PP-HRSST

Progress Report

Collaboration between DBCP and GHRSST

- Drifter SST vital for satellite SST validation and algorithm development (GHRSST group)
- Hampered by lack of accuracy, resolution and metadata
- Reasonable set of requirements for HRSST drifters agreed
- Deployments rolled out over last 18 months
- ESA funding being sought (Sentinel-3 campaign)
- Model for collaboration with other specialised observation groups, e.g. for pCO_2, pH
  - High visibility

Result of a dialogue: GHRSST requirements for drifters

- Requirements:
  - Hourly measurements
  - Report design depth in calm water to ± 5 cm
  - Report of geographical location to ± 0.5 km or better
  - SST accuracy to ± 0.05K or better, resolve 0.01K
  - Report of time of SST measurements to ± 5 minutes

Year 2 activities

- Complete Year 1 work items
- Pursue proposal to ESA for coordinated deployment campaign in support of Sentinel-3
- Agree a deployment schedule with buoy operator(s)
- Procure HRSST upgrades
- Oversee calibration/recalibration protocols
- Implement BUFR encoding for HRSST data
- Monitor buoy deployments, data flow and data ingestion by GHRSST
- Present at GHRSST science meeting (June 2013)
- Make interim report to DBCP-XXIX

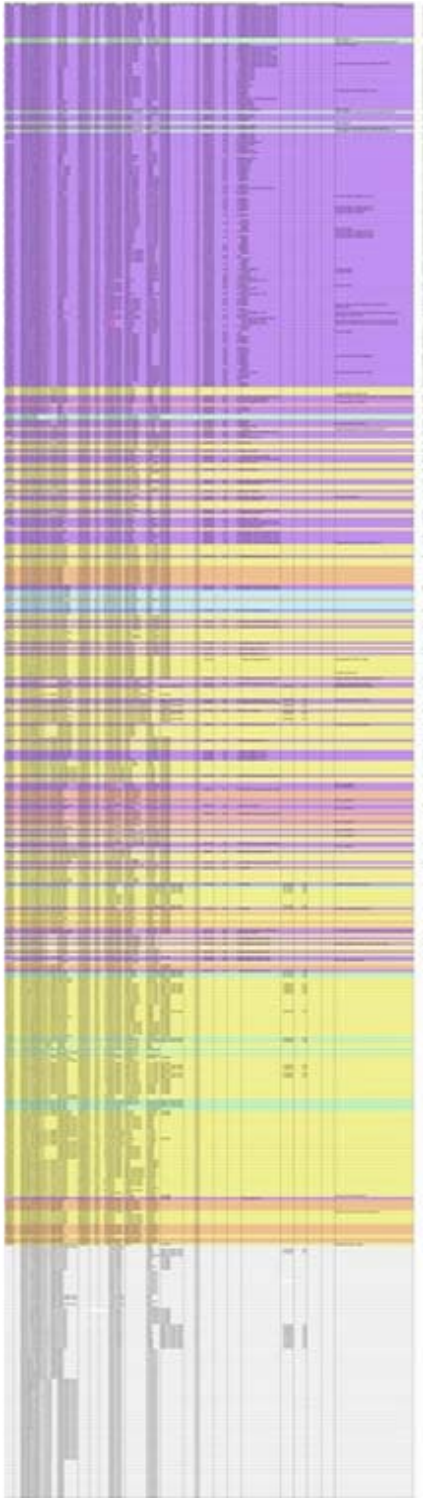
Steering group

- Chair: D Meldrum appointed by Panel
- Vice chair (DBCP appointee, TBA)

