SSTDV: R.EX.–IM.A.M.

SST Diurnal Variability: Regional Extent - Implications in Atmospheric Modeling

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Outline

1. Introduction
2. Preliminary Results
3. Future

ESA Support to Science Element (STSE)

- Major challenges for understanding the Earth system
- Major contribution from satellite data
- Challenges of the Ocean
  - Understand physical air/sea interaction processes
  - Provide reliable model- & data-based assessments & predictions of past, present & future state of the ocean
- Challenges of the Atmosphere
  - Understand/quantify natural variability & human induced changes in climate system

SSTDV: R.EX.–IM.A.M.

2013–2015

- WP1. Regional extend of diurnal warming from SEVIRI
  - T1.1 SEVIRI–AATSR validation
  - T1.2 Foundation SST
  - T1.3 Regional diurnal warming
- WP2. The General Ocean Turbulence Model
  - T2.1 Sensitivity Tests
  - T2.2 GOTM at point locations: In Situ–SEVIRI–GOTM
  - T2.3 GOTM North/Baltic Sea: SEVIRI–GOTM–parametrizations
- WP3. SST and Atmospheric Modelling
  - T3.1 SEVIRI in WRF
  - T3.2 WRF diurnal parametrizations
  - T3.3 Validation & error estimates (10m wind, heat fluxes)

