Copernicus TRUSTED: HR-SST in situ datasets
Surface Velocity Platform drifter with Barometer and Reference Sensor for Temperature

Marc Lucas[1*], Arnaud David[2], Jérome Sagot[2], Paul Poli[3], Mathieu Belbeoch[4], Kai Herklotz[5], Marc Le Menn[6], Anne O'Carroll[7]

[1] CLS, Collecte Localisation Satellites, Ramonville Sainte Agne, France
[2] nke Instrumentation, Hennebont, France
[3] Météo France, Centre de Météo Marine, Brest, France
[4] JCOMMOps, JCOMM in situ Observations Programme Support Centre, Plouzané, France
[5] Bundesamt für Seeschifffahrt und Hydrographie (BSH), Hambourg, Germany
[6] Metrology and Chemical Oceanography Department, (Shom), Brest, France
[7] EUMETSAT, European Organisation for the Exploitation of Meteorological Satellites, Darmstadt, Germany
*Corresponding author: mlucas@groupcls.com

Overview:

- New radiometer the 'Sea and Land Surface Temperature Radiometer' (SLSTR) on Copernicus Sentinel-3 A/B require high quality Fiducial Reference Measurement (FRM) data for calibration and validation purposes.
- New Copernicus-funded drifting buoy design to include a high accuracy and high frequency (1Hz) sampling capacity, with additional digital probe and near-surface water pressure sensor.
- FRM measurements to be linked to SI traceability, and include documentation of the SST accuracy / uncertainties and metadata.
- New design complies with DBCP SVP standards, with a new array of 100+ buoys planned.
- 2 Phase to project: Design and Validation, Production and Deployment
- Deployment plan focused on sensitive areas
- Data avalable on public repository (Drifting Buoy Global Data Assembly Center, GDAC, hosted by Ifremer)
- 6 Partners: CLS, nke instrumentation, Meteo-France, SHOM, BSH, JCOMMOPS.
- Project to run until the end of 2021.

The Sentinel-3 Satellite

Design & Assembly::