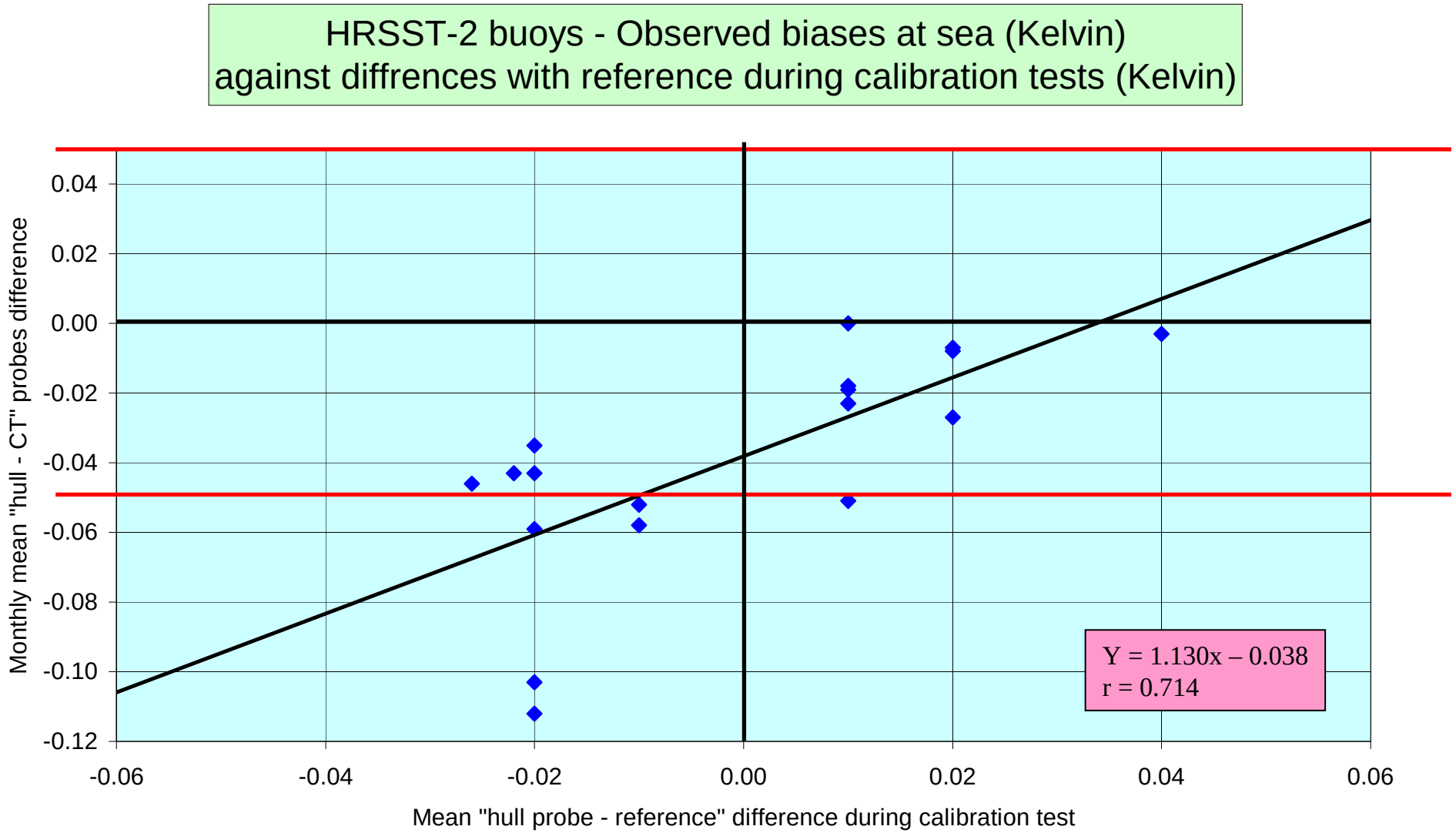
- DBCP chair (*ex officio*)
- DBCP TC (*ex officio*)
- Buoy programme manager(s) - *Rolland*
- Buoy data analyst(s) – *Blouch, Corlett*
- Buoy manufacturer(s) – volunteer from Metocean (*Clifton Flint*) + others TBA
- GHRSST representative(s) – *Donlon, Beggs*
- Oceanographic user(s) - TBA
- Secretariat (*ex officio*)

Deployments

- 550 total
- Most are HRSST-1
  - Conventional sensor
  - Report to 0.01C
  - BUFR essential for coding
- About 40 HRSST-2
  - Dedicated sensor module
  - Digital output
  - Calibration certificate
  - Not yet demountable for post calibration
  - Incremental cost approx $1000
  - Accuracy better than 0.05C (Blouch)