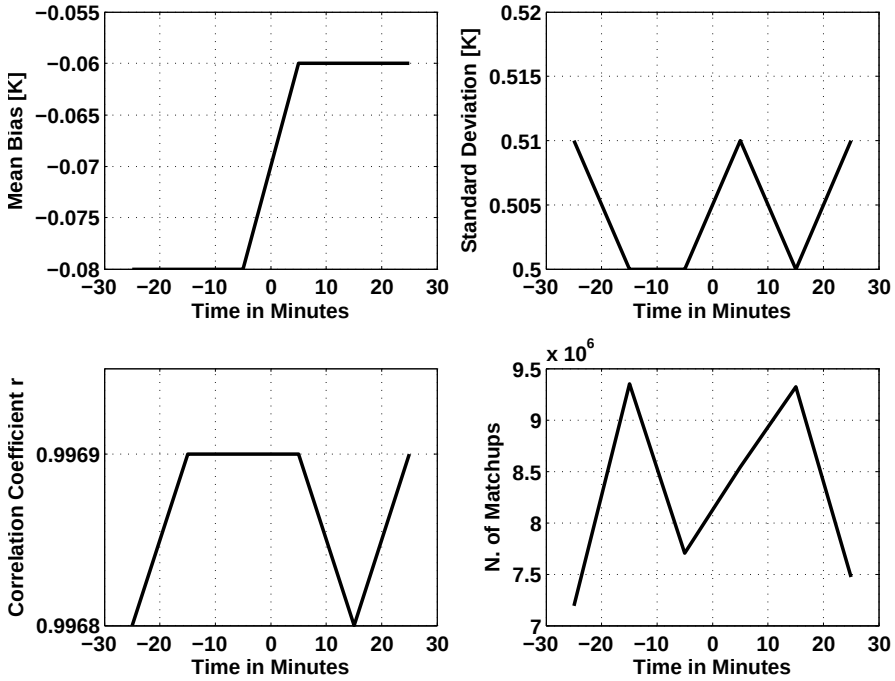
1 Introduction

2 Preliminary Results
- SEVIRI vs. AATSR
- Test Foundation Fields

3 Future

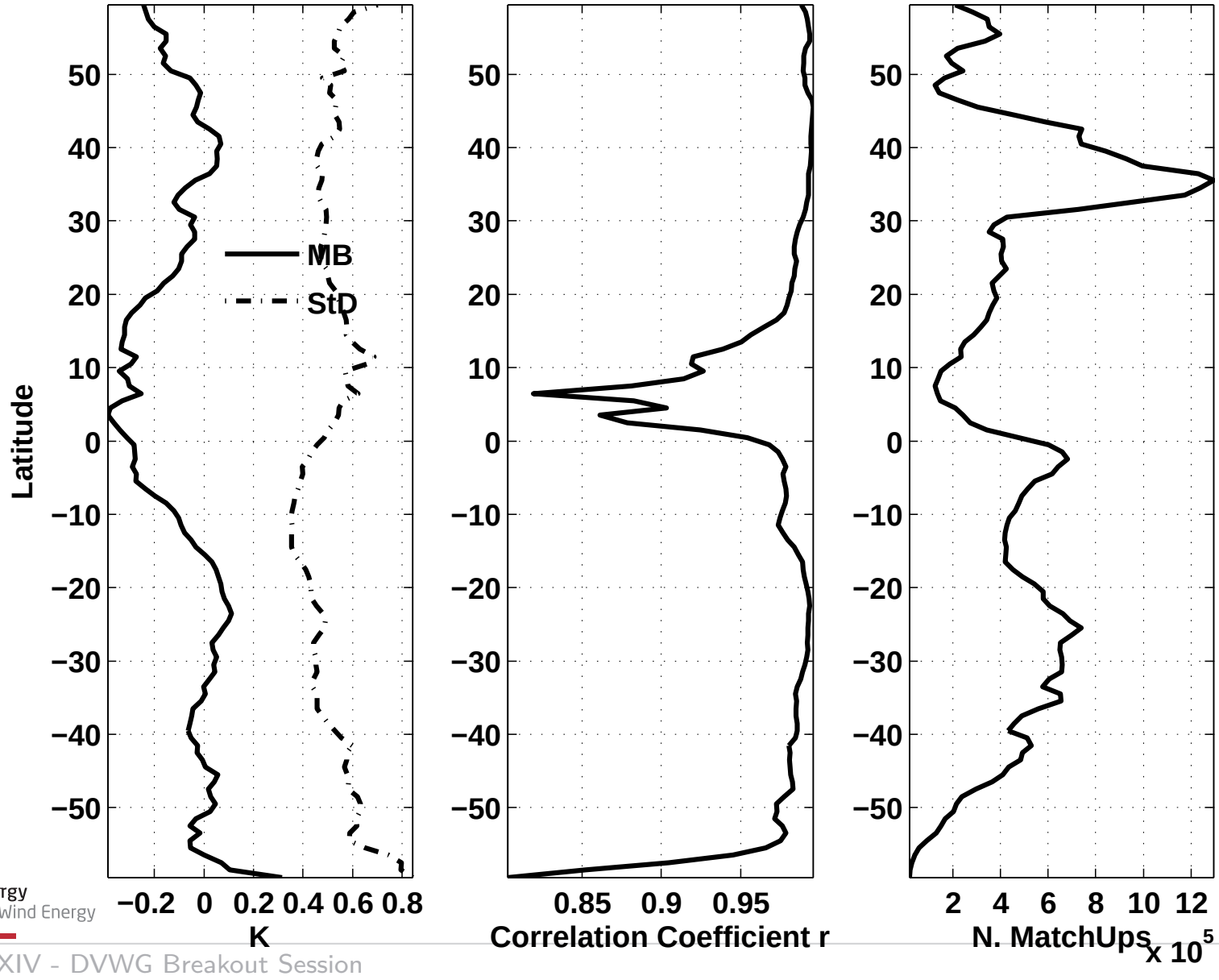
Collocation criteria

- Hourly SEVIRI 0.05° (CMS)
- AATSR (ARC) 0.1°
- Spatial: $|\text{Lat}_{SEV} - \text{Lat}_{AATSR}| \leq 0.049°$
- Temporal: 30 minutes
- SEVIRI Quality ≥ 3
- AATSR Uncertainty ≤ 0.8

