NEW EUROPEAN INITIATIVES IN SUPPORT OF BETTER DRIFTER SST FOR SATELLITE VALIDATION

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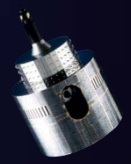


Outline

- Drifting buoy SST for satellite validation
- Copernicus Sentinel-3 Sea and Land Surface Temperature Radiometer (SLSTR)
- DBCP-GHRSST Pilot Project
- New European initiatives – ESA & EUMETSAT

Background

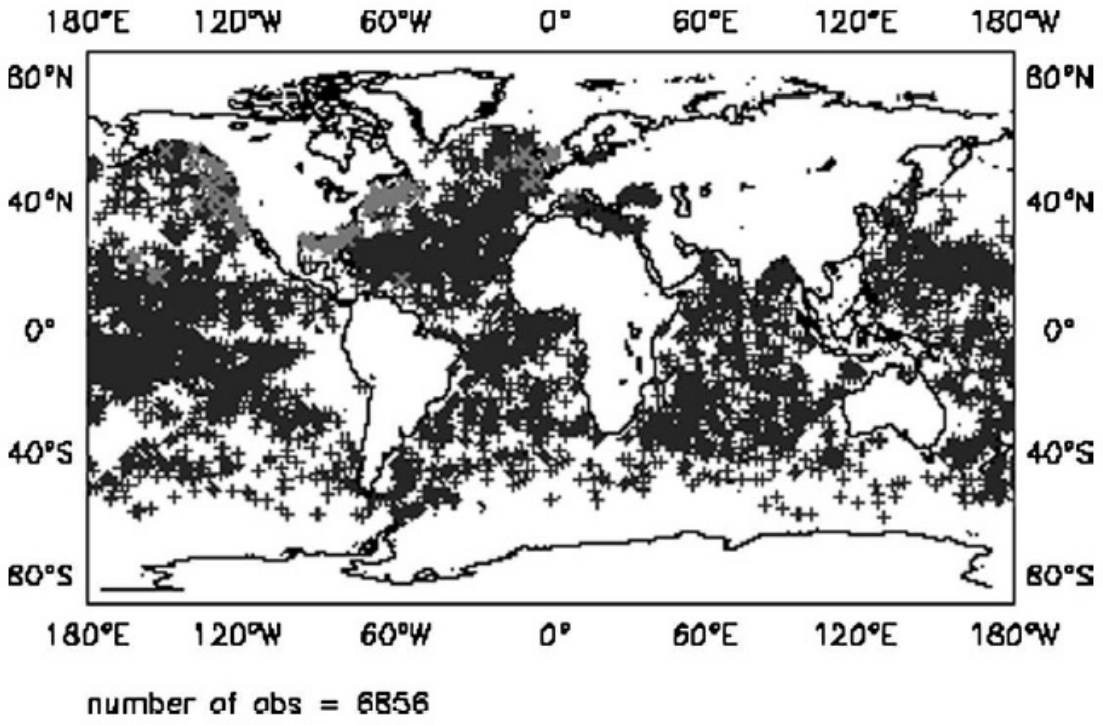


FIG. 6. Locations of moored (gray) and drifting (black) buoy SSTs matched with AATSR SSTs from 19 Aug 2002 to 20 Aug 2003.