HRSST-2 Salinity Drifters

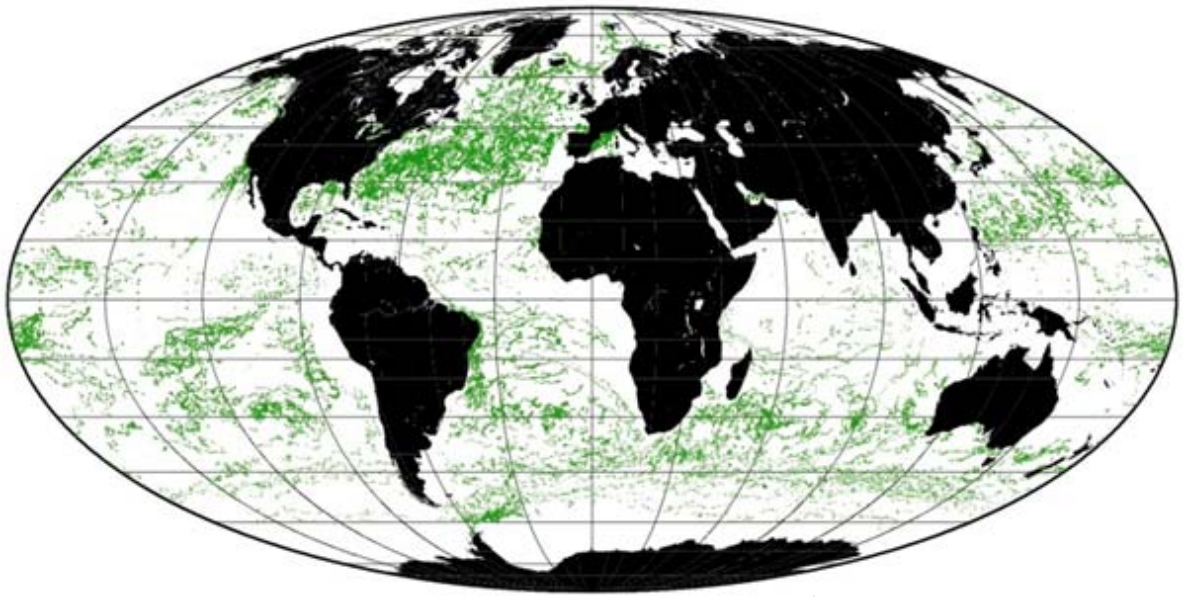


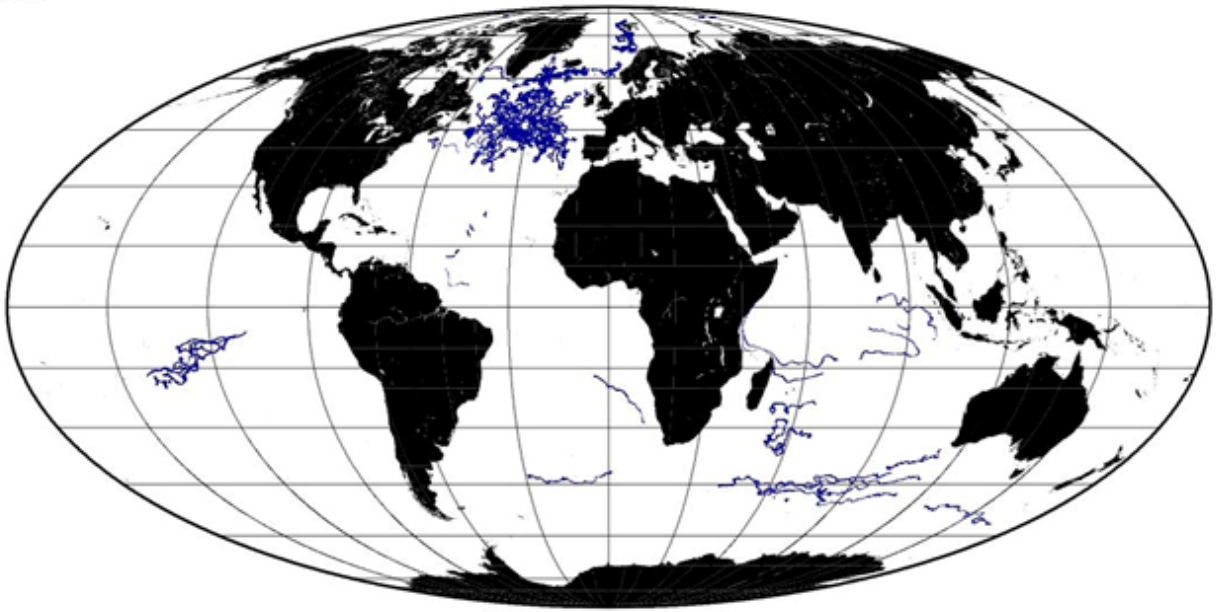
± 0.05K tolerance interval (measured at sea)