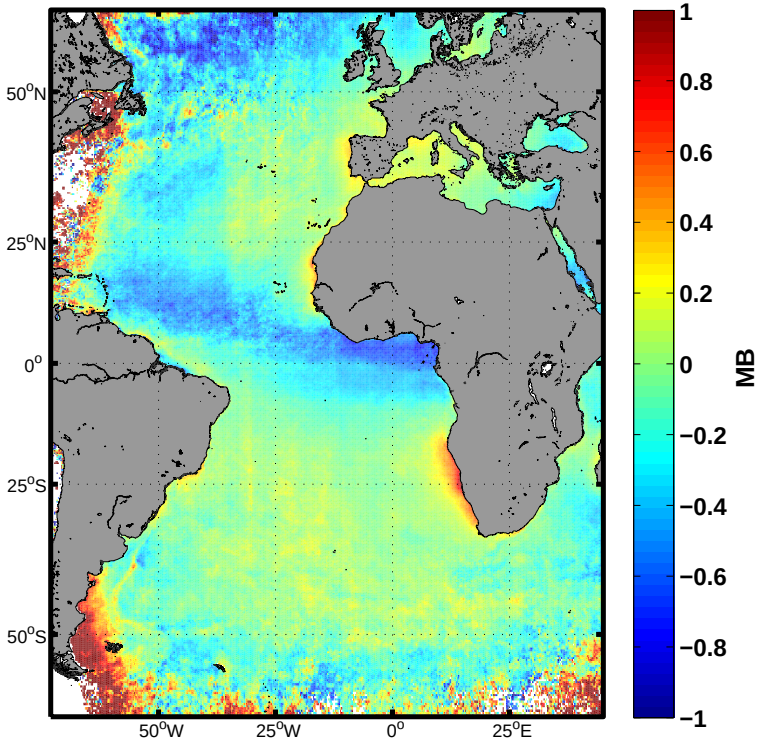


	Mean Bias	St.D.	r	N.
All Unc. Flagged (skin)	-0.06	0.56	0.996	53393988
Filt. & Unc. Flagged (skin)	-0.07	0.51	0.997	53127984
-"- & SEV QF 3	-0.18	0.55	0.997	22195034
-"- & SEV QF 4	-0.06	0.46	0.998	7262765
-"- & SEV QF 5	0.03	0.45	0.997	23670185

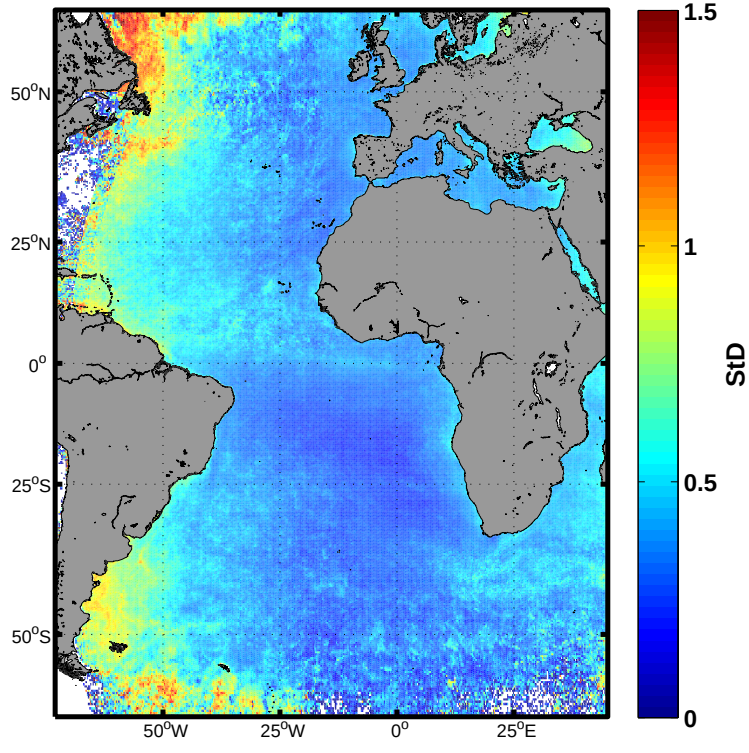
Bias dependence on Latitude (1°)



