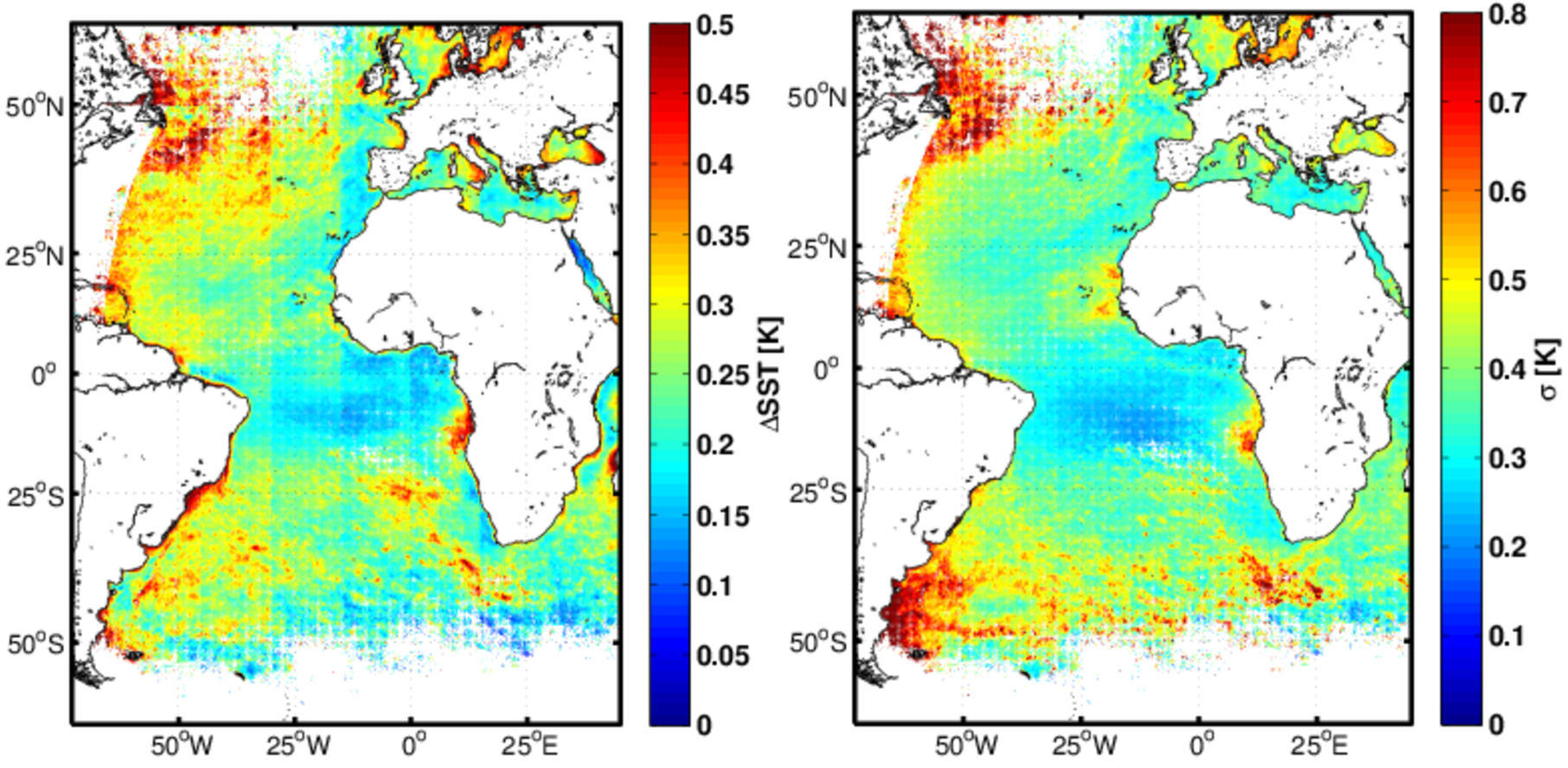


Figure: ΔSST (left) defined as monthly averaged ΔSST_{day}, i.e. the mean $SST_{24hours} - SST_{found}$ and its σ (right).