- Based on nke instrumentation SVP-40 drifter
- Sensor array:
  - Analog Temperature sensor
  - Strain Gauge
  - Vaisala PTB110 Barometer
  - HR Temperature & hydrostatic pressure sensor
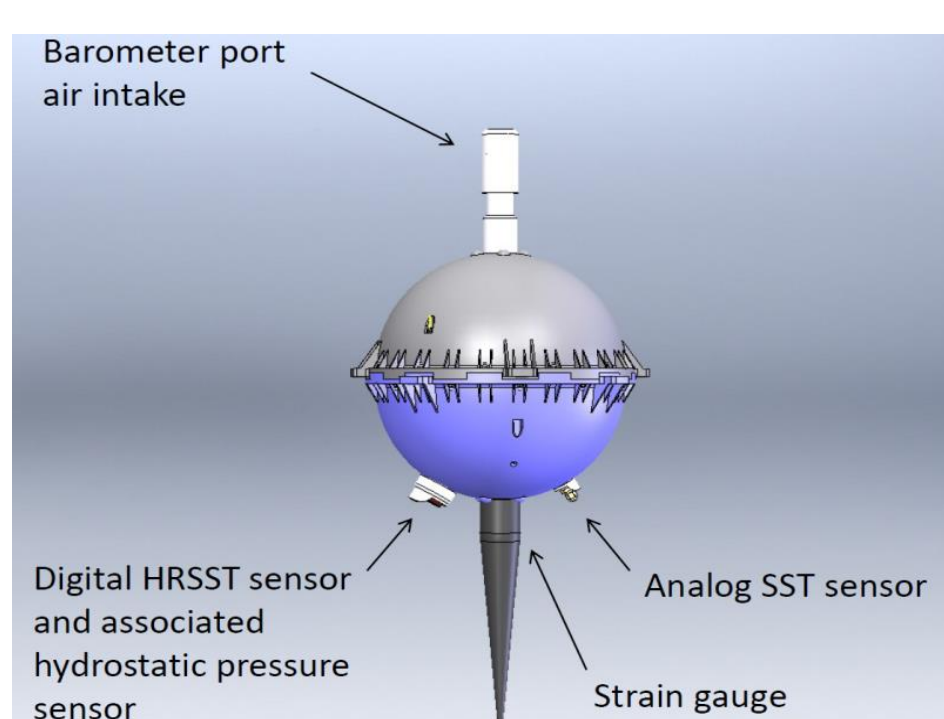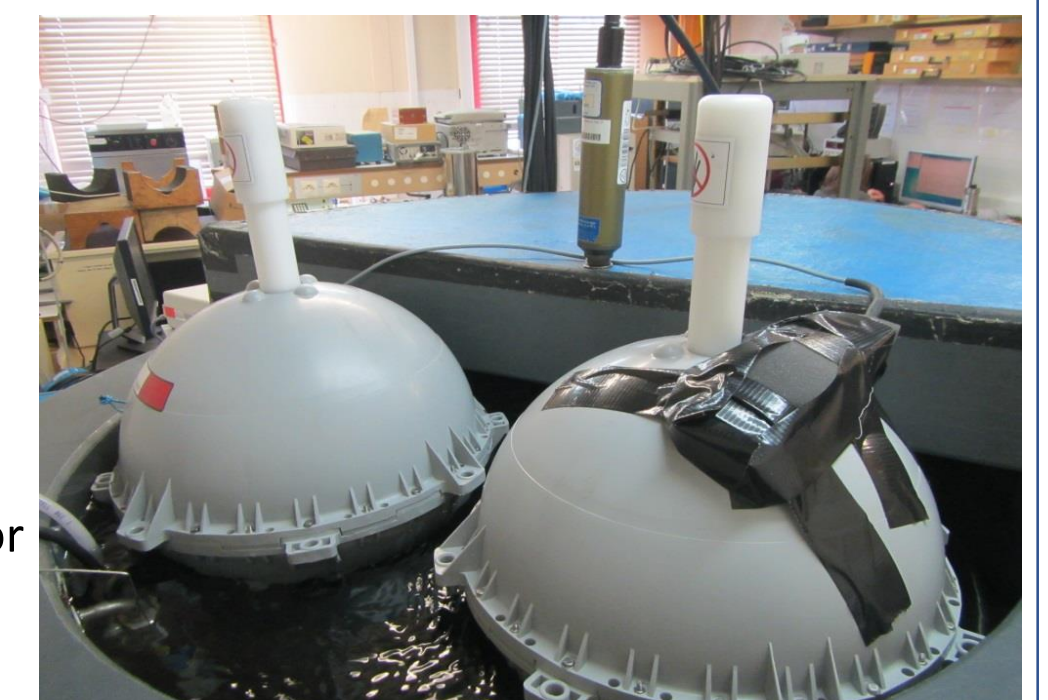

Schematic of the SVP-BRST Buoy

- Iridium 9602 transceiver with Maxtena antenna for communication
- GNSS module with positioning error
- 2 alkaline batteries provide power for at least 18 months
- Sensors initial calibration in nke testing facility
- User set up through PC with Bluetooth
- 2 prototypes tested and deployed in Mediterranean sea from April 2018 to January 2019
- Design Validated and production phase initiated
- 2 message format to transmit data to GTS (91 and 92)

1st Production Batch in NKE Offices

Metrology:

- Performed by the SHOM
- Dual Step approach:
  - calibration of temperature sensors
  - verification of sensors within the buoy
- High Resolution Sensor and Analog Sensor calibrated with SBE35 reference thermometer regularly checked in triple point of water and fusion point of gallium cells
- Response time of HRSST sensor also measured in bath with SI linked instruments
- Range from 1°C to 35°C,
- Verification at sea by comparison to an SBE35 fixed to an MBSA
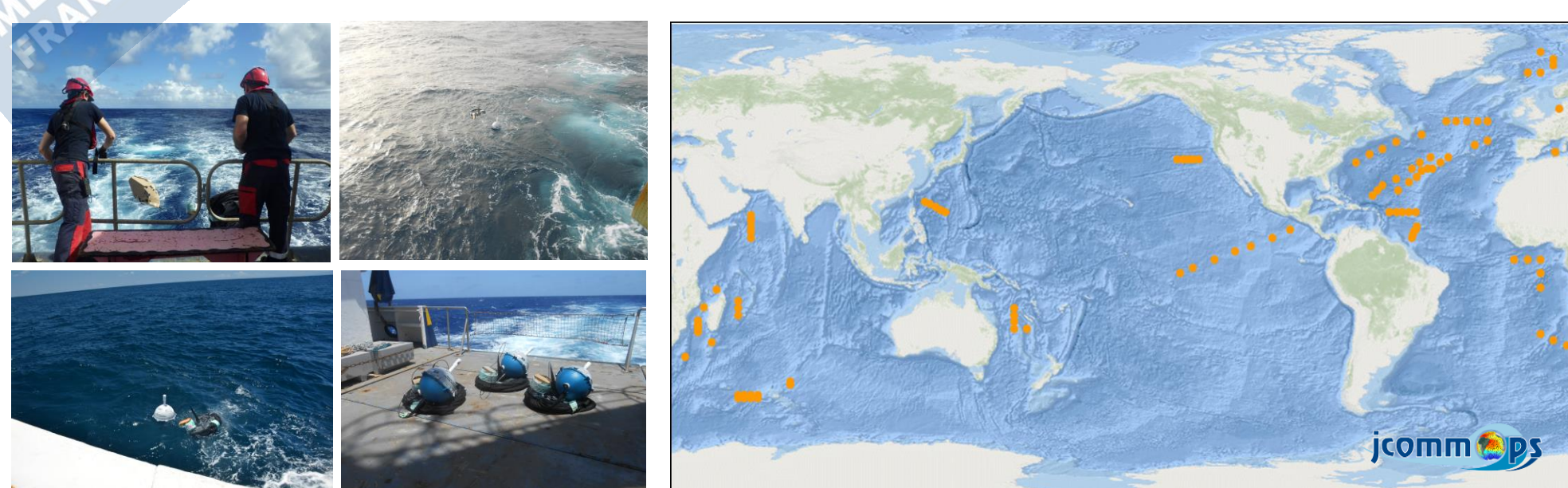
- Expanded uncertainty:
- -HRSST sensor: 5 to 7mK
- -SST sensor: 12 to 14mk

- Prototypes tests confirm that metrology approach

- For each batch of 50 buoys,
- All sensors calibrated
- And 5 Buoys verified.