SEVIRI–AATSR

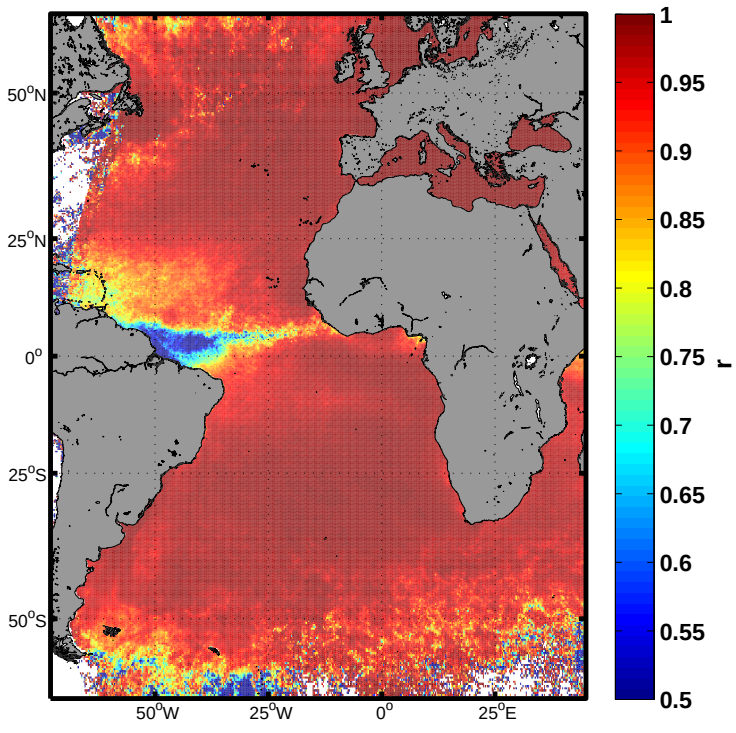


(a) MB

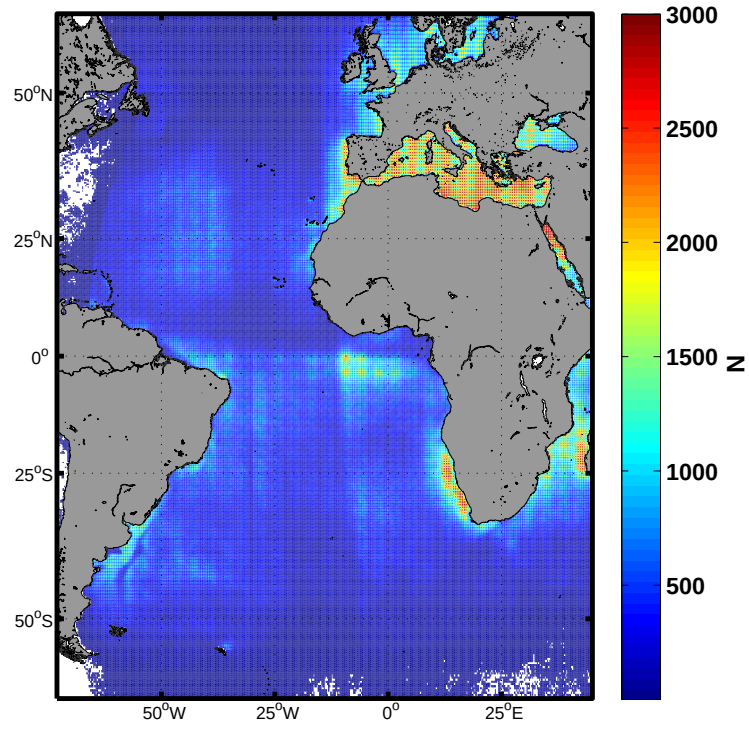


(b) σ

SEVIRI–AATSR



(a) r



(b) N

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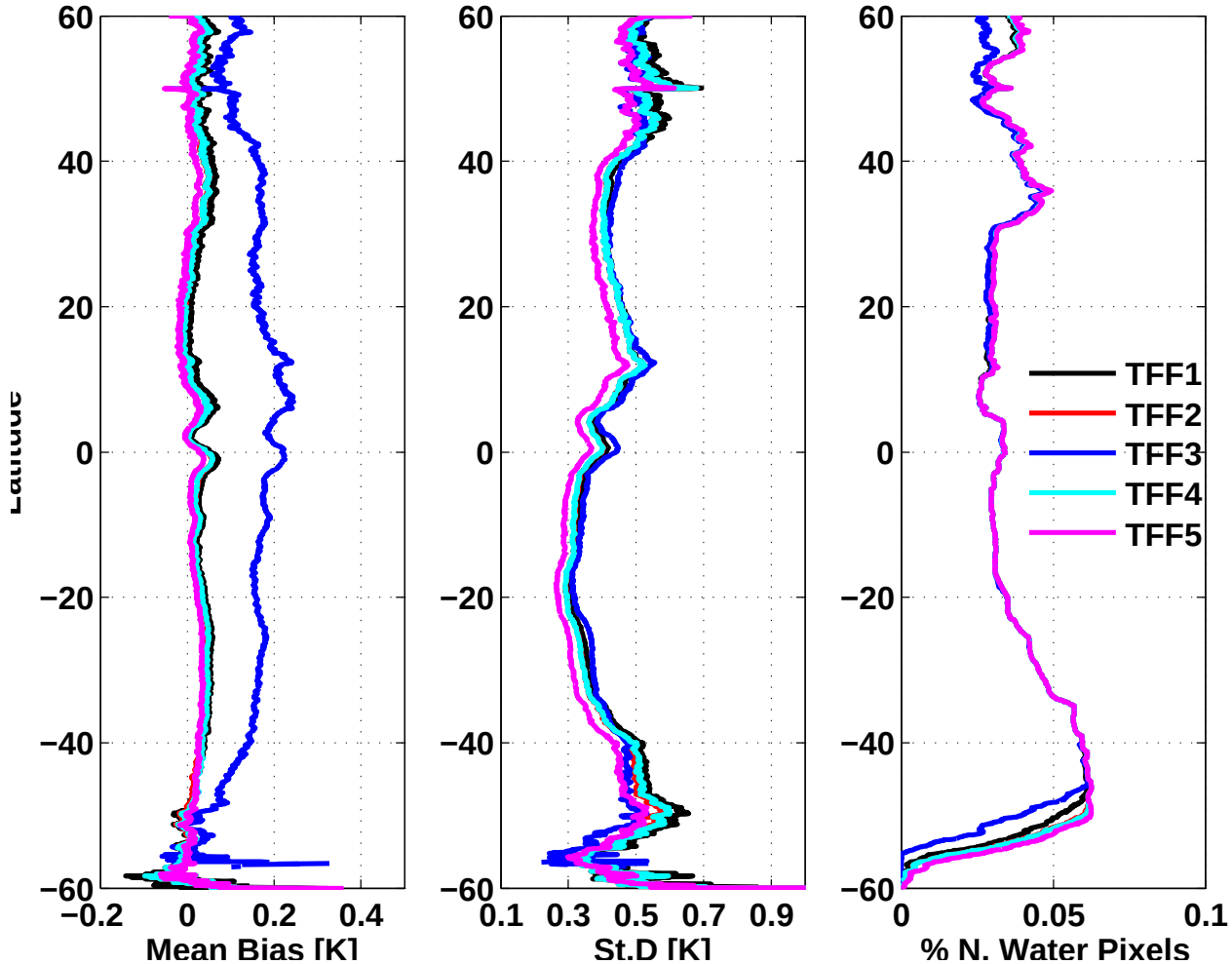
Methodology