δSST$\geq$1 K 2006–2011 & ECMWF

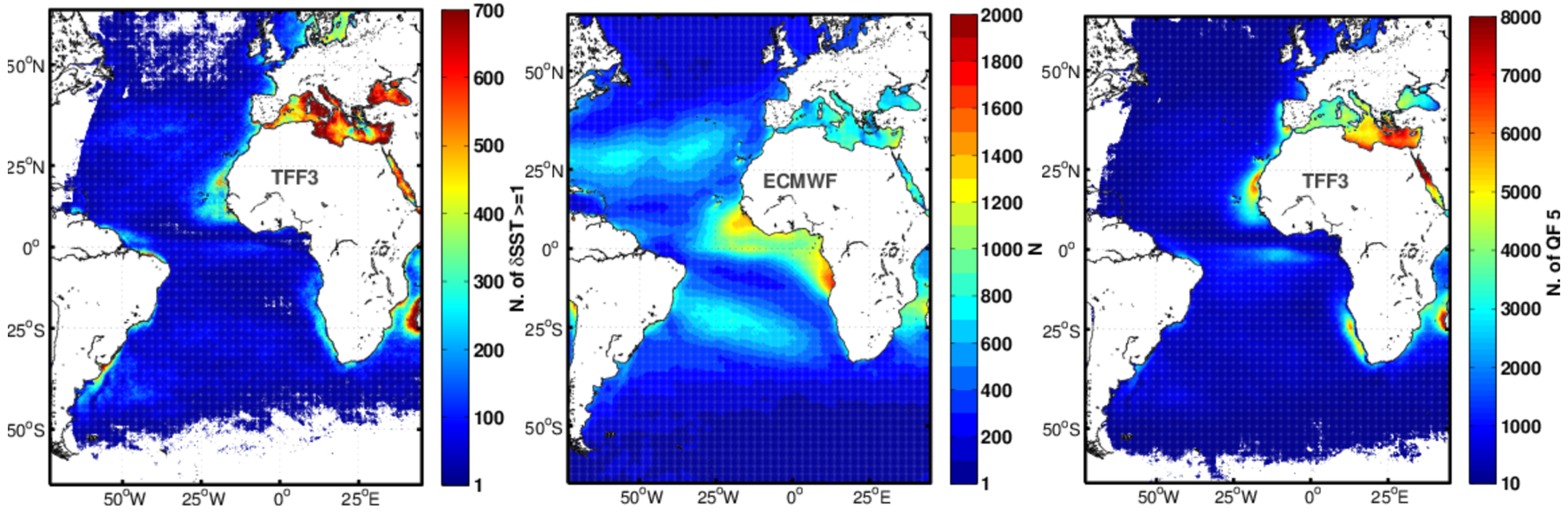


Figure: Left: Hours of δSST$\geq$1 K, 2006–11 (white=zero occurrences), Middle: ECMWF U$\leq$6 ms^{-1} & net SSI$\geq$400 Wm^{-2} (09–11), Right: QF = 5.