Pierre’s conclusion

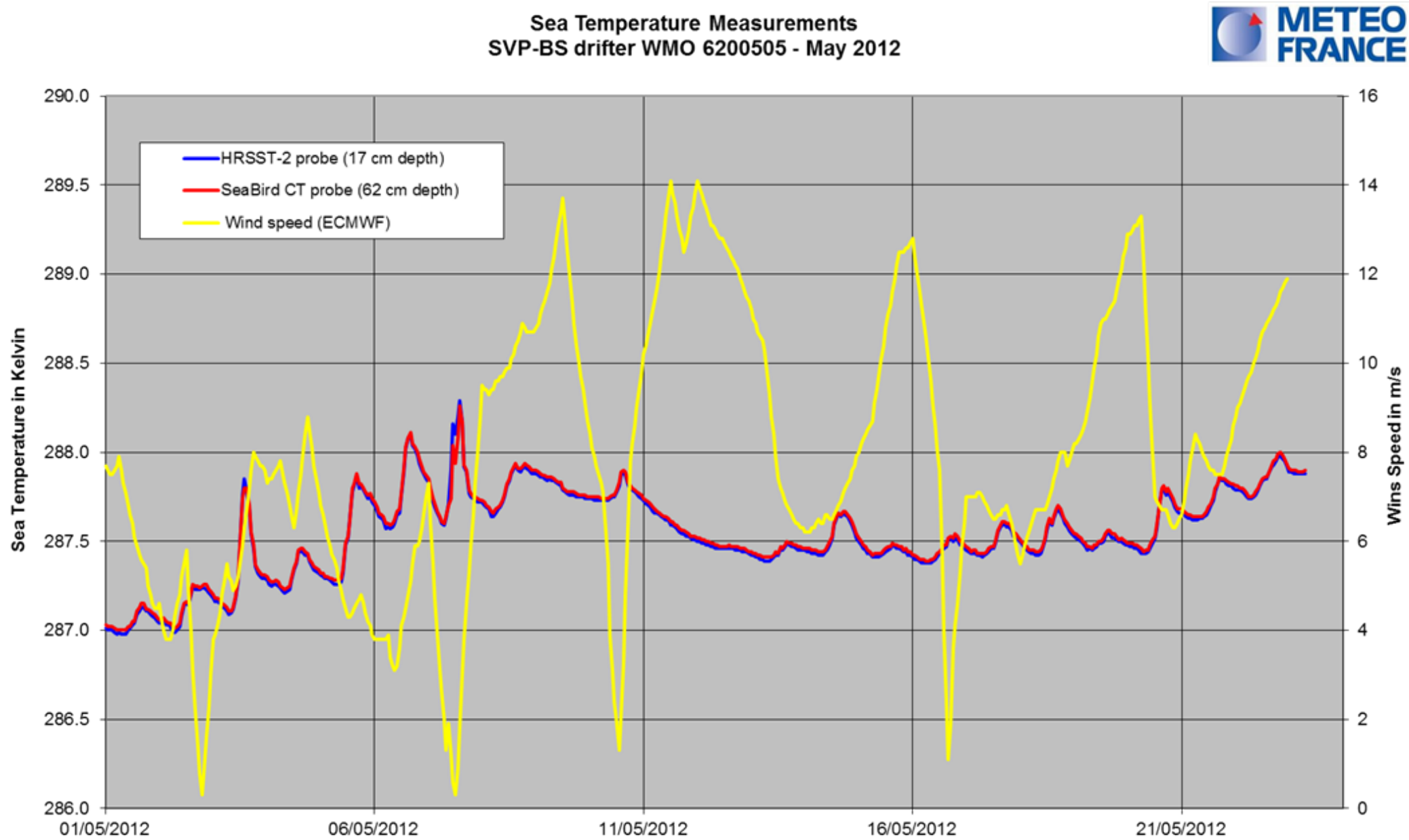
- HRSST-2 buoys measure SST with a better accuracy than HRSST-1 buoys
- This is probably due to the fact that digital probes are better calibrated. The standard deviation of differences with CT SST probes is similar with HRSST-1 or HRSST-2 buoys (< 0.015 K)
- HRSST-2 buoys meet the accuracy requirement (0.05K) during calibration tests but some do not meet it at sea
- The most part of the « HRSST-1 to HRSST-2 » upgrade cost is due to the probe calibration
- Data users requiring such accuracy (satellite SST community) should contribute to borne the extra cost: EUMETNET does not plan to purchase more HRSST-2 buoys at its own expenses