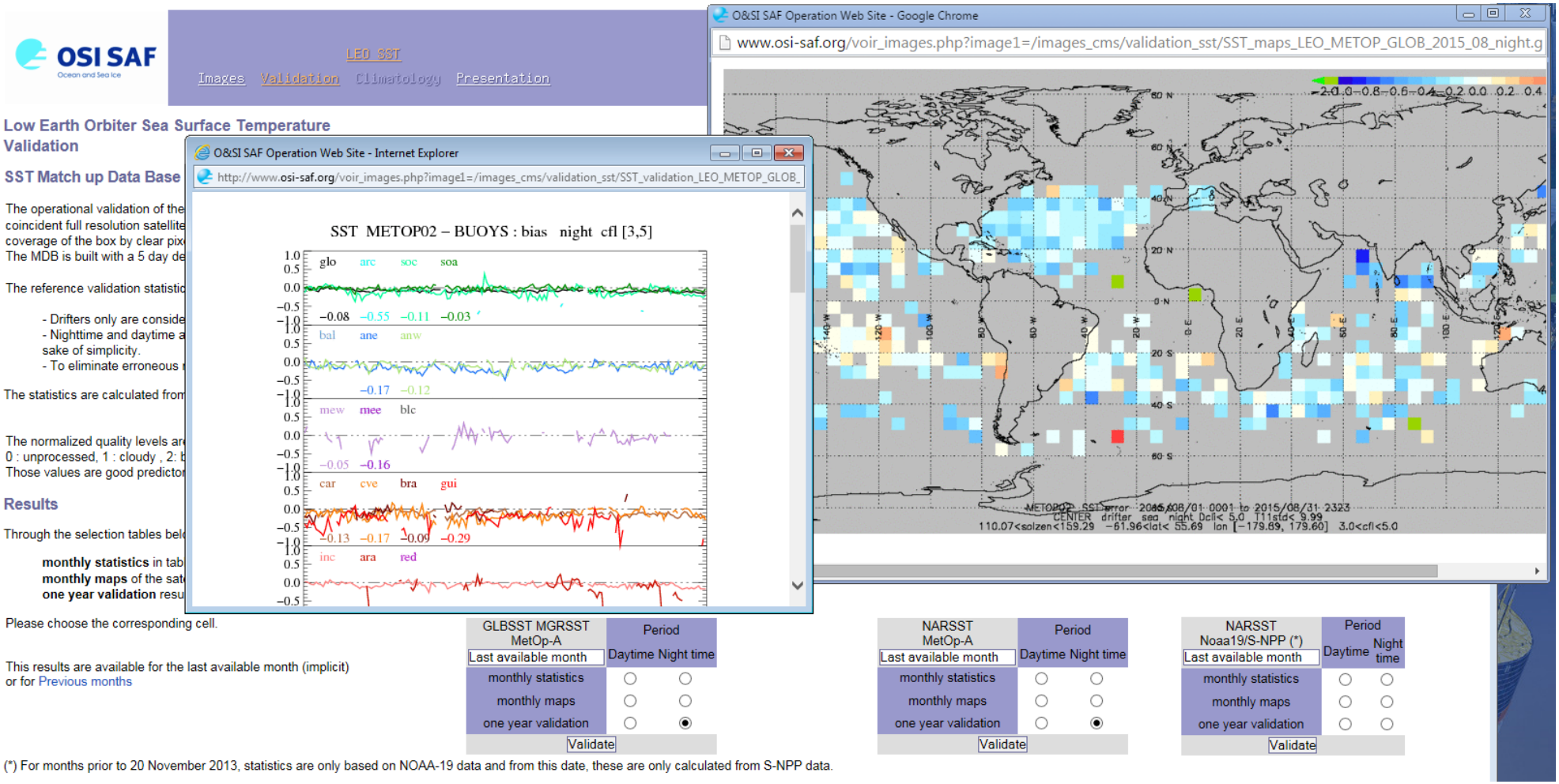
- SST observations from drifting buoys have been routinely used for satellite SST applications: both within regression / retrievals; and validation
- Wide geographical spread of satellite collocations with drifting buoys

In situ data for satellite SST validation

Kennedy, JGR, 116, D14, 2011

- Relative increase in available drifting buoy observations in recent years
- Drifting buoys now largest source of in situ SST observations for satellite SST validation
- Other sources are: Argo, GTMBA, coastal moored buoys, ships, ship-board radiometers

