

JOINT EUROPEAN RESEARCH INFRASTRUCTURE NETWORK FOR COASTAL OBSERVATORIES

CNRS – Ifremer Ferry Box Best Practices in the Western Channel

Comparison between calibration of different types of sensors on Fixed Platforms and Ferry Box

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Speaker | Organism | adresse mail



Outline:

Description of CNRS Fixed Platforms and CNRS - Ifremer FerryBox

Pre- and Post deployment procedures, maintenance, fouling

Calibration procedures

Comparison of Fixed Platform and Ferry Box data

Data Processing (data transmission, archiving, quality codes)

Time Series in the Western Channel: Platform types and types of measurements



Low Frequency



Ferry Box

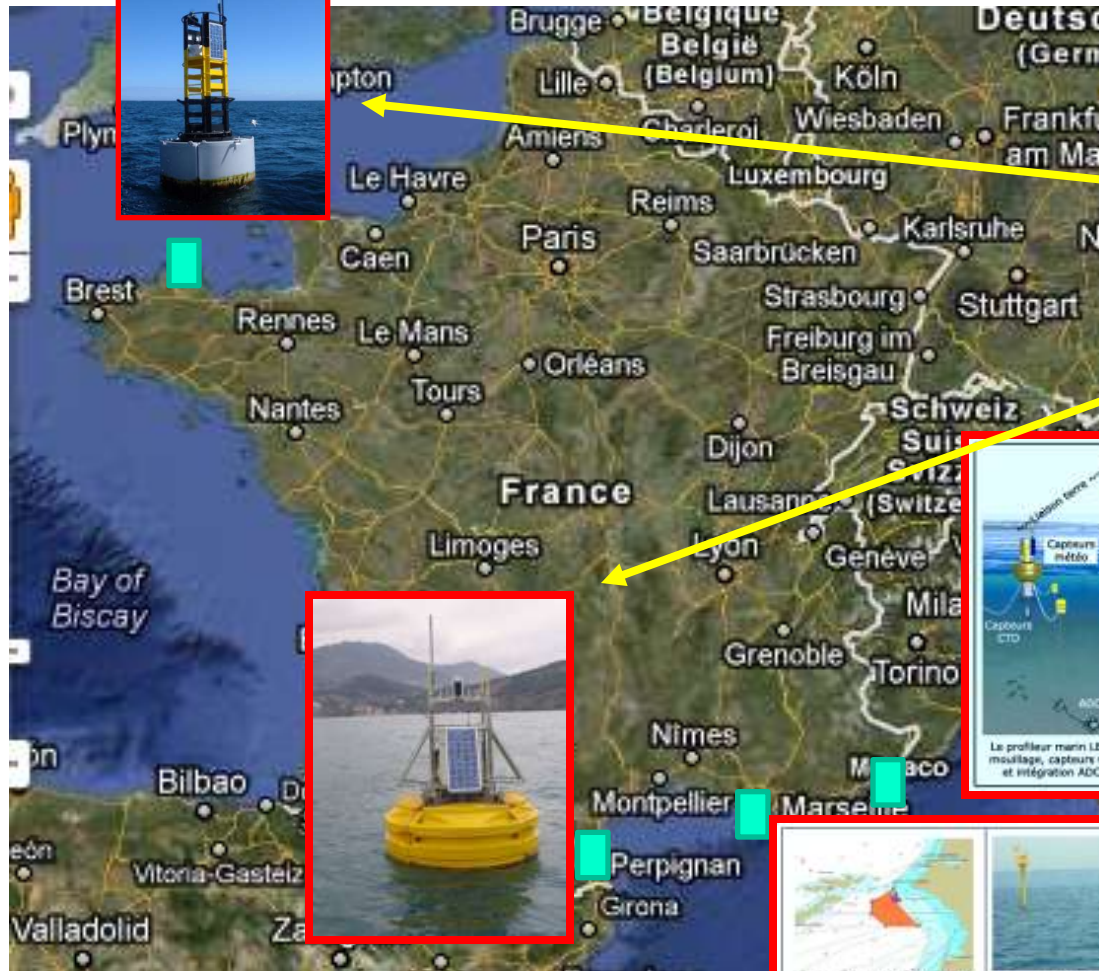
High Frequency



Fixed Platform

- 16 physico-chemical and biological parameters

CNRS coastal buoys network

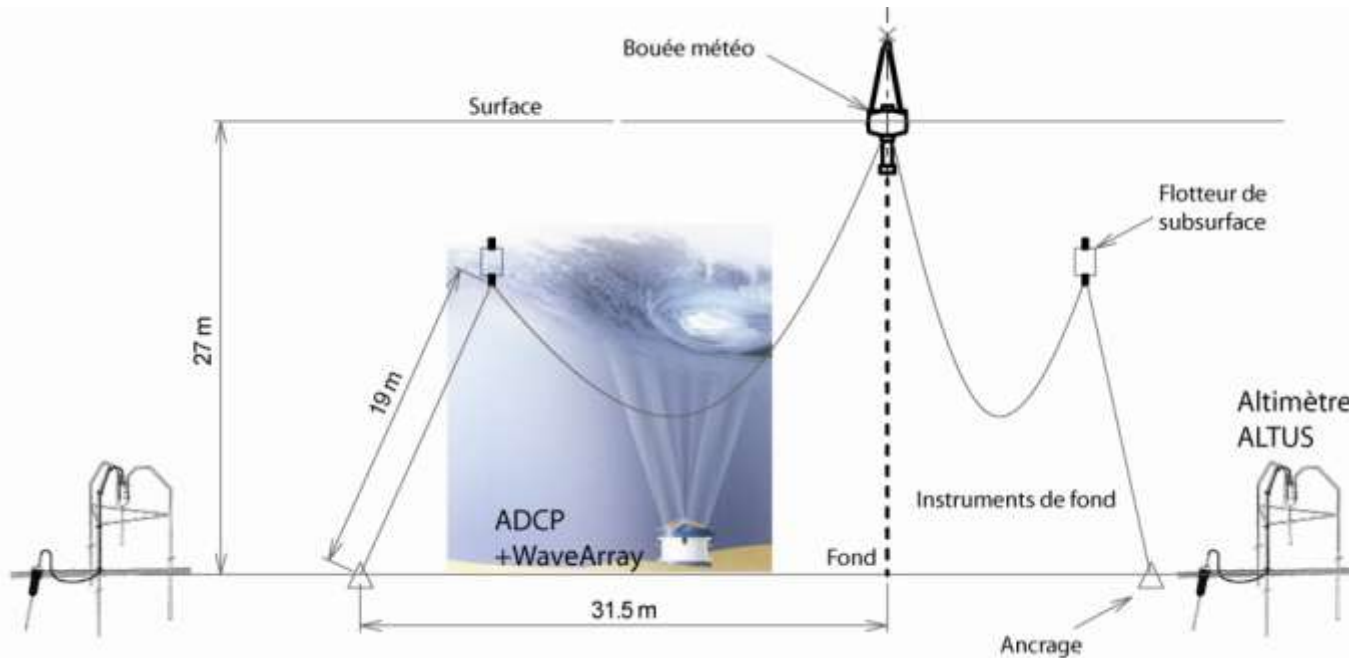


- 5 Fixed platforms:
- Somlit ASTAN
 - SOLA Banyuls
 - POEM Perpignan
 - Eole Villefranche
 - Somlit/Smatch/Marseille

CNRS coastal buoys network



POEM Buoy / Perpignan Flood and storm impact survey



- Meteorological measurements
- Sub-surface oceanographic measurements (CTD + Turbi + Fluo)
- Near-bottom instrumentation