δSST$\leq$ =1 K

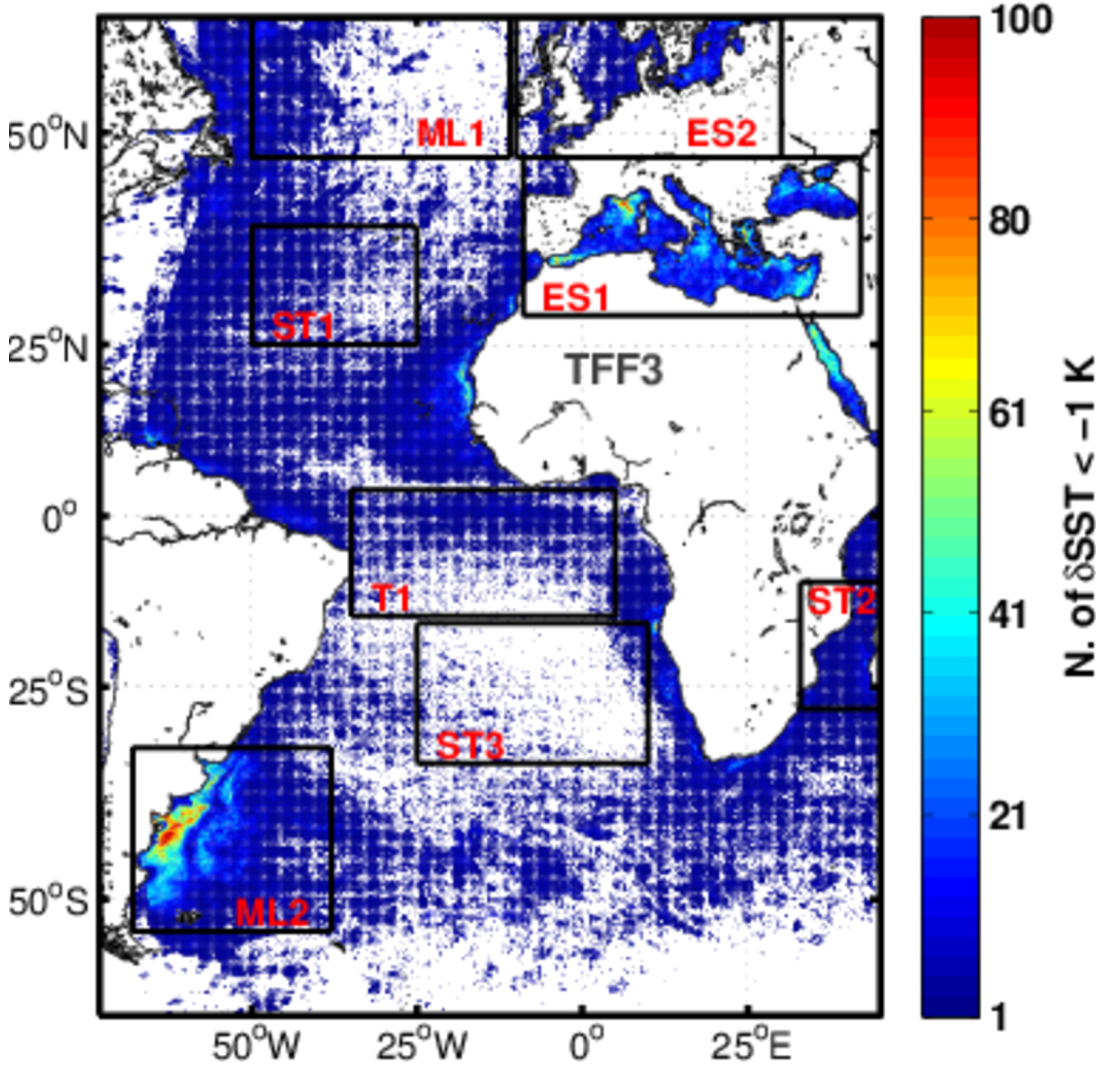