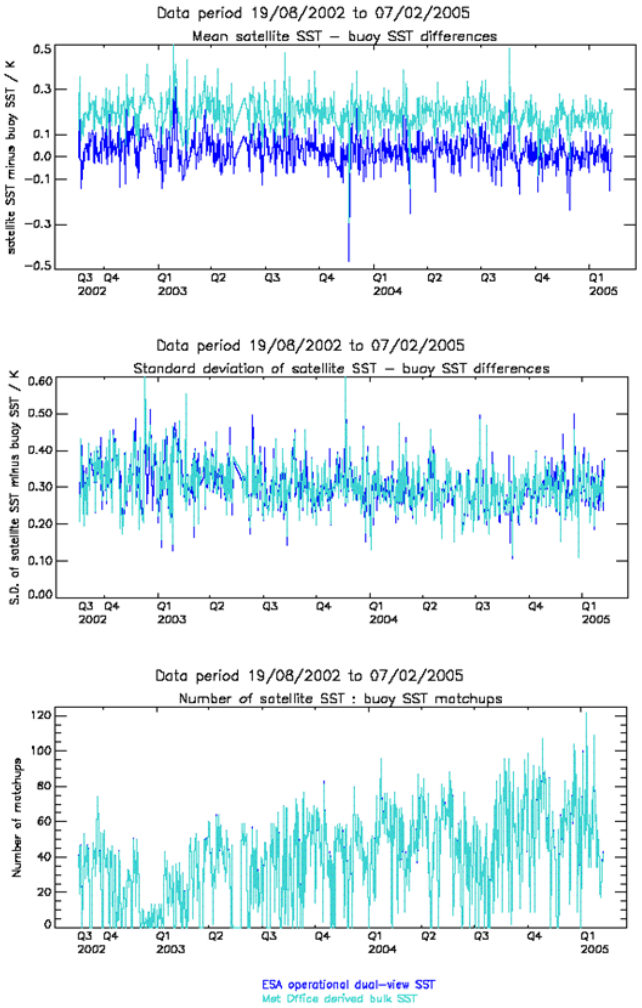
Operational satellite SST validation in NRT



-> Drifting buoys important for operational SST validation in near-real time

Climate satellite SST validation

-> Drifting buoys important for validating climate quality SSTs

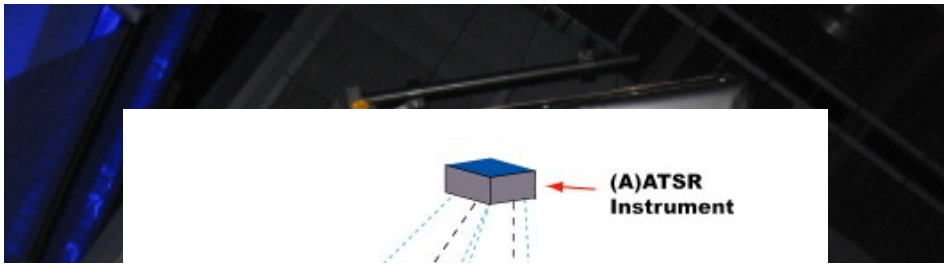


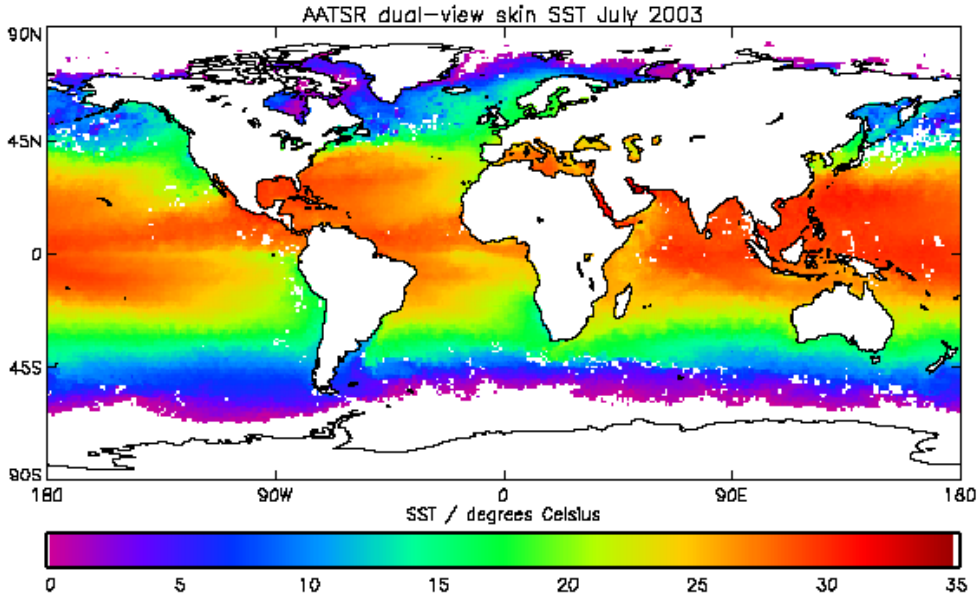
Long time series of satellite and buoy comparisons indicate