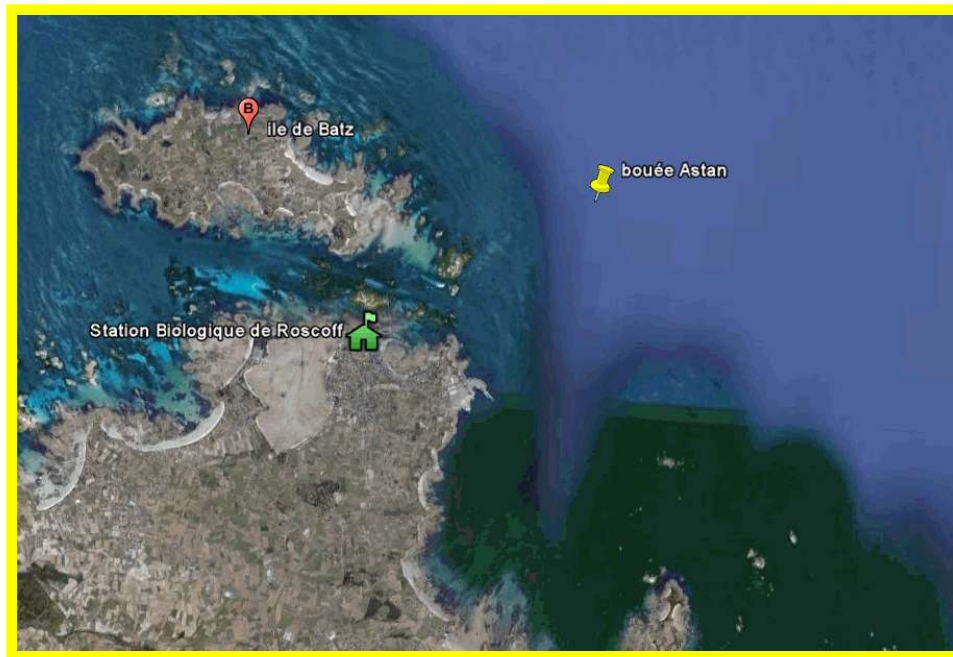
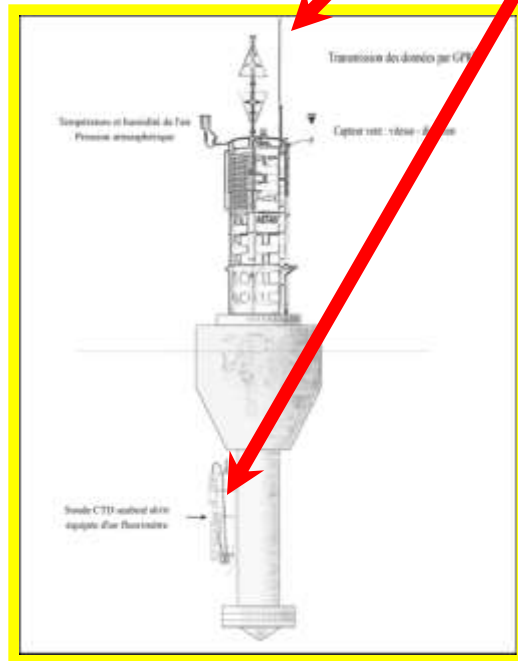
<http://cefrem.univ-perp.fr/>

ASTAN Buoy of opportunity



Atmospheric (T, Patm, Wind) and oceanographic sensors (T, S, chl fluorescence, Dissolved Oxygen)

Sensors: SBE 16+, Turner C7, SBE43



2 milles off the north Brittany coast (Western Channel)

Depth > 40m

Buoy Deployment



Maintenance of the buoy:

- Existing buoy, Phares et Balises

Pre-deployment:

- Check of sensors, data transmission

Deployment:

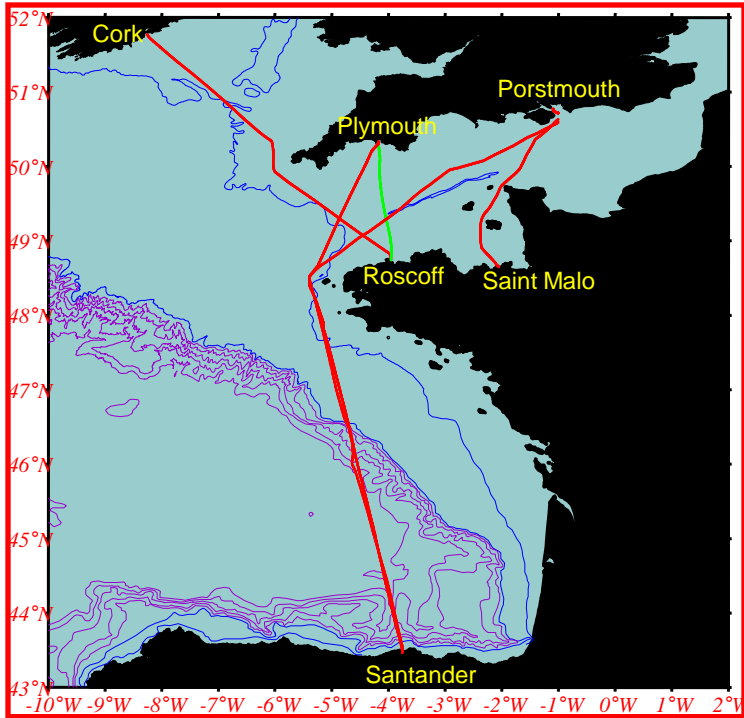
- Installation by divers and maintenance operations (2 months)

Post-deployment:

- fouling cleaning (algae, mussels,...), conductivity cells cleaning, batteries replacement, anodes replacement



Ferry Box Lines in the Western Channel and bay of Biscay



MV Armorique (2009, 168m)



MV Pont Aven (2004, 185m)

Brittany Ferries lines:

Armorique daily frequency = 2-3 transects)

Pont Aven (weekly frequency)

Measurements along transects in the Western Channel and Bay of Biscay

Continuous measurements of physico-chemical and biological parameters in surface waters

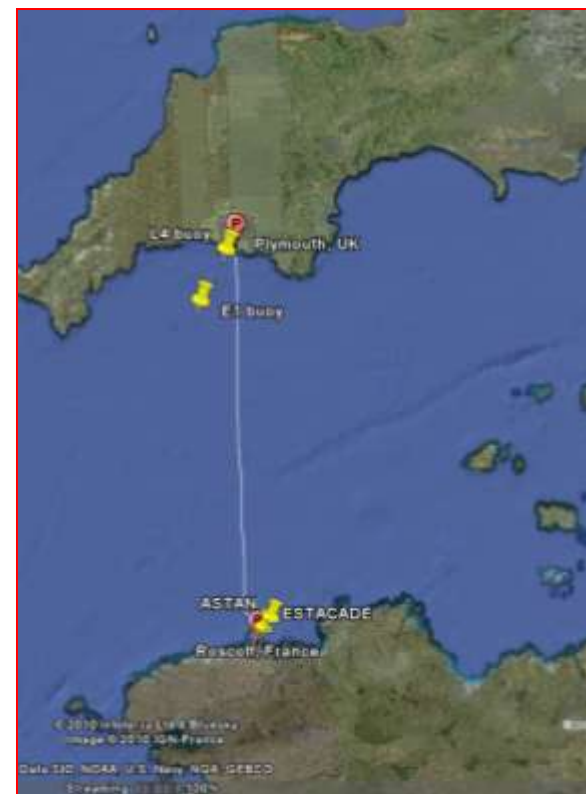
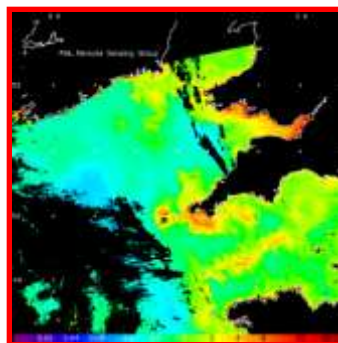


MV Armorique

6 parameters:

- Temperature
- Salinity
- Oxygen
- Fluorescence
- Turbidity
- CDOM
- pCO_2 (Armorique since 2012)

Automatic sampler



Ferry Box Sensors:



SBE 45
Thermosalinograph

Anderaa
3835 Optode

Turner Designs C3
Fluorometer

Same sensors onboard MV Armorique and Pont Aven + 1 additional set



Automatic sampler connected to the ferrybox

24 bottles (1l)

- *Refrigerated (4°C)*
- *Remotely piloted from laboratory*

Data qualification (salinity, chlorophyll, turbidity...)