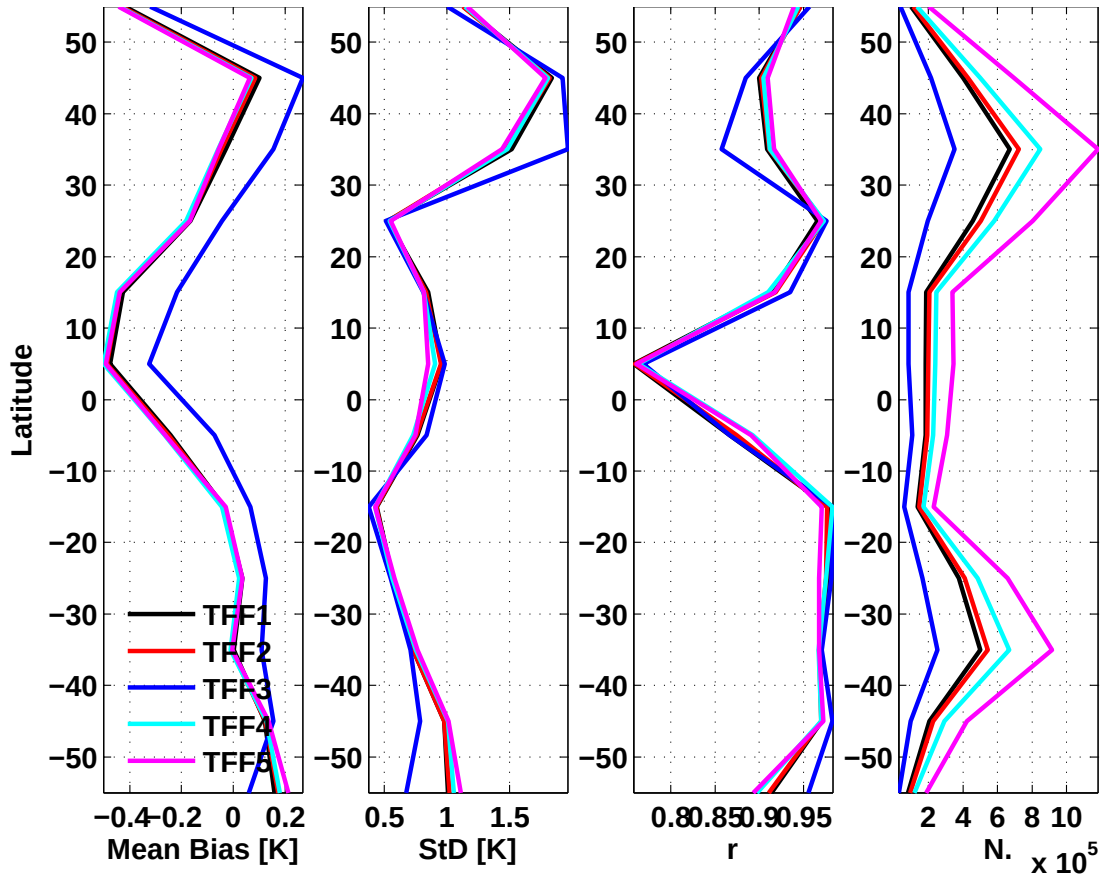
- Representative SST_{found}
- Test Foundation Fields (TFF)
  - TFF1: LT 00–03, QF 3–5, $\pm$ 3 days
  - TFF2: LT 00–04, QF 3–5, $\pm$ 3 days
  - TFF3: LT 00–04, QF 5, $\pm$ 3 days
  - TFF4: LT 22–04, QF 3–5, $\pm$ 3 days
  - TFF5: LT 22–06, QF 3–5, $\pm$ 3 days
- Validation Fields (VF)
  - VF1: Last pre-dawn (LT), QF 3–5
  - VF2: Last pre-dawn (LT), QF 5