- Stability of satellite SST over a long time period
- Satellite SST meeting accuracy requirements
- Continuation of future similar missions ensured (e.g. AATSR & SLSTR)

Dual-view satellite SST providing climate quality SST

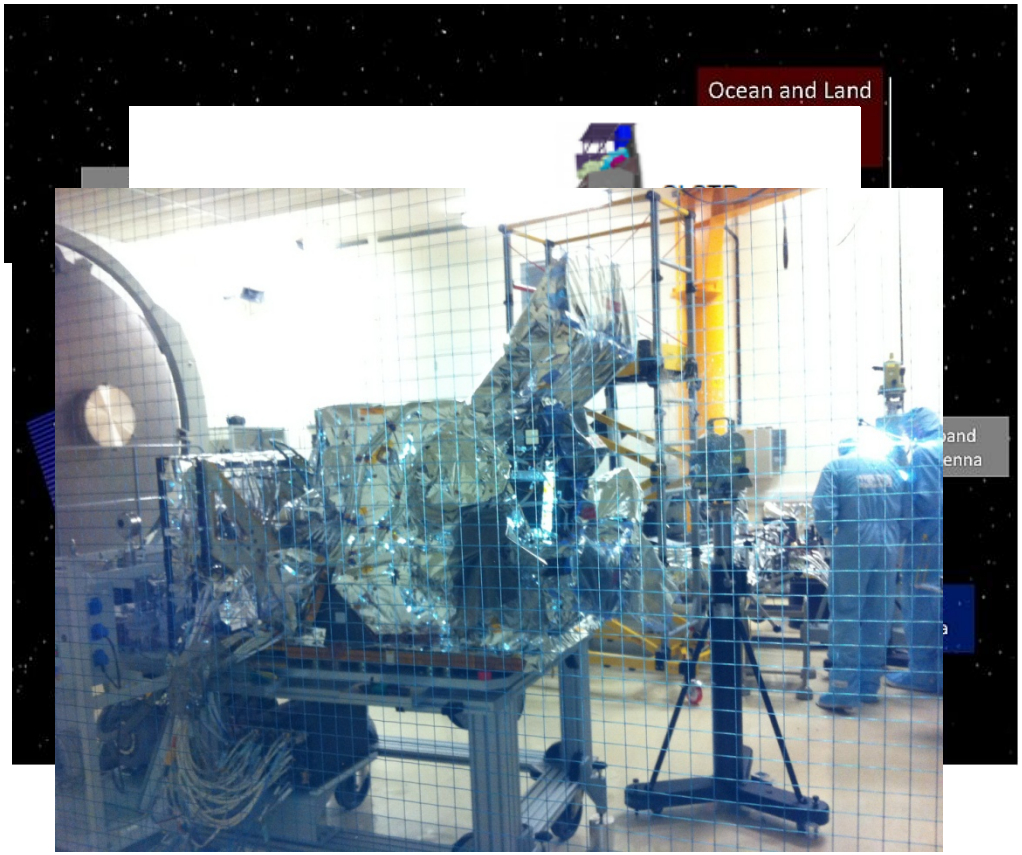
Along Track Scanning Radiometers





1991-2000; 1995-2008; 2002-2012

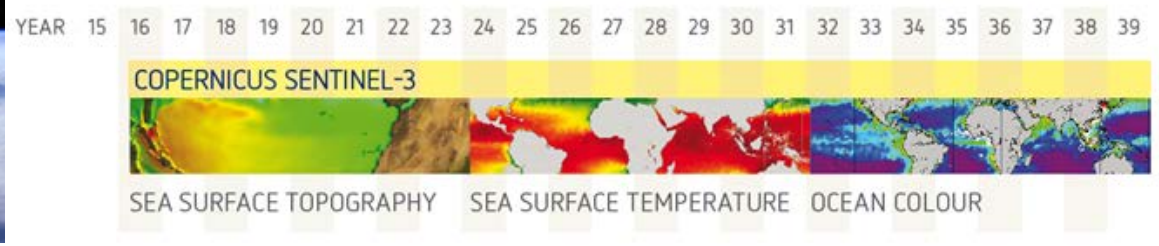
Sea and Land Surface Temperature Radiometer



Current launch scheduled not before Dec 2015

EC Copernicus Sentinel-3 SLSTR (A to D)