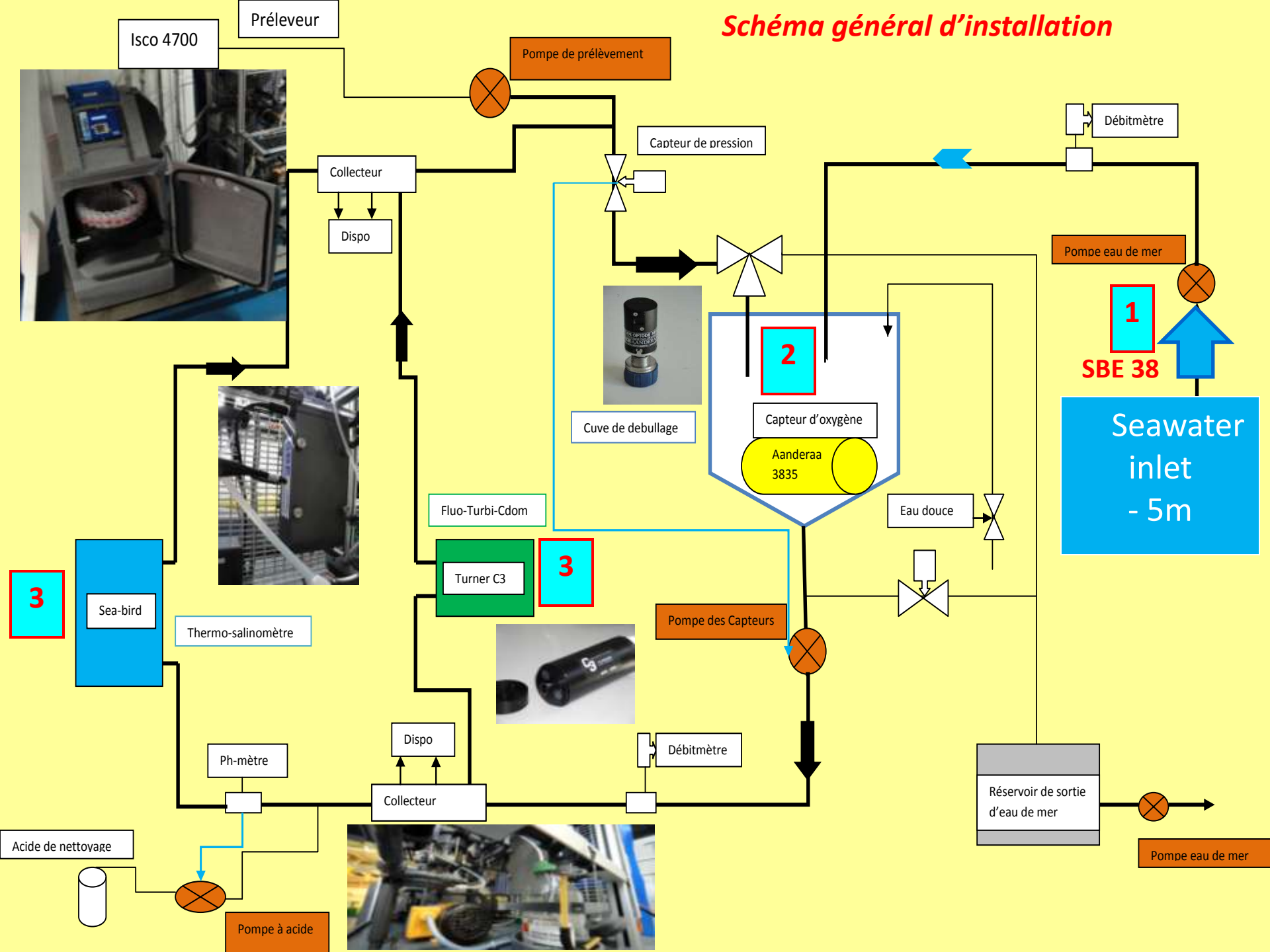
Analysis of additional parameters:

- *Nutrients (nitrate, phosphate, silicate)*
- *chlorophyll a, pigments,...*

**2 transects realized per month with
1 coordinated with CPR sampling**



Schéma général d'installation



Fouling



Fixed Platform Maintenance:

- Cleaning every 2-3 months depending on the season (more frequent during the productive season)
- Antifouling: TBTO pills from Seabird

Ferry Box Maintenance:

- Automatic cleaning at each arrival in port (10% HCl solution)
- Regular cleaning of the debubbler,
- Entire circuit every year



Calibration procedures



Fixed Platform:

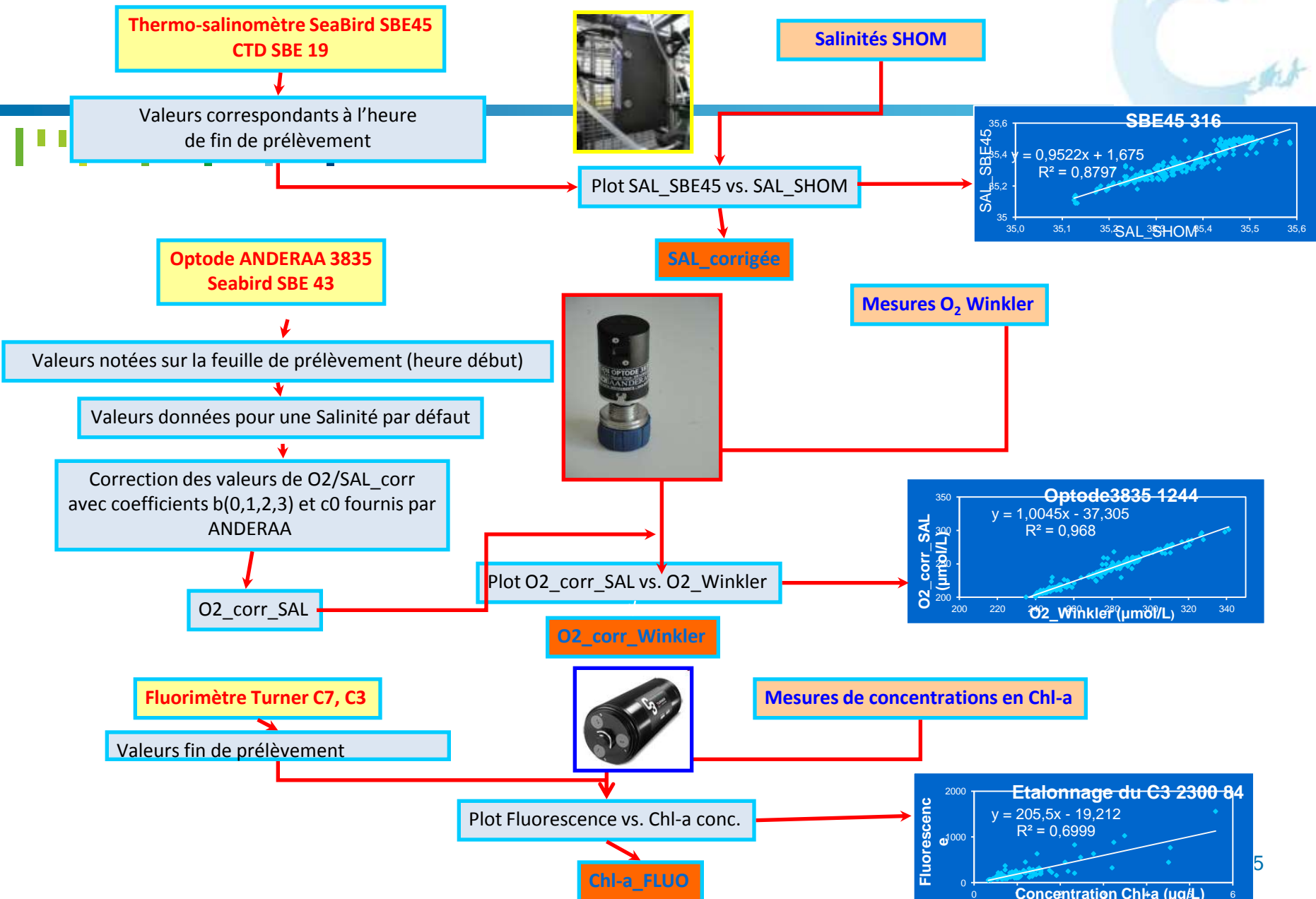
- CTD sensors calibration every year at SHOM calibration facility (Brest)
- Fluorometer: calibration with chlorophyll extracted from algal cultures
- Samples (bimensual frequency) for salinity, dissolved oxygen, chlorophyll

Ferry Box:

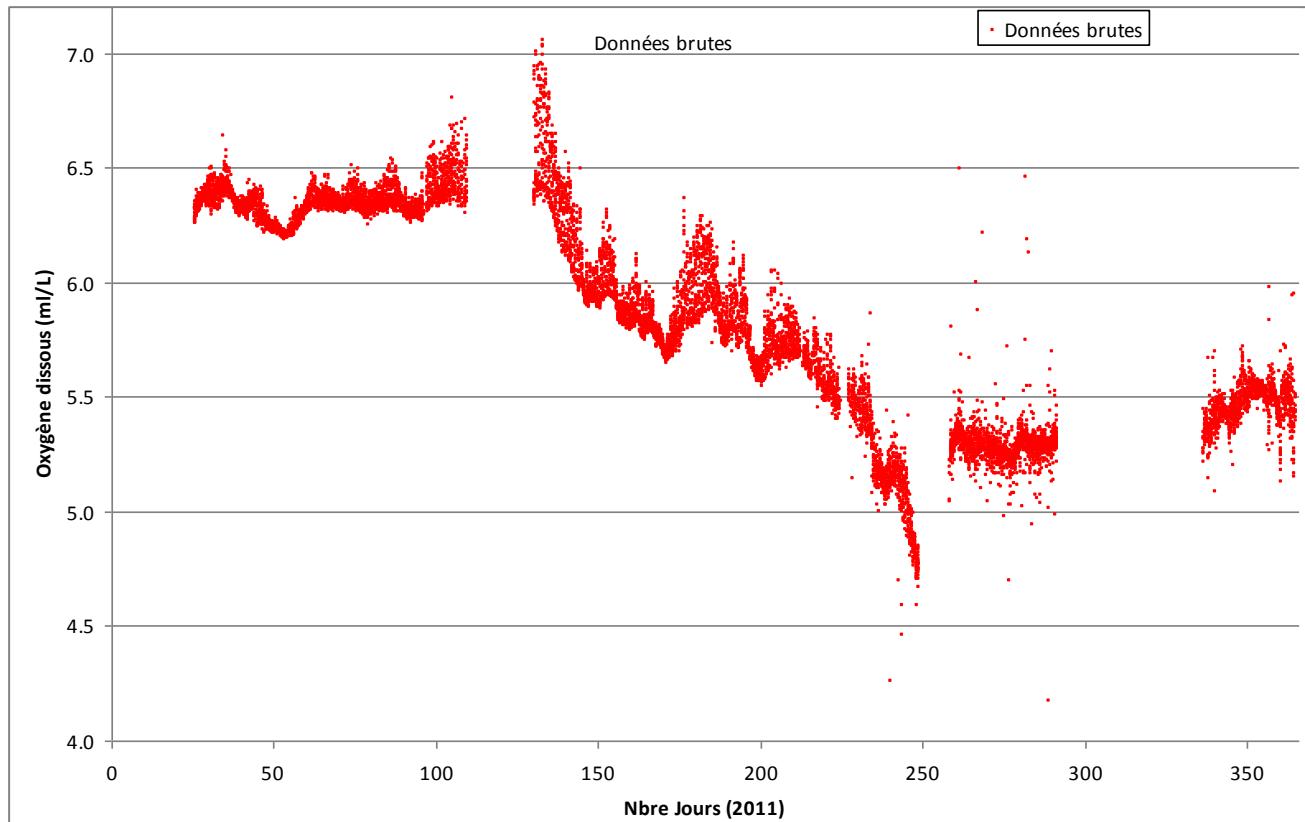
- CTD sensors calibration every year at SHOM calibration facility (Brest)
- Fluorometer: calibration with solid secondary standard, chlorophyll extracted from algal cultures
- Samples (bimensual frequency) for salinity, dissolved oxygen, chlorophyll, $p\text{CO}_2$ (DIC and alkalinity measurements)