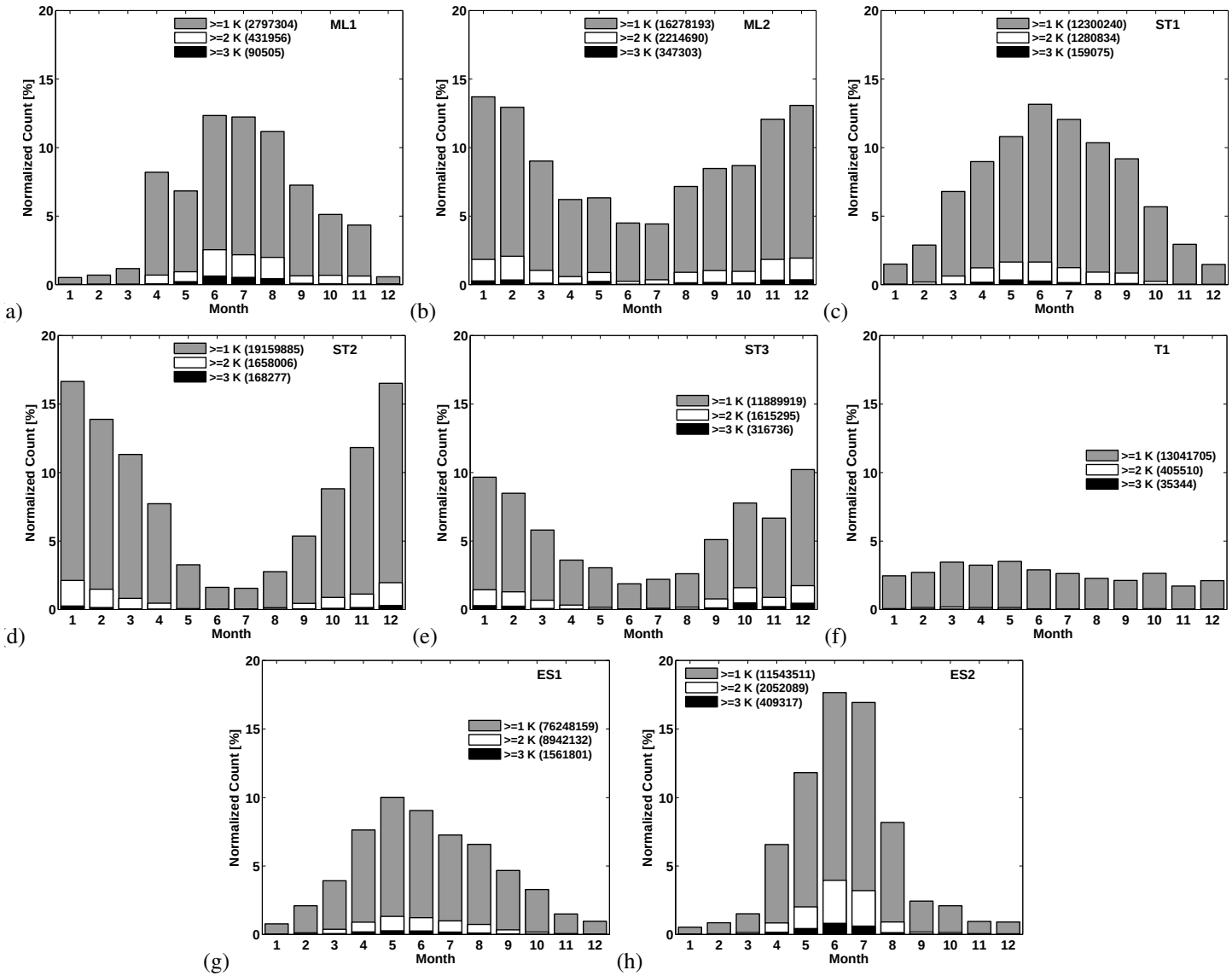