Future of dual-view satellite SST for the next 20 years



- ESA: Development of space and ground components, Serve land user community
- EUMETSAT: Marine Centre, L2 SST products, Operator of satellite in routine phase
- ESA and EUMETSAT dissemination of L1 radiance and brightness temp products

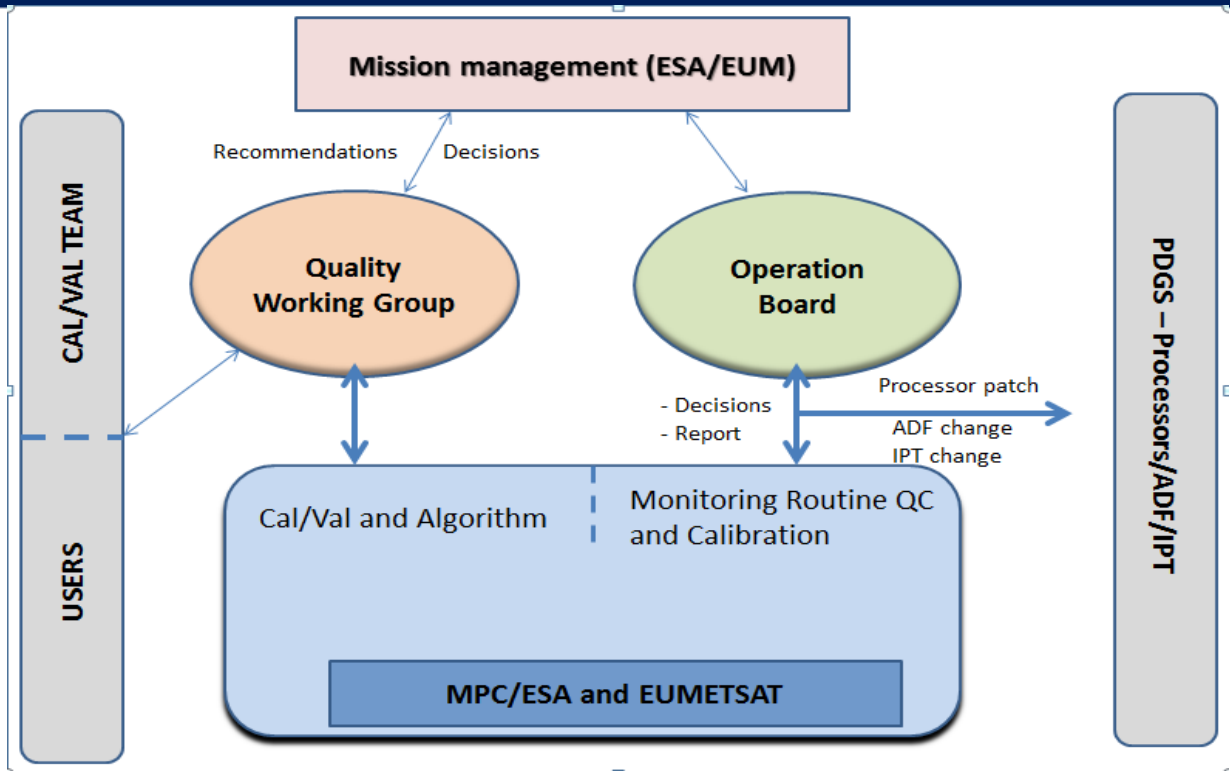
Validation of SLSTR SST

EUMETSAT esa

DOCUMENT

Sentinel-3 Calibration and Validation Plan

https://earth.esa.int/aos/S3VT



- ESA and EUMETSAT jointly working on Sentinel-3 Cal/Val preparations
- Comparisons with drifting buoys a critical component of NRT and offline validation activities

Prepared by	Helge Rebhan, Philippe Goryl
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In situ datasets for NRT validation