Buoy and Ferrybox sensors calibration procedures

→ Calibration from measurements on samples taken onboard during the transects (every 2 weeks).

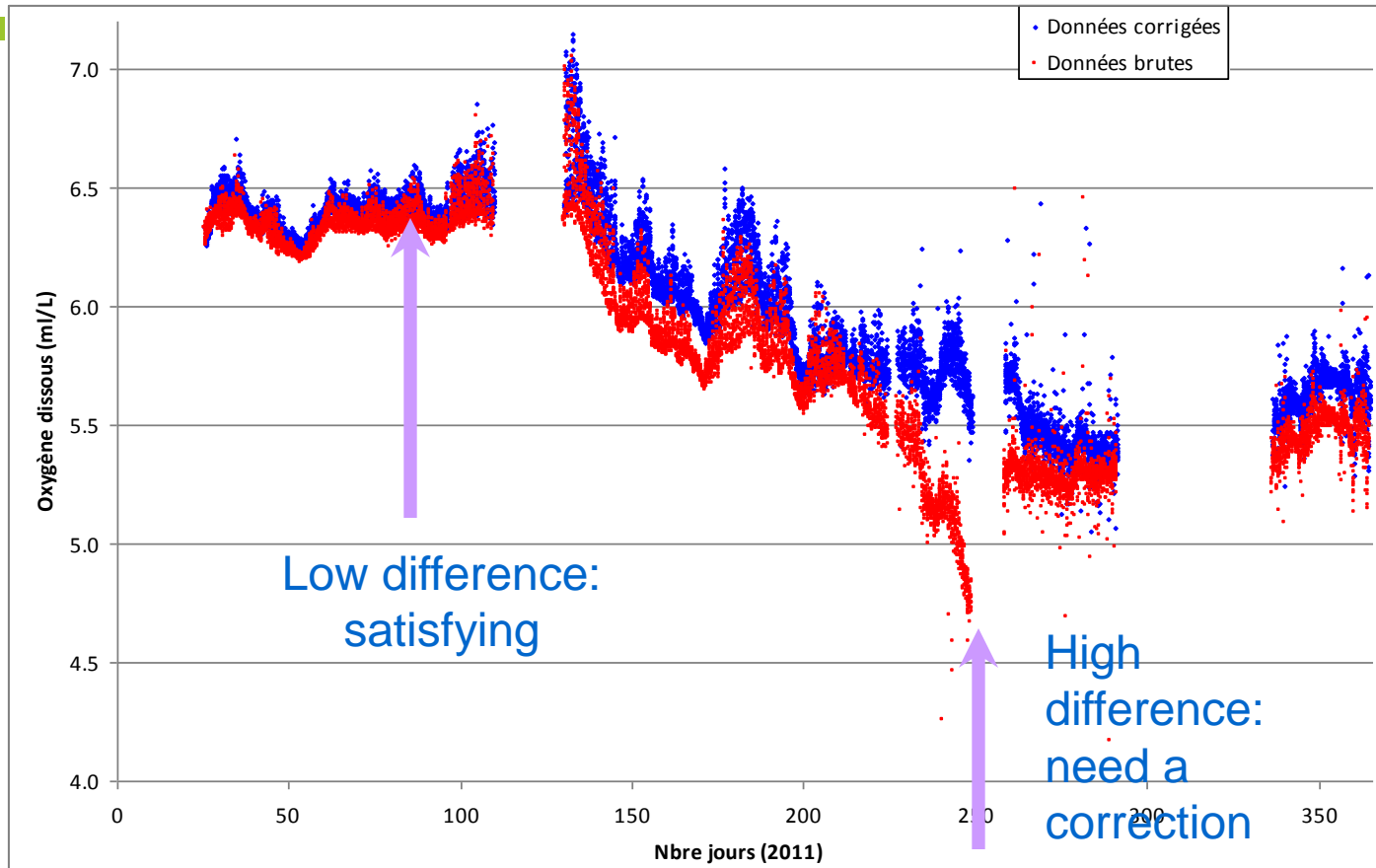


Buoy: Dissolved Oxygen Calibration



Evolution of dissolved oxygen concentrations against time (data with the initial manufacturer calibration)

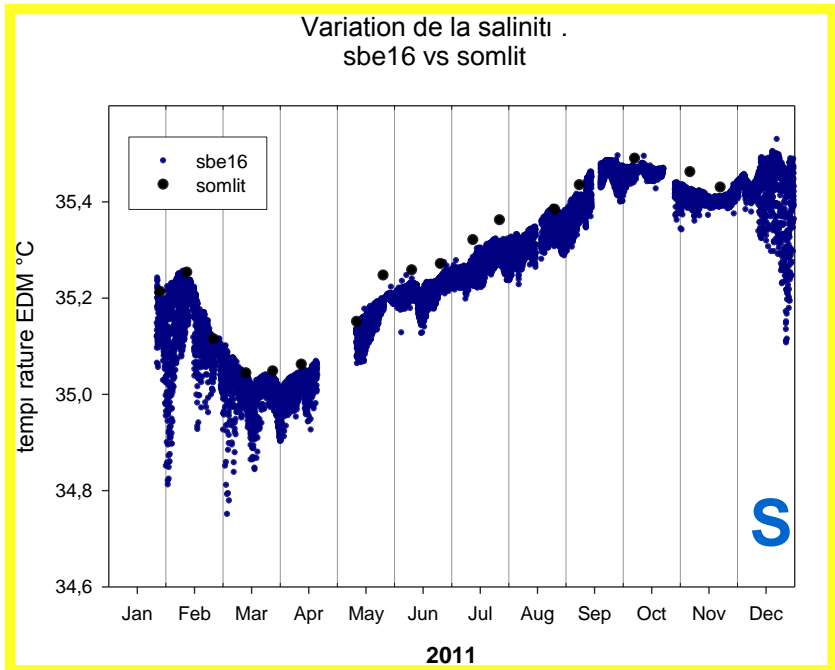
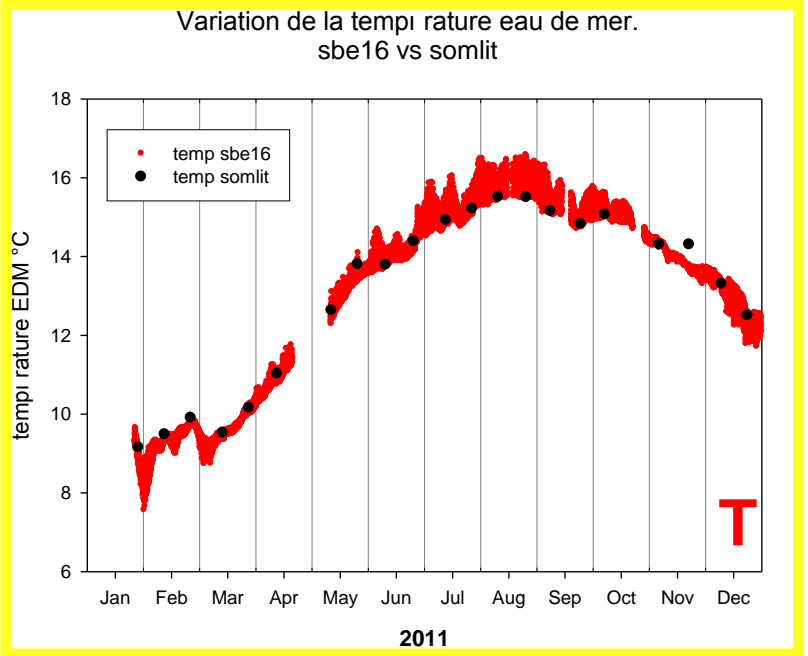
Buoy: Dissolved Oxygen Calibration