TFF—VF1 (2006-2011)

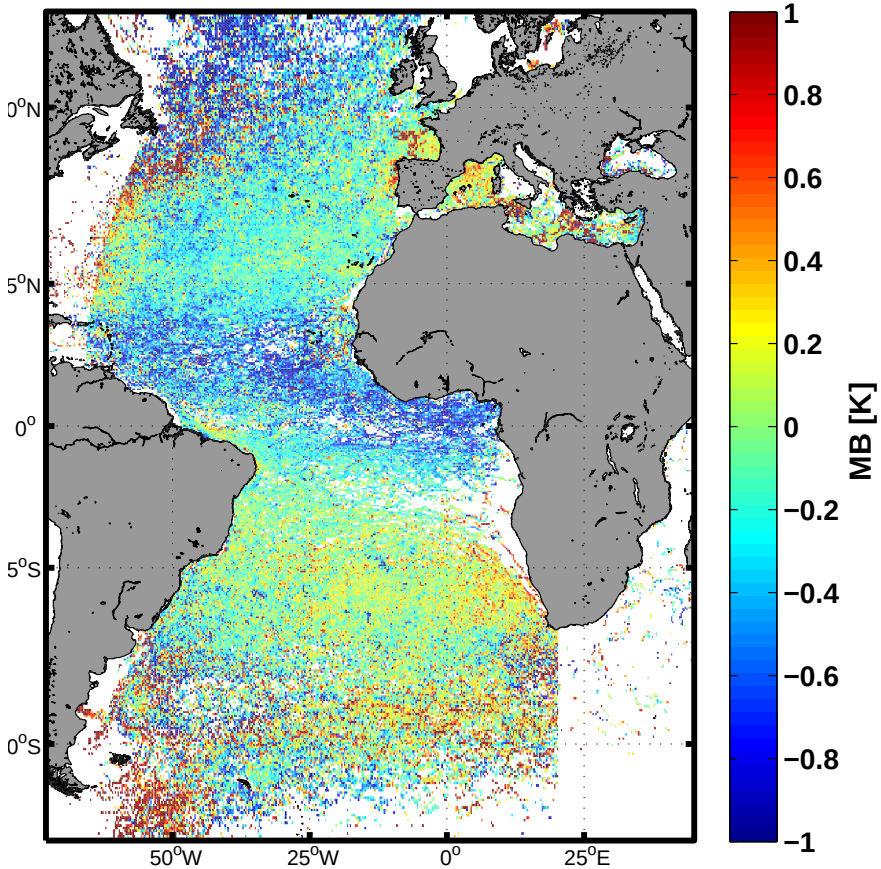


Validation with Coriolis Drifter TFF (2006–2011)

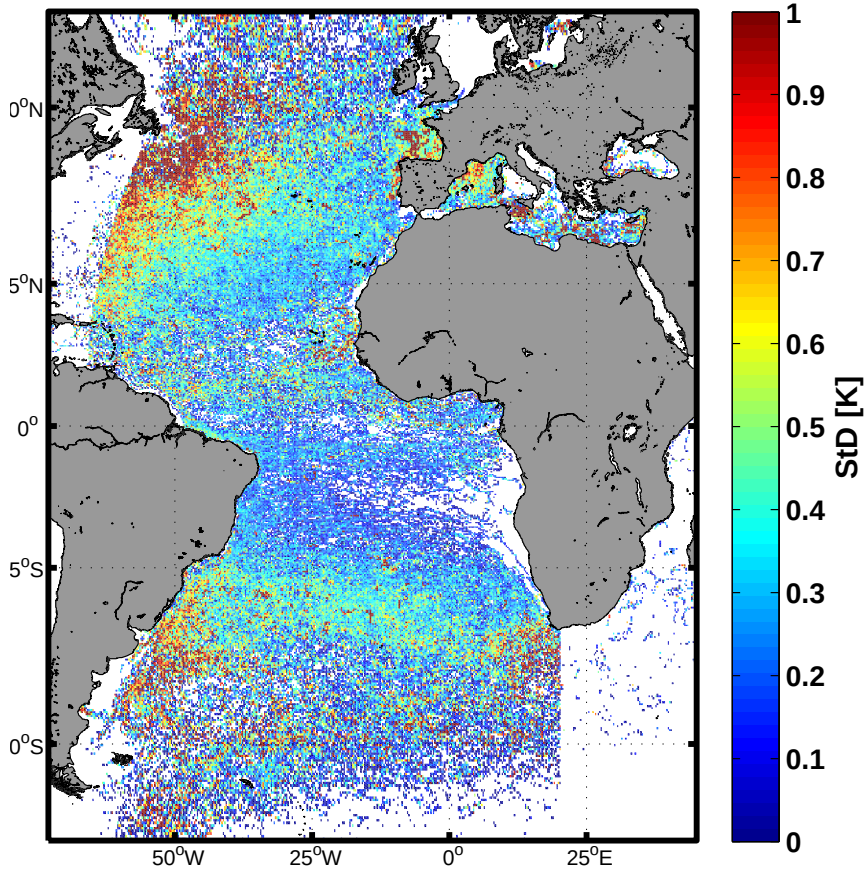
	TFF1	TFF2	TFF3	TFF4	TFF5
Mean Bias	-0.08	-0.09	0.06	-0.09	-0.09
St.D.	1.12	1.10	1.28	1.10	1.09
r	0.983	0.984	0.977	0.986	0.980
N.	3478824	3789122	1674118	4509825	6288208
Median buoys/match-up	2	2	2	2	3