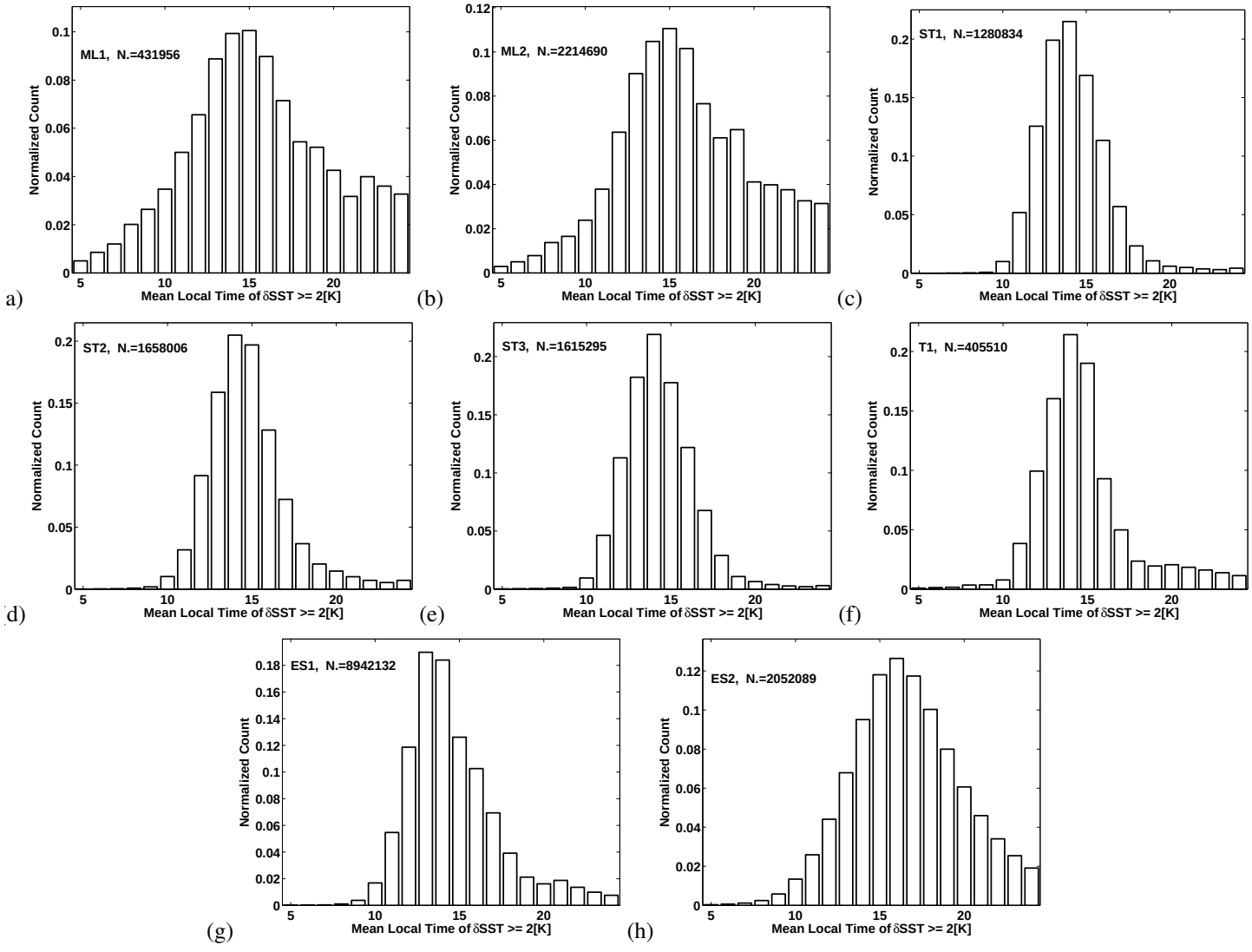