Raw and corrected data from SBE43 sensor (Astan Buoy)



Comparison between samples and buoy data

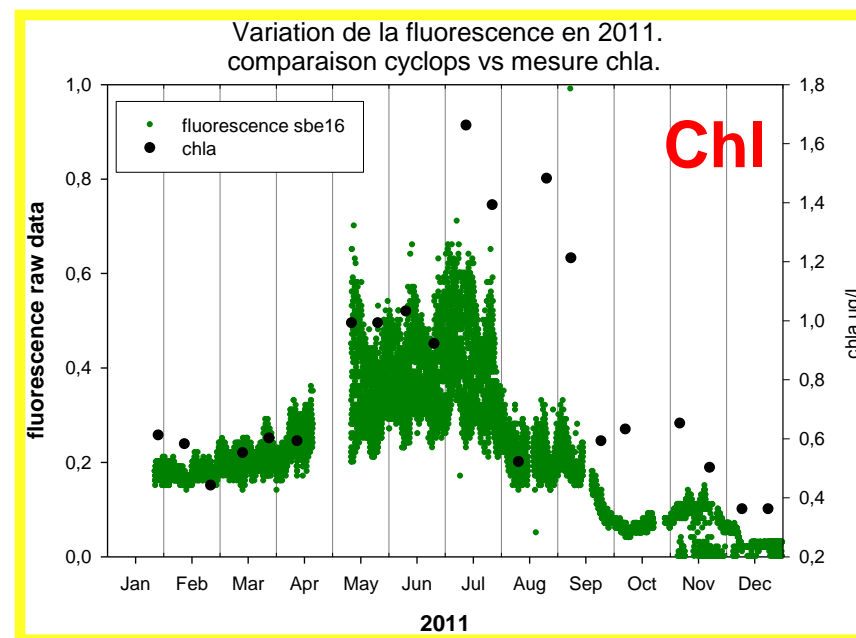
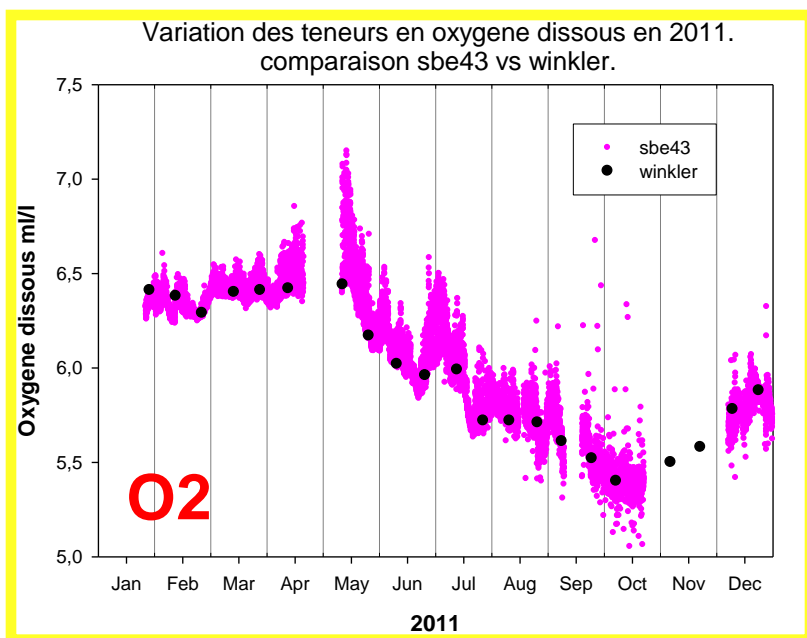


Data return 2011 = 83%

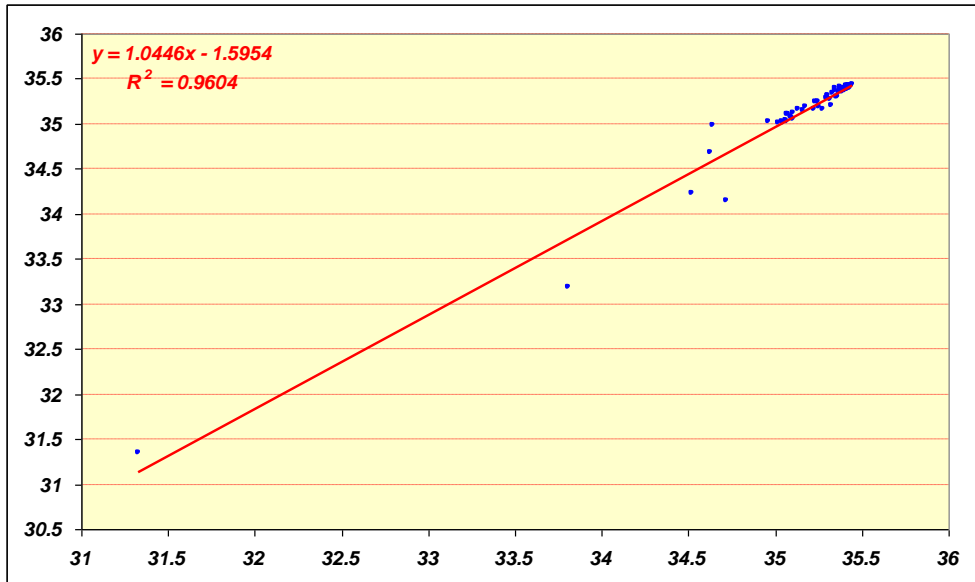
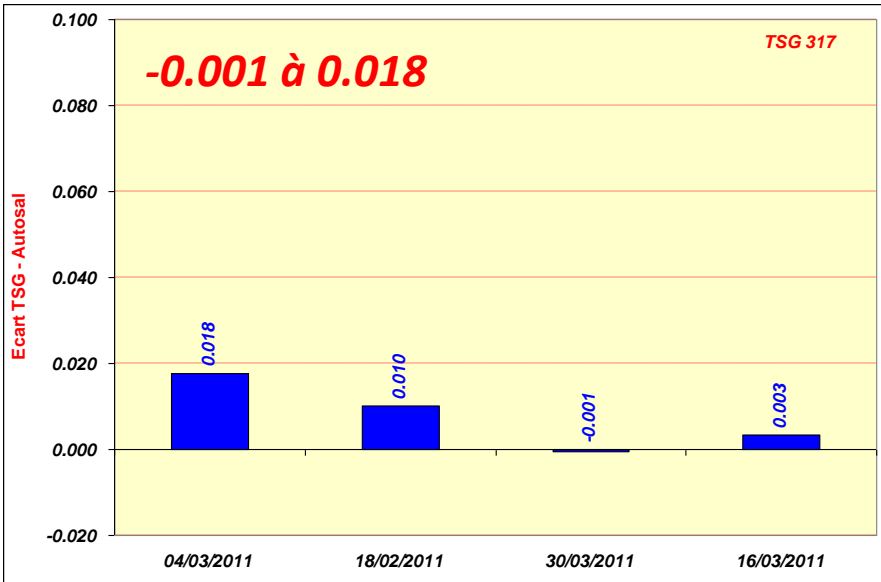
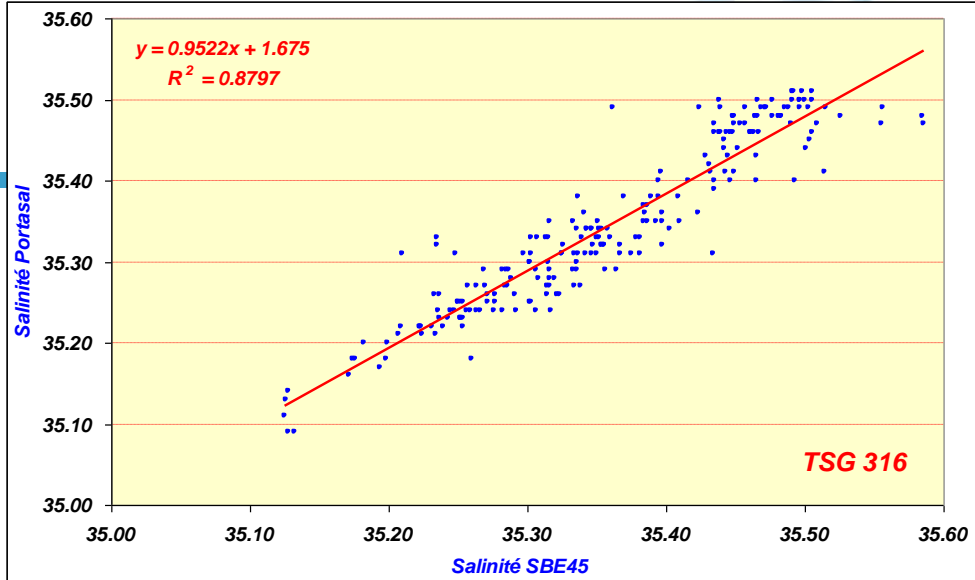
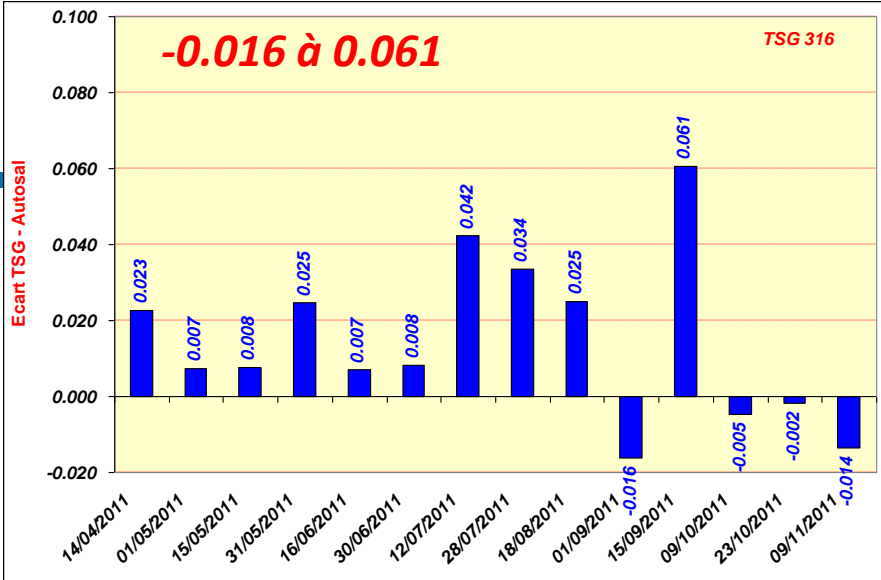
Data return 2010 = 94%