TF1–Drifter TFF1

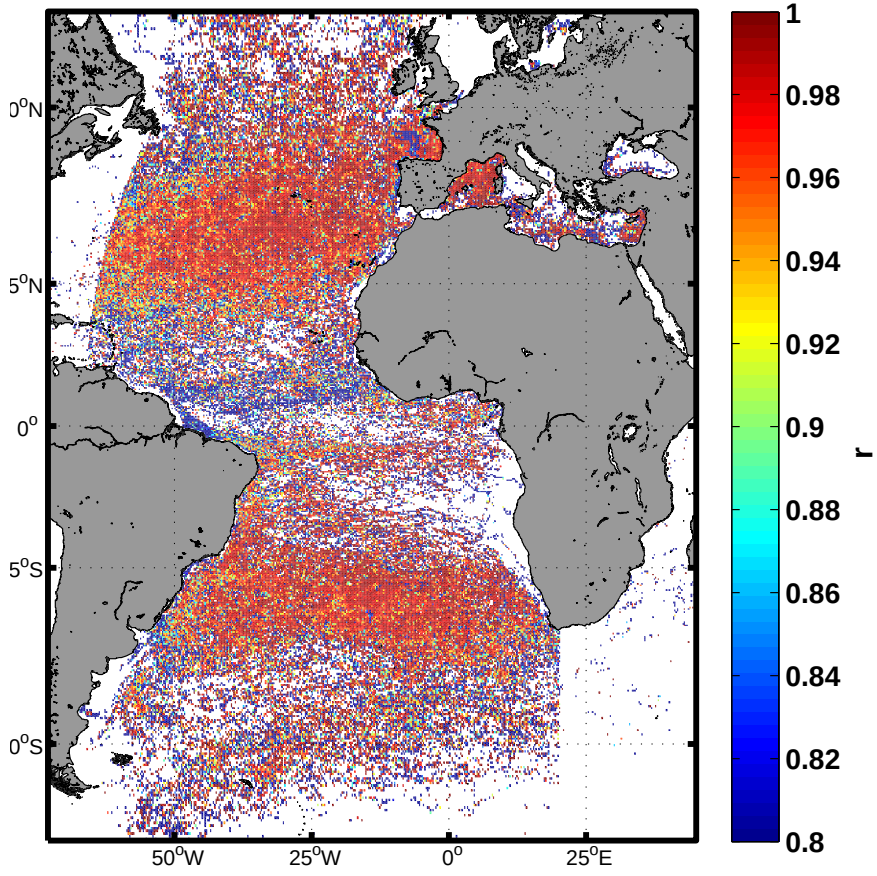


(a) MB

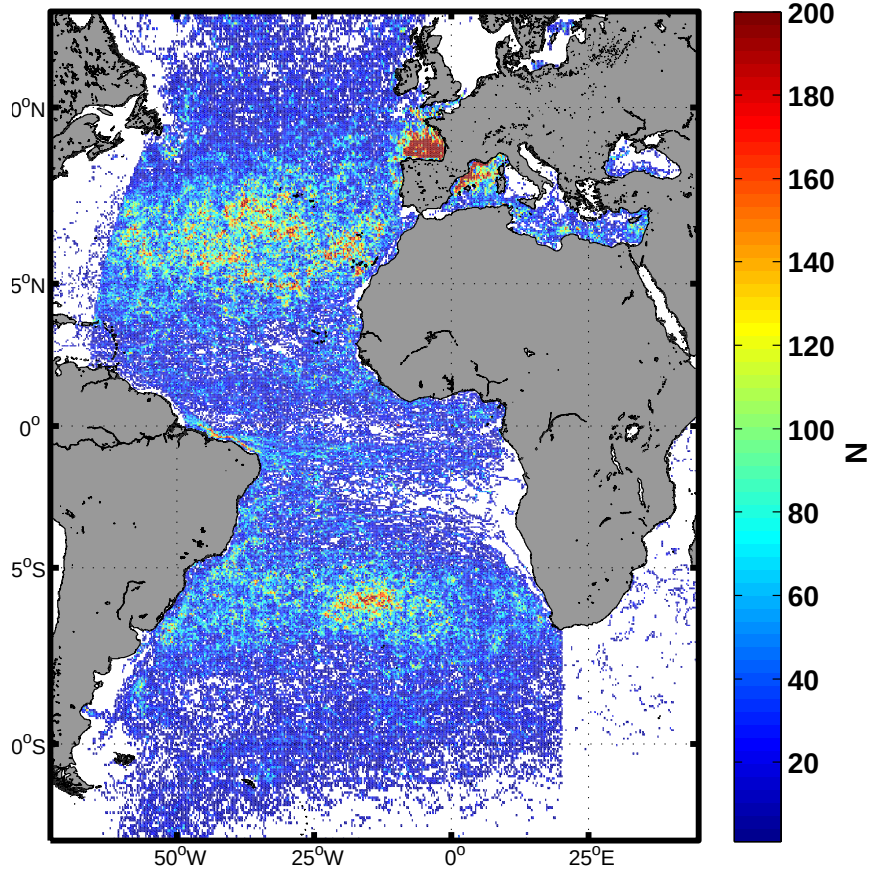


(b) σ

TF1–Drifter TFF1



(a) r



(b) N

Validation with PIRATA Buoys (2010)

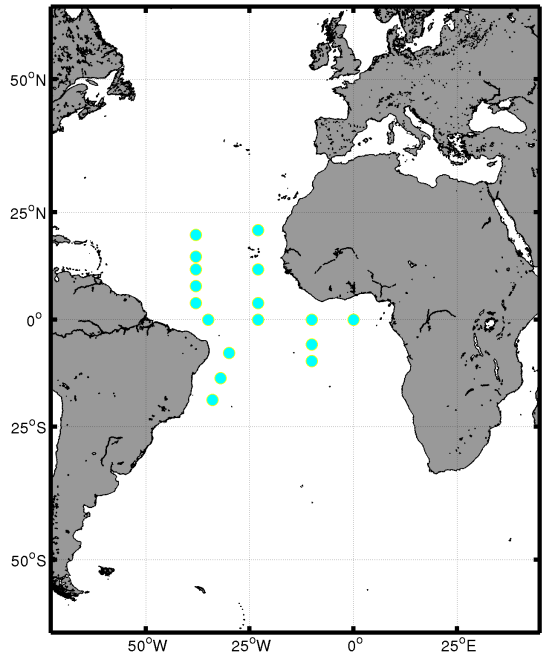


Table: Statistics of TFF with the PIRATA Buoys

	TFF1	TFF2	TFF3	TFF4	TFF5
Mean Bias	-0.58	-0.58	-0.42	-0.59	-0.59
St.D.	0.53	0.53	0.52	0.53	0.52
r	0.94	0.95	0.95	0.95	0.95
N.	4175	4235	2307	4236	4603

Table: Statistics of TFF–VF at the locations of the PIRATA Buoys.

	TFF1		TFF2		TFF3		TFF4		TFF5	
	VF1	VF2	VF1	VF2	VF1	VF2	VF1	VF2	VF1	VF2
Mean Bias	0.01	-0.13	0.01	-0.13	0.19	0.02	0.01	-0.13	0.00	-0.13
St.D.	0.37	0.33	0.37	0.33	0.42	0.34	0.37	0.33	0.34	0.30
r	0.97	0.98	0.97	0.98	0.97	0.98	0.97	0.98	0.98	0.98
N	925	252	931	254	644	197	931	254	960	258

Conclusions & Current Activities

Conclusions:

- SEVIRI–AATSR $\sim$ 0.5 K
- AATSR warmer in Tropics & night-time
- SEVIRI TFF colder than drifters
- Is TFF night-time window reasonable?
- Is TFF "days" window reasonable?

Currently:

- **WP1**: Regional diurnal warming
- **WP2**: GOTM