Non-HRSST vs HRSST



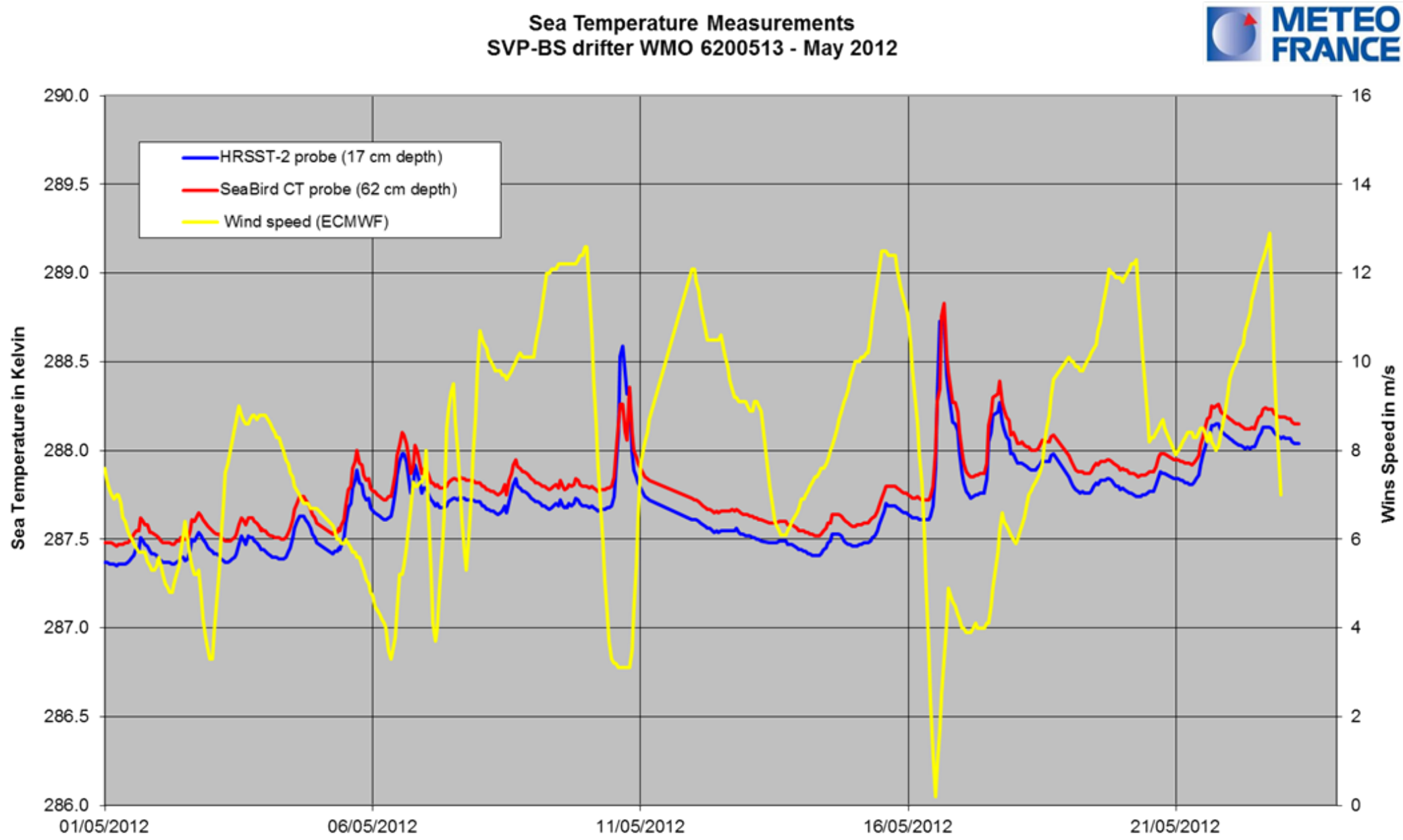


HRSST-2 calibration issues



IOC

HRSST-2 calibration issues



IOC

GHRSST activities so far

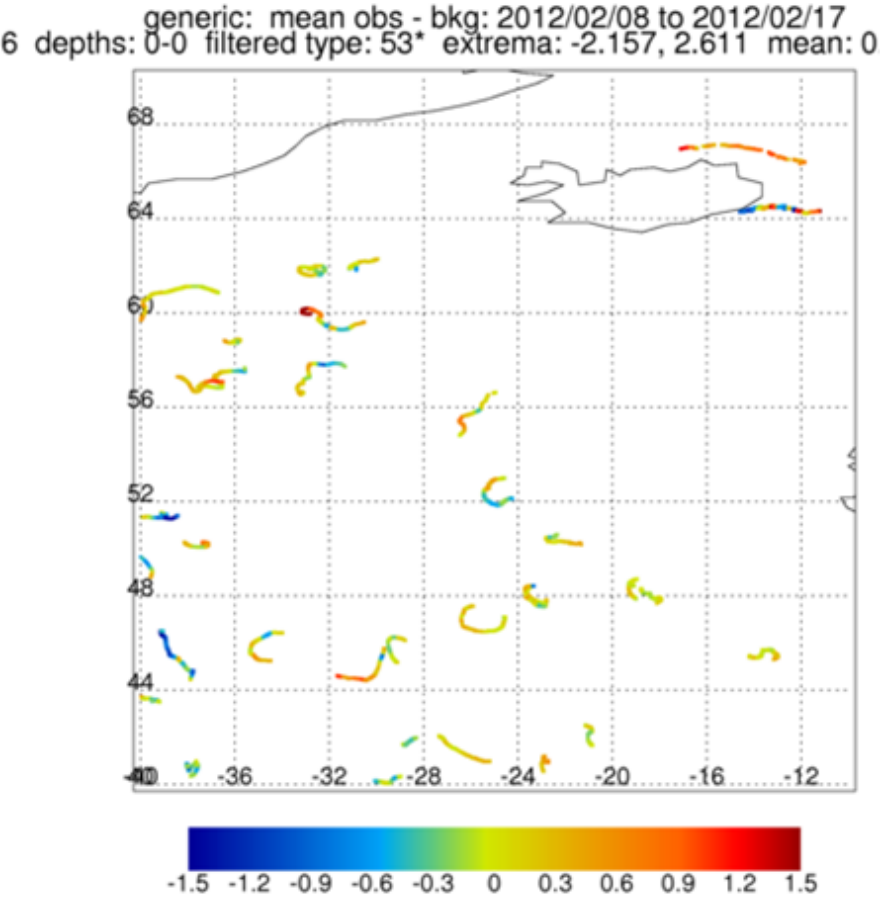
- Matt Martin (Met Office) : matchups with FOAM/OSTIA
  - Model/analysis foundation SST
- Gary Corlett (University of Leicester): matchups with AATSR v2.1
  - Satellite skin SST
- Sasha Ignatov (NOAA) and Peter Minnett (RSMAS): matchups with VIIRS v5.3
  - Satellite skin SST