Comparison between samples and buoy data

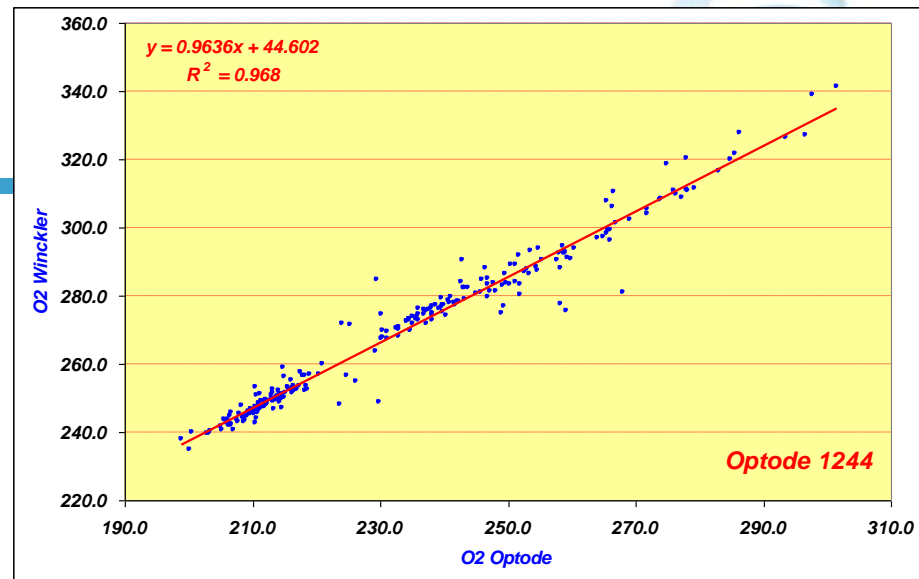
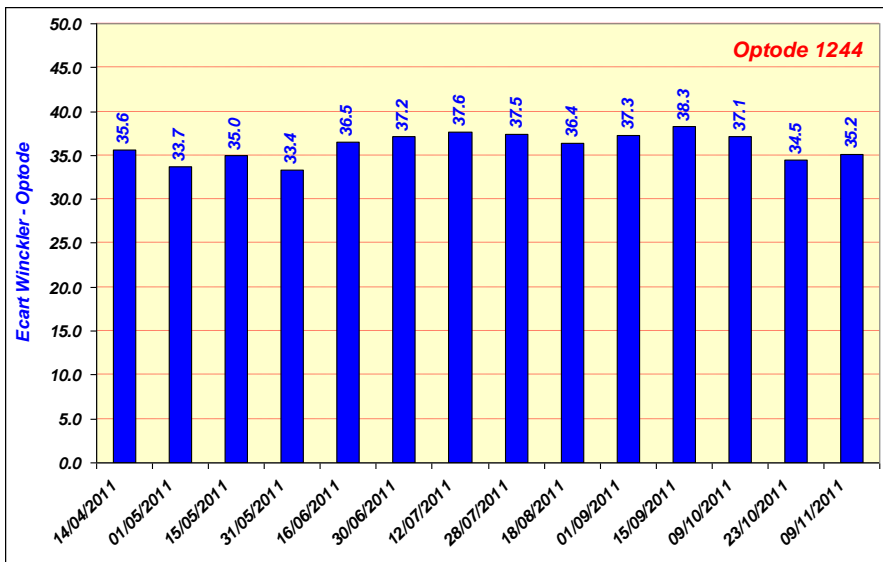


FerryBox : Salinity calibration (TSG vs salinometer measurements):

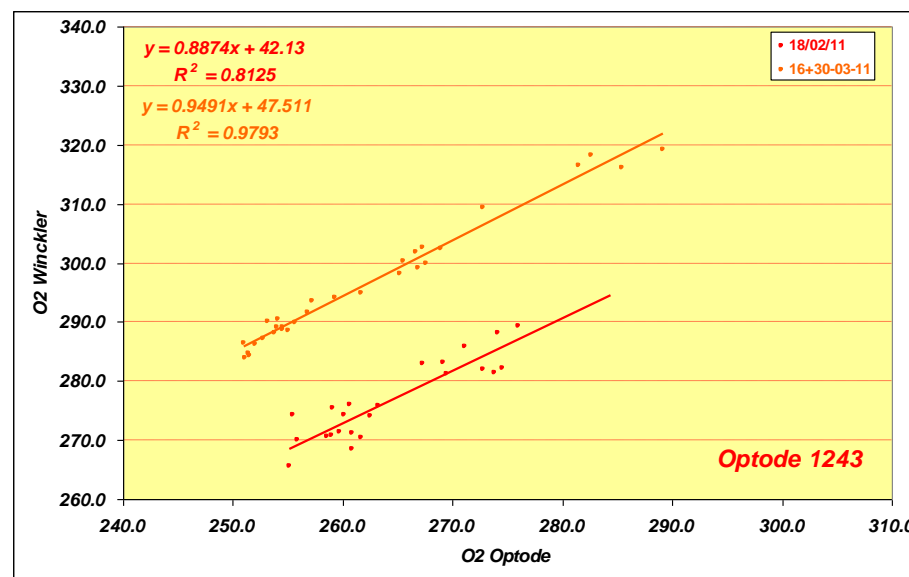
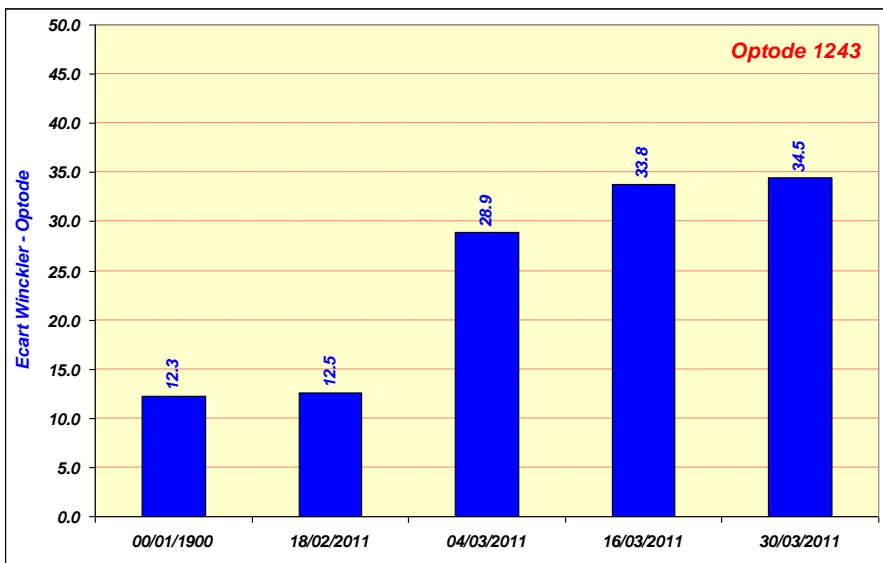