The 2 prototypes in the Metrology Lab
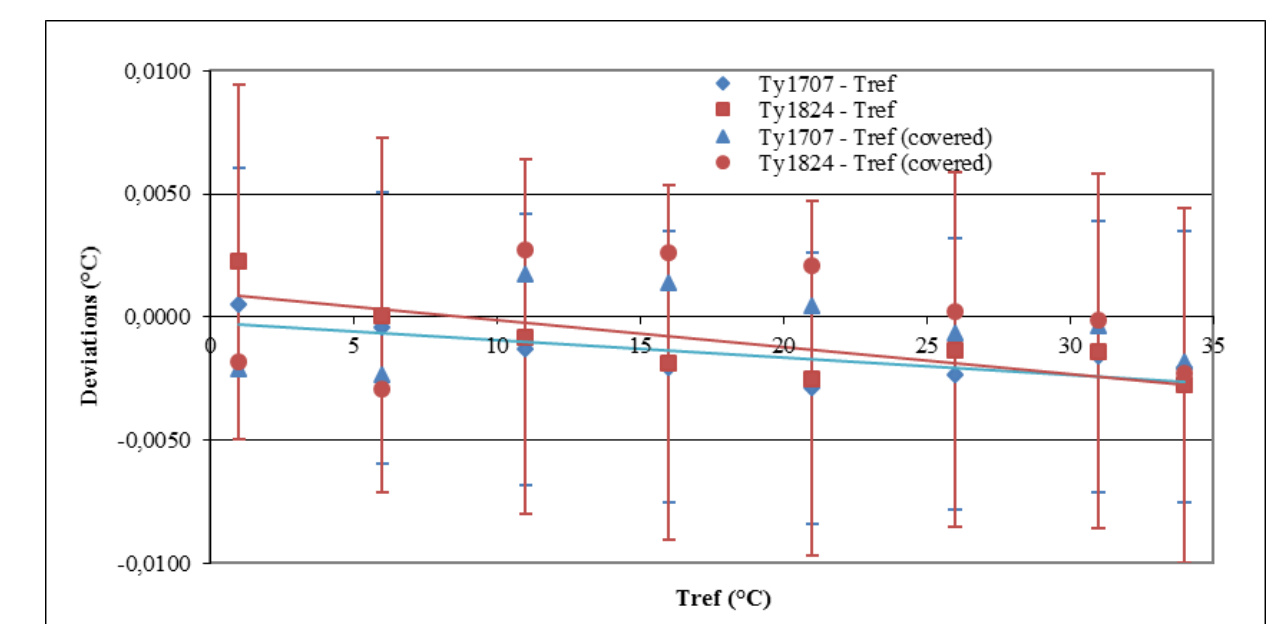

The 2 prototypes HRSST calibration curve

## Deployment:

Photos of first Deployments

Map of deployment Plan (from Jcommops Website)

- First Batch of 50 buoy delivered by nke instrumentation on 04/12/2018
- Deployment plan coordinated by Meteo-France
- Deployment plan and metadata on JCOMMOPS website
- Second batch due to be received 12/06/2019
- Combination of High Frequency and low Frequency buoys
  - LF: 1 Message per hour, Mean and Percentile
  - HF: 5 Message per hours, 300 Temperature data points
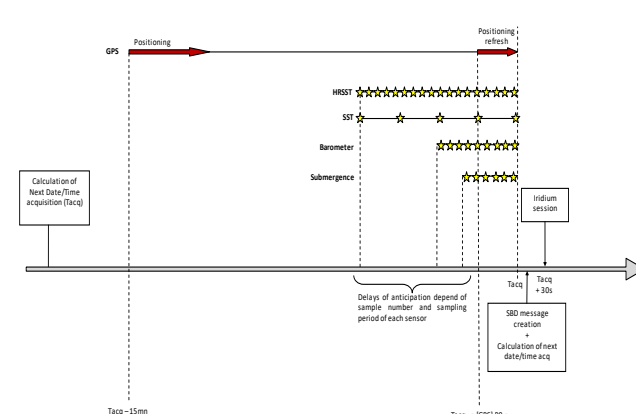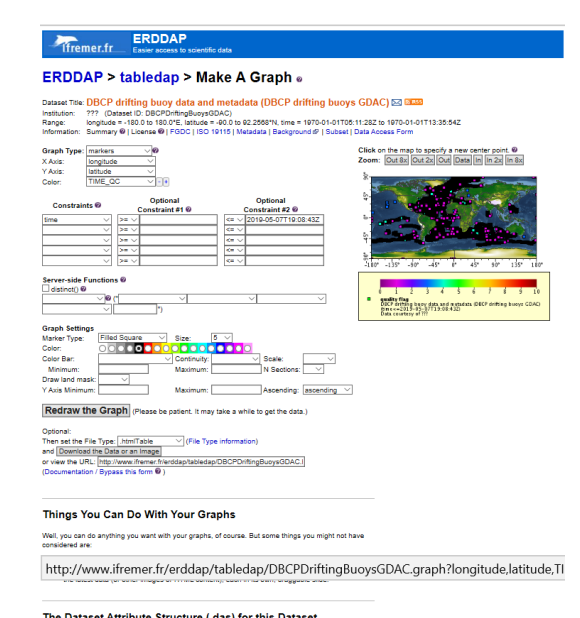

Sampling Strategy

Monitoring and Data access:

23   7
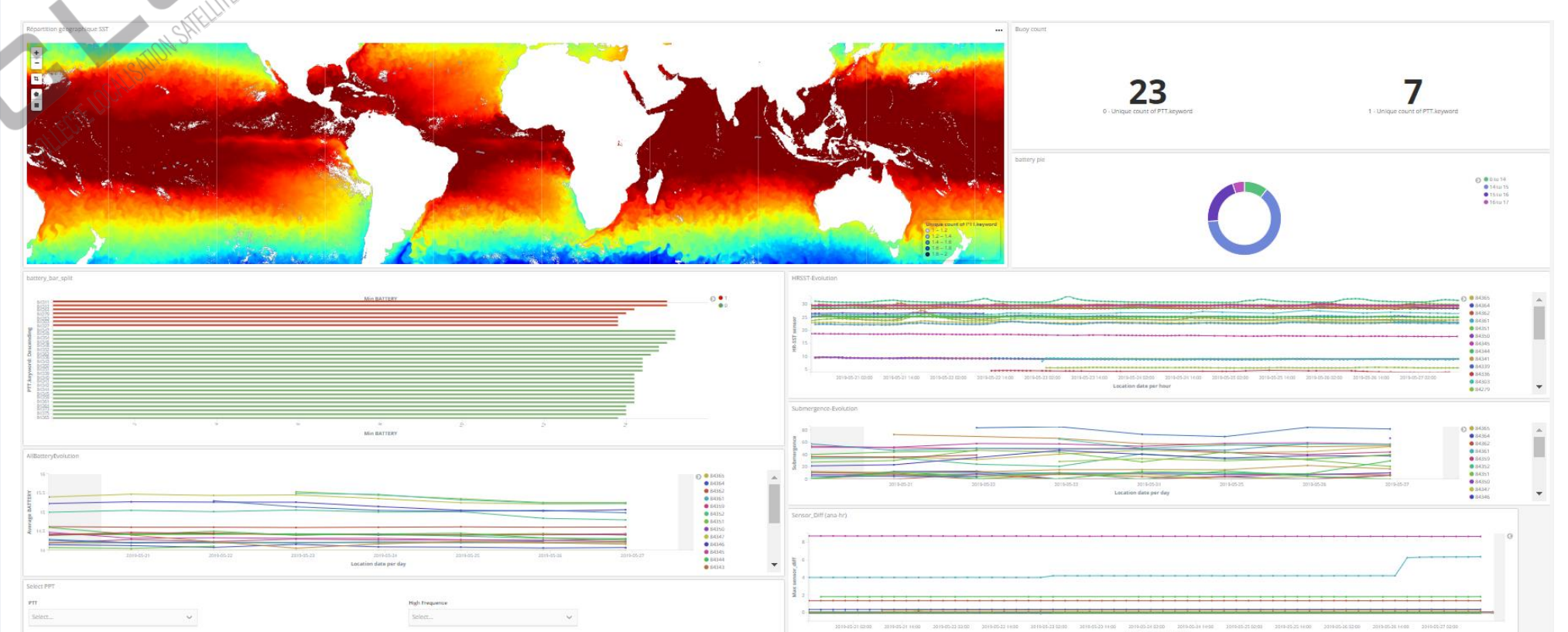
Monitoring Portal with Battery and sensor data refreshed in real time

- Raw data Via FTP (credential required)
- csv file available via argosweb portal
- Netcdf (cf compliant) on the Coriolis GDAC portal:
  - FTP : ftp://ftp.ifremer.fr/ifremer/dbcp-drifter/gdac/active/
  - ERDDAP :http://www.ifremer.fr/erddap/tabledap/DBCPDriftingBuoysGDAC.graph

References:

Poli, P., Lucas, M., O'Carroll, A., Le Menn, M., David, A., Corlett, G. K., Blouch, P., Meldrum, D., Merchant, C. J., Belbeoch, M., and Herklotz, K.: The Copernicus Surface Velocity Platform drifter with Barometer and Reference Sensor for Temperature (SVP-BRST): genesis, design, and initial results, Ocean Sci., 15, 199-214, https://doi.org/10.5194/os-15-199-2019, 2019.

Sybrandy, A. L., Niiler, P.P., Martin, C., Scuba, W., Charpentier, E., Meldrum, D.T.: Global Drifter Programme Barometer Drifter Design Reference, DBCP Rep. 4, rev. 2.2, 2009.