Figure: δSST≤ -1 K for 2006–2011.

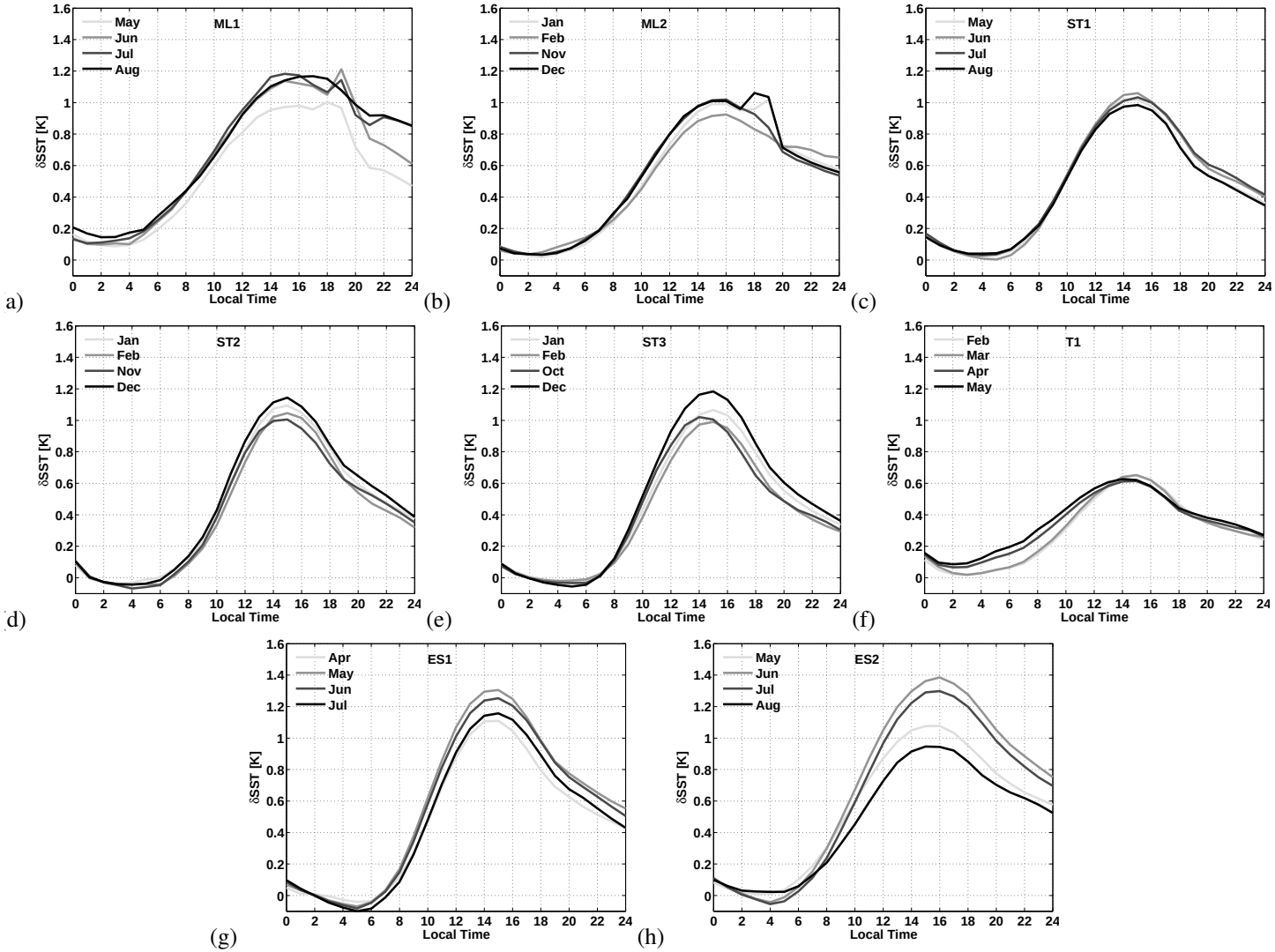
Annual Distributions



LT of Occurrence



Regional diurnal cycles



Summary

- SEVIRI–AATSR (RC) μ=–0.07 K, σ=0.51 K
- Night-time foundation fields–Pre-dawn SST μ ∼0 K, σ ∼ 0.3 K
- Diurnal warming $\geq$ 1 K in enclosed basins and open ocean
- Maximum monthly mean diurnal amplitude ∼0.5 K
- Consistent patterns: seasonality, early morning cooling, residual warm layer
- Differences in threshold exceedance, amplitude and timing
- See paper in Ocean Sciences Discussions `http://www.ocean-sci-discuss.net/11/1093/2014/osd-11-1093-2014-discussion.html`!

Thank you

Questions?