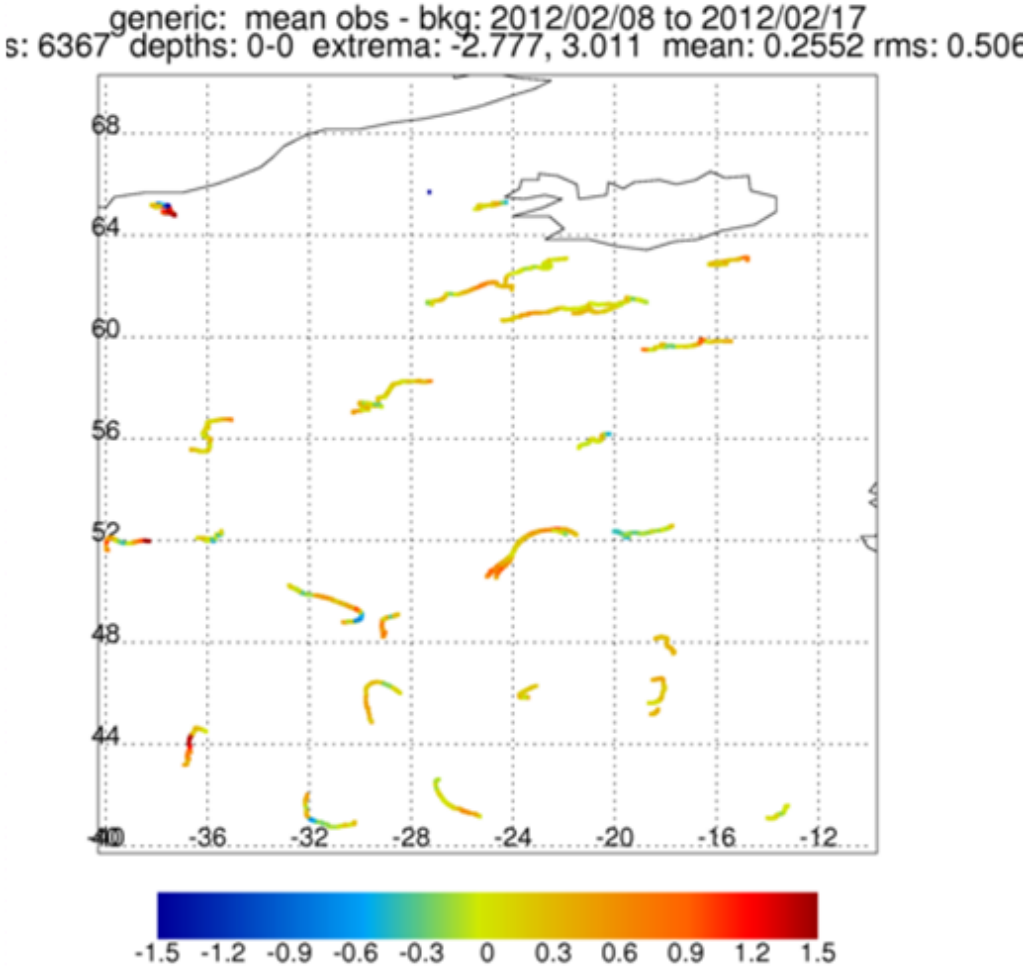
OSTIA/FOAM

Matt Martin

Preliminary comparison of SST from the new and old type of surface drifters with operational FOAM output

- Data used in the comparison:
  - Comparing the operational FOAM model output 1-day SST forecast (before assimilation) with the surface drifters.
  - For a 10 day period (8th – 17th Feb 2012).
  - Selected a region where most of the new type of drifters are:
    - 70W -> 10W, 40N -> 70N.
- Caveats to bear in mind when looking at the results:
  - Despite reasonable numbers of obs (~9300 of the old type, ~6400 of the new type), the number of independent obs is fairly small (only a limited number of actual drifters, each of which reports many times).
  - Difficult to distinguish model errors from observation errors.
- Overall summary:
  - old drifter obs types have a much smaller mean error than the new types (+0.02 vs +0.26).
  - new drifter obs types have a slightly smaller standard deviation than the old type (0.42 vs 0.44).