PARTNERS

Ifremer

PML Plymouth Marine Laboratory

pelamis scientific software

PROJECT FUNDED BY

esa

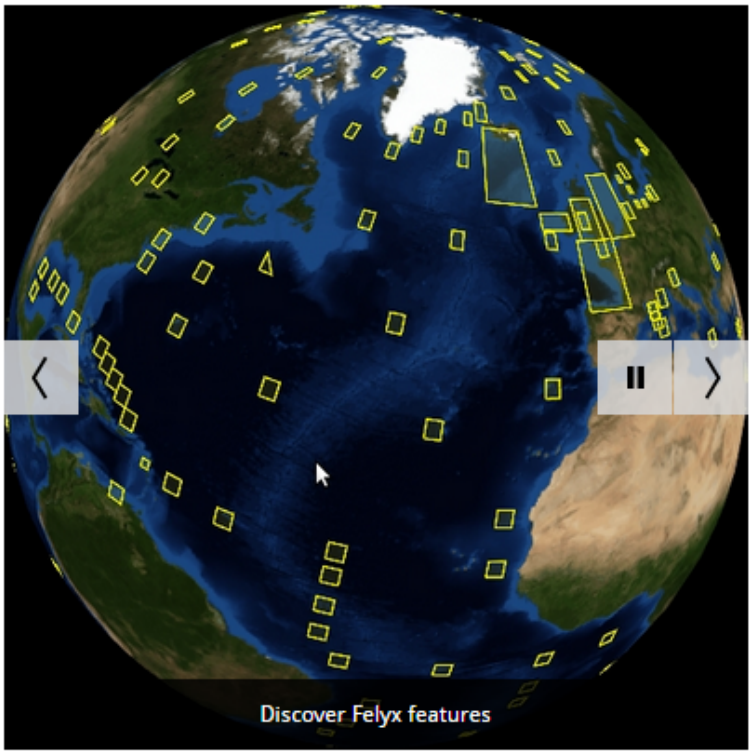
http://hrdds.ifremer.fr

Free, open source, software system for the analysis of large Earth Observation datasets

The aim of the Felyx project is to provide an open-source, flexible and reusable software system that can be used to research and monitor the quality and performance of Earth observation (EO) data streams. The input data streams can be from sensors mounted on satellites, generated by models, or collected in-situ. The Felyx system is being developed to support both producers and users of EO data.

Felyx is being developed by IFREMER, PML and Pelamis and funded by the European Space Agency.

DISCOVER THE PROJECT



- ESA Felyx provides collocation and analysis software
- EUMETSAT OSI-SAF Federated Activity for inclusion of SLSTR

- Technical workshop to be hosted by Ifremer in February 2016 on “In-situ Data Provision for NRT Satellite SST Validation”.

Improved drifting buoy SST observations

Why are better drifting buoys needed for satellite SST validation?

- Climate quality satellite SSTs have shown higher accuracy than previous expected with respect to the in situ data
  - Multi-mission (triple collocation); ESA CCI for SST
  - AATSR ~ 0.15 K, traditional drifting buoys ~ 0.2 K (0.1K resolution)

- SLSTR SST accuracy requirement of less than 0.3 K with a long-term radiometric stability of 0.1 K/decade

- Improvements in accuracy and reporting position will allow the mission requirements to be assessed

- Uncertainty due to spatial collocation of point and area observations around 0.1 K

DBCP-GHRSST pilot project

Original proposal in 2013 requested:

- A number of drifters to be upgraded to a higher specification
  - Position accuracy and reporting to 0.01degrees (HRSST-1)
  - SST accuracy < 0.05K; reporting to 0.01K (HRSST-2)

- Requirements (e.g. Blouch, DBCP-29)
  - Hourly measurements
  - Report design depth in calm water to ±5cm
  - Report of geographical location to ±0.5km or better
  - Report of time of SST measurements to ±5 minutes

- Endorsed by GHRSST 2013; Sentinel-3 Validation team 2013; and discussed at CEOS WGCV
- HRSST-2 not yet funded, but opportunities from EUMETSAT (Copernicus coming soon)

New initiatives

ESA

- Fiducial Reference Measurements for Surface Temperature from Satellites (FRM4STS) – project began April 2015

EUMETSAT

- Opportunity for Improved Drifting Buoy Sea Surface Temperature for Copernicus Satellite Validation – ITT coming soon

- Includes a study of the SI traceability of historical and current drifter SST measurement, leading to the development of new best-practice guidelines

- Workshop planned for Autumn 2016

New opportunity – Copernicus project

EUMETSAT

"Improved drifting buoy SST for Copernicus satellite validation"