Good precision of TSG measurements (better than 0.05 PSU) TITLE - JERICO - 24

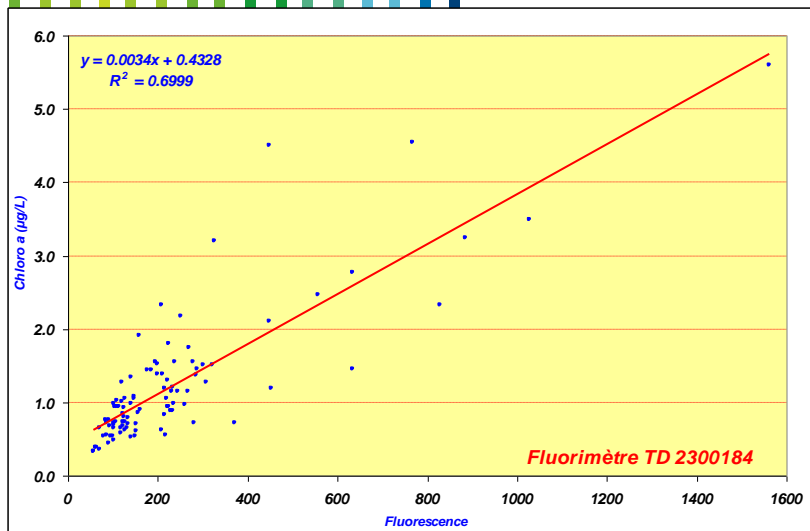
Dissolved Oxygen calibration (Optode vs Winckler measurements):



Optode 1244 : Constant offset of 35 $\mu\text{mole/L}$ = 1 correction



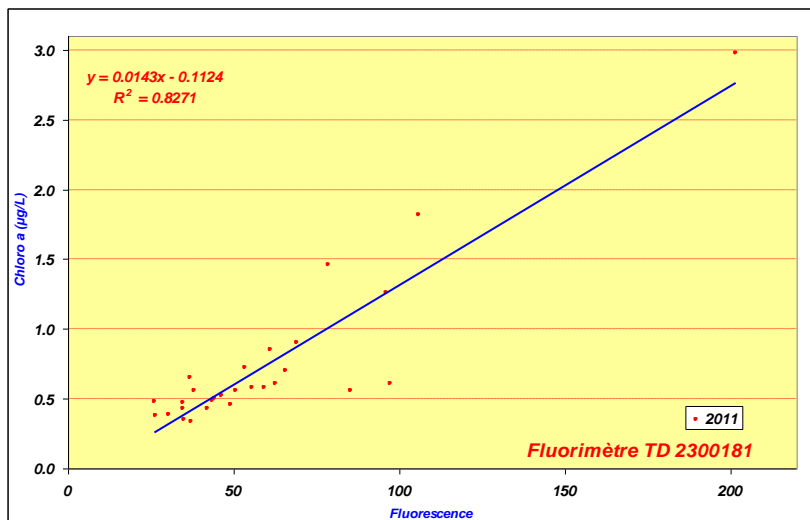
Optode 1243: Variable offset = 2 corrections



Fluorescence Chlorophyll calibration (Turner C3 vs fluorimetric Turner Designs measurements):

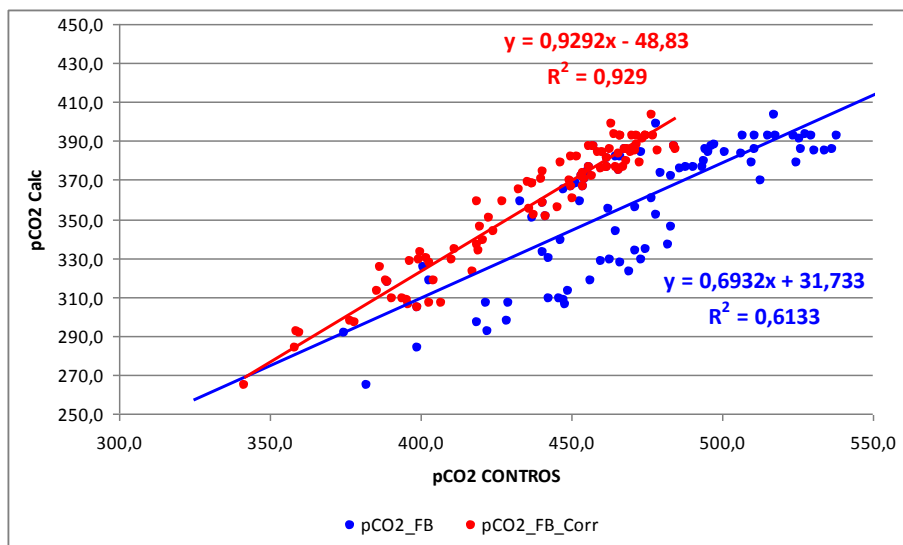
Relatively good correlations between in situ fluorescence and chlorophyll a measurements:

$R^2 > 0.70$





pCO₂ calibration (Contros sensor vs calculated pCO₂ (DIC + alkalinity))

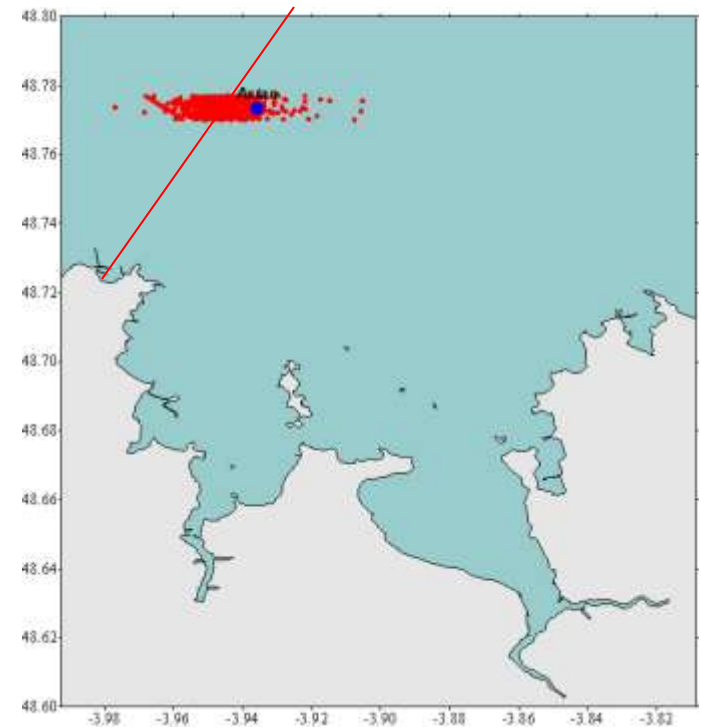
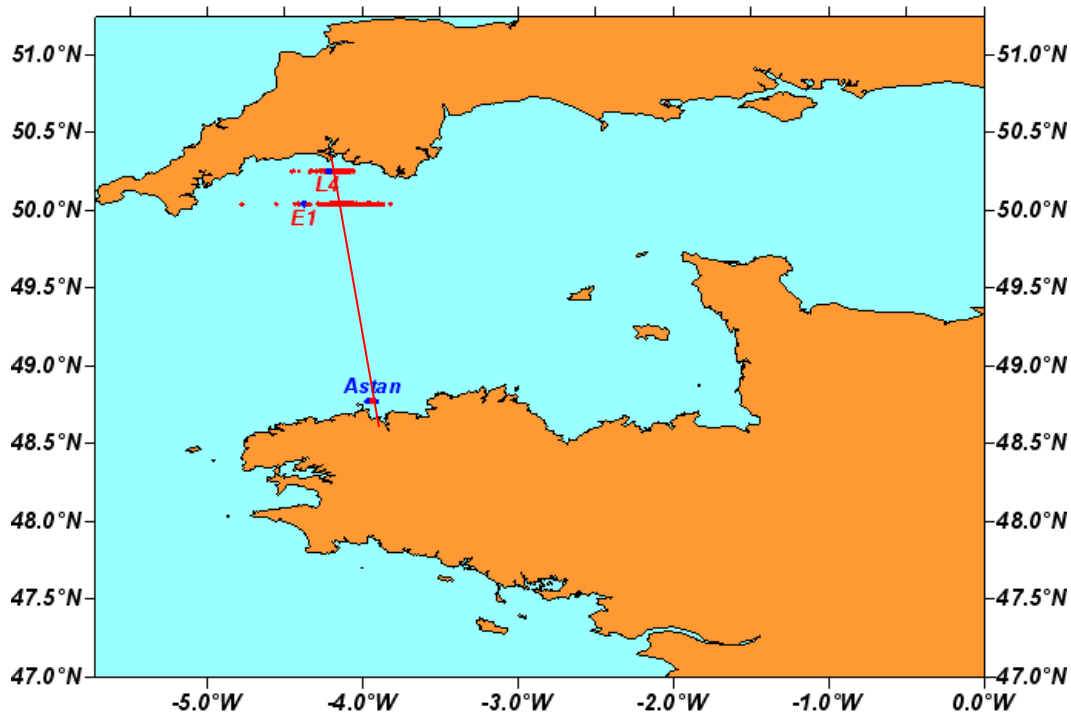


Water Sampling: Existence of an offset plus and increasing trend.

When corrections made, better correlation between sensor values and calculated pCO₂.



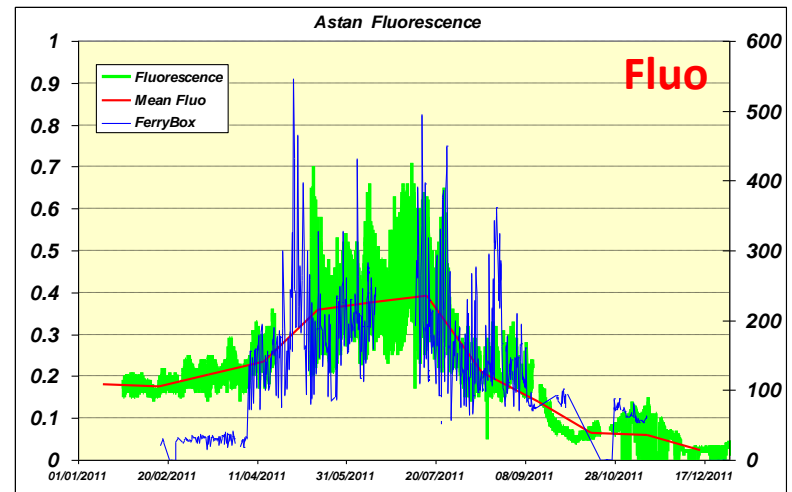
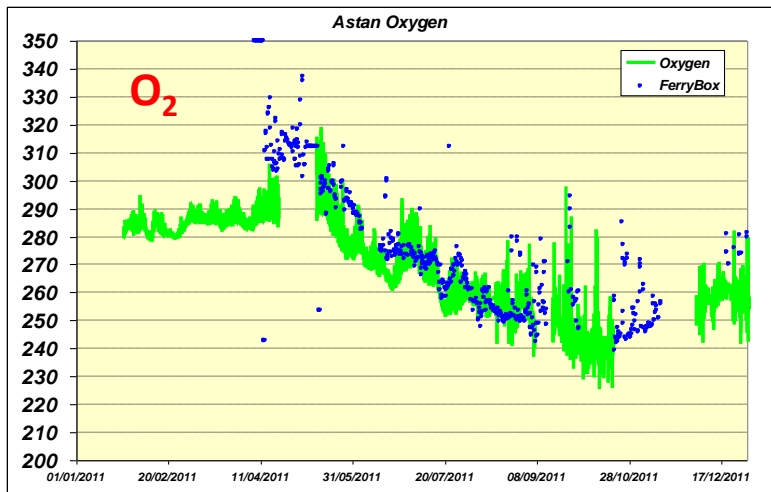
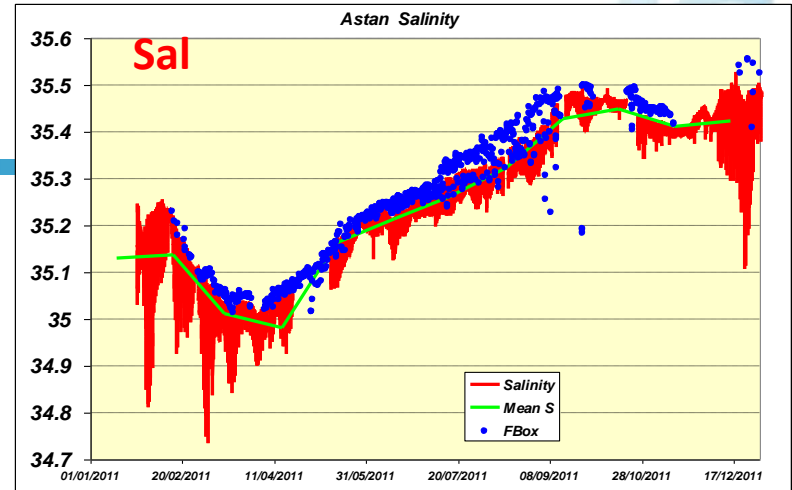
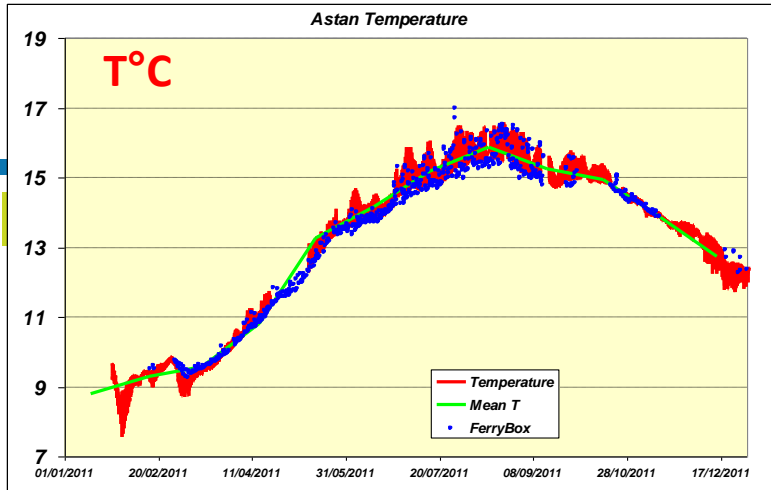
Comparison Data from 2011 : Buoy vs Ferry Box



Passage of Ferry Armorique near Astan buoy (2-3 times/day)

Comparison of data acquisition by the two platform types

Comparaison Données ASTAN 2011 : Bouée vs Ferry Box

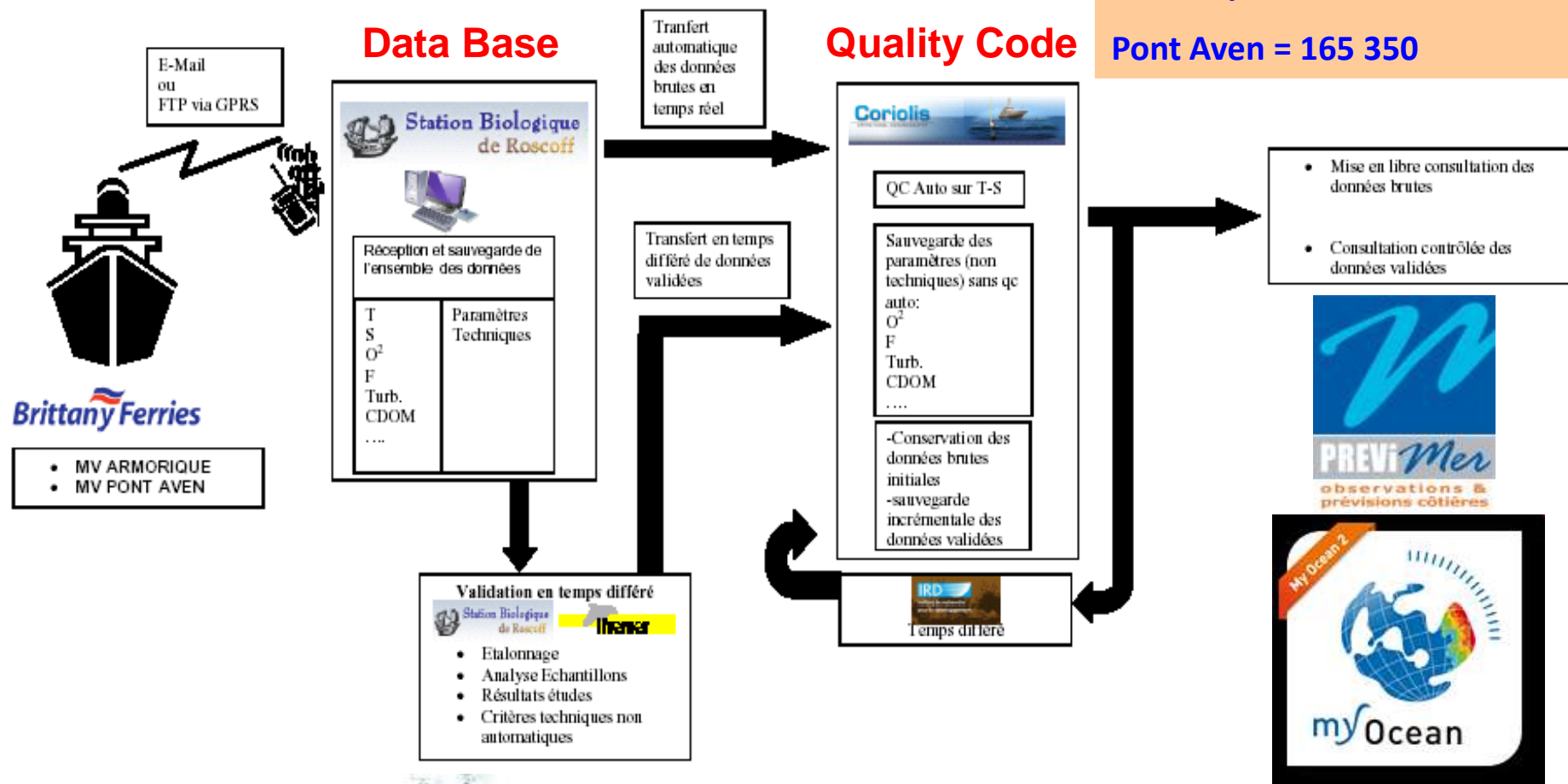