AATSR Validation

Gary Corlett

AATSR Validation

- Compare AATSR SST-skin to drifter SST-depth
- Nearest pixel within 3 hrs. (correct for time difference using Embury et al., 2012)
- AATSR mission ended on 8th April 2012
  - Loss of communication with Envisat
- Limit analysis to:
  - 70W -> 10W, 40N -> 70N.
  - 1st September 2011 to 1st April 2012

AATSR Results

Best retrieval

	Number	N2	N3	D2	D3
Non-HRSST					
Day	3176	-0.17 (0.29)		-0.14 (0.30)	
Night	3138	-0.28 (0.23)	-0.26 (0.22)	-0.23 (0.29)	**-0.26 (0.26)**
HRSST					
Day	404	-0.44 (0.34)		-0.37 (0.30)	
Night	555	-0.48 (0.35)	-0.43 (0.25)	-0.40 (0.27)	**-0.41 (0.26)**

Skin to depth so expect difference of roughly -0.17 K

HRSST buoys warmer by 0.15 ºC in North Atlantic; 0.2 ºC for all regi

VIIRS Validation

Sasha Ignatov, Peter Minnett

VIIRS – drifter statistics

	v5.3 non-HRSST buoys
IDPS SST2b night	
median	-0.292
sd	0.601
mad	0.414
count	50561
IDPS sst3b night	
median	**-0.156**
sd	0.531
mad	0.282
count	50561

	V5.3 HRSST buoys
IDPS SST2b night	
median	-0.543
sd	0.702
mad	0.346
count	2404
IDPS sst3b night	
median	**-0.363**
sd	0.590
mad	0.234
count	2404

Best retrieval

Skin to depth so expect difference of roughly -0.17 K

Summary

- Very small number of match-ups so far
- Initial results show warm bias of 0.15-0.2 ^{0}C compared to existing drifters
  - Lower noise
- Work ongoing to
  - Expand number of matchups (add MODIS & AVHRR)
  - Compare to ARC SSTs (best satellite SSTs)
  - Compare HRSST and non-HRSST drifters
  - Investigate other features (e.g. drogue)

Where would be the most important deployment areas?

1. Canary Islands: area of the Aquarius surface salinity validation campaigns (SPURS); effects of Saharan Air Layer and aerosols on infrared SSTs
2. SE-Asia: high water vapor and periodic smoke aerosols from forest fires
3. Upwelling areas: anomalous air-sea temperature differences; surface flow divergence tends to reduce buoys drifting into upwelling areas
4. High Latitudes: very low water vapour content; anomalous air-sea temperature differences)

The effects of the higher quality might be best seen in the connection with the SPURS campaign

Sentinel-3 E1: HRSST Drifter Project Phase 1

Launch - 3 to Launch + 15 months

	keuro
Item 1 - upgrade drifters being bought by other agencies	
300 upgrades to HRSST x 1keuro	300
Item 2 - outright purchase of drifters for own purpose	
100 HRSST drifters x 3.5keuro	350
Deployment costs 100 x 0.5keuro	50
Satcoms costs for 1.5 yrs: 100 x 1.5 x 0.2	30
Item 3 - staff costs for implementation and analysis	
120 days x 0.35keuro	42
Institute overhead @120%	50
Travel and subsistence	8
Item 4 - phase 1 workshop at ESA	
Costs for local host (ESA)	40
Total (all items selected)	**870**

Events affecting progress this year

- ENVISAT AATSR died
- Some GHRSST participants have retired
- Draft proposal to ESA rejected
- Many issues with data flow
  - BUFR not universally decoded
  - 7 digit WMO IDs not compatible with databases
- E-mail from Gary Corlett, GHRSST chair:
- 1. How many HRSST drifters are currently reporting in BUFR?
- 2. What is the percentage of HRSST drifters being deployed as a function of the total network?
- 3. How will this change over the next year or two? You mentioned the fact that all 5-digit WMO IDs are stopping.

My apologies that we cannot provide a more formal report this year. Please pass on any other useful information on drifter deployments and data availability that you think are relevant.

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WHAT'S NEW

24 Sep 2013 :
European Space Expo
The Expo is now travelling to Tallinn, Estonia

24 Sep 2013 :
Magnetic Field Monitoring
Preparing to launch Swarm

18 Sep 2013 :
Costa Concordia Parbuckling
Copernicus marine monitoring servic used to support the Italian Coast Gua during the parbuckling of Costa Concordia

18 Sep 2013 :
Crisis Management
The potential of Web 2.0 users' geospatial information for crisis management

FOCUS EVENT

European Space Expo
01 October 2013 - 06 October 2013
Tallinn, Estonia