To assess and establish the benefit of HRSST-2 incremental improvements of drifting buoy for satellite SST validation

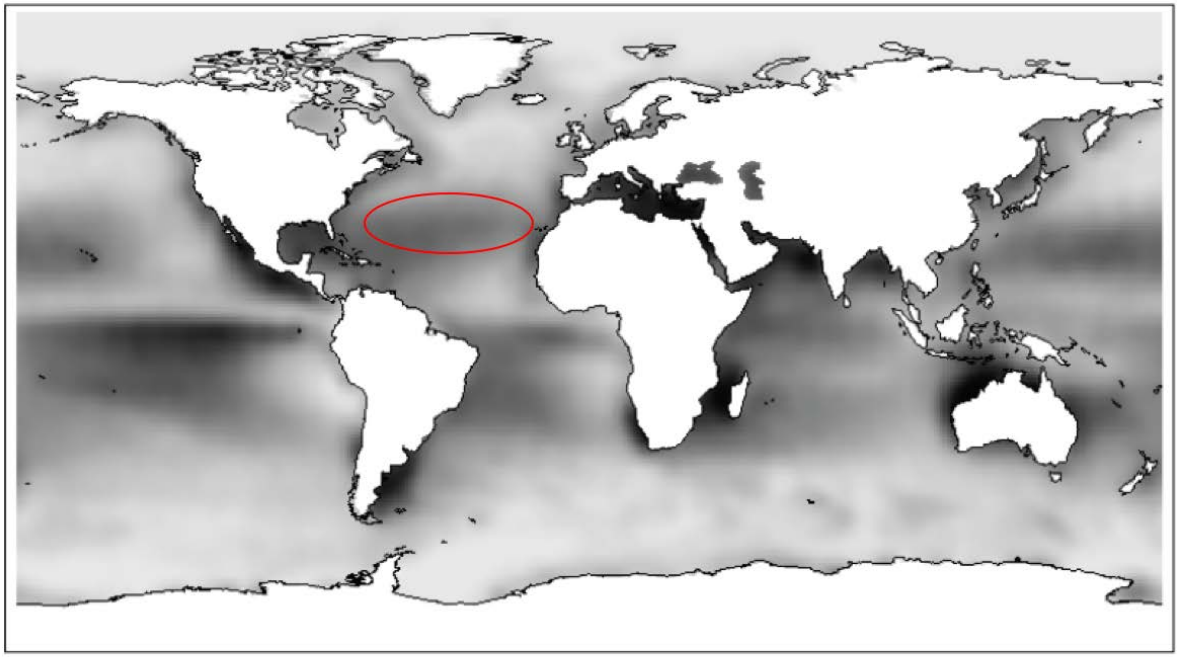
Achieved by:

- Equipping a number of drifting buoys with digital SST probes (HRSST-2)
- Analysis by Sentinel-3 SLSTR validation activities (in coordination with FRM4STS)

EUMETSAT project details

- To equip approximately 150 to 200 drifting buoys with HRSST-2 capability.
- Favour an incremental approach based on already planned deployments if possible?
- Consideration of a staggered deployment?
  - Initial deployment of a few drifters with post/during deployment calibration
  - Following initial analysis, remaining deployment to proceed
- Technical documentation containing details of deployment
- Timing with respect to successful Sentinel-3A SLSTR essential

Regions of preference



Possibilities:

- Canary Islands
- SE-Asia
- Upwelling areas
- High-latitudes

Source:
AATSR Reprocessing for Climate Prior probability of cloud, University of Reading

Access to data

- Availability on GTS

- Coordination with in situ datasets (e.g. Coriolis) to ensure identification of HRSST-1 and HRSST-2 is carried through to the in situ datasets used by the satellite SST community (Technical Workshop in February, Ifremer); and crucially do the satellite SST community know how to identify them?

- Advertisement to satellite community so they make sure of these drifter observations and contribute to the analyses e.g. GHRSST

Aim

- To assess and establish the benefit of HRSST-2 incremental improvements of drifting buoy for satellite SST validation
  - Sentinel-3 SLSTR validation activities
  - FRM4STS workshop for discussion of initial results

- If benefit is established then discussion and coordination with the DBCP to understand how any further deployments may be facilitated including the funding situation

Thank you for your attention

We would appreciate any guidance from the DBCP on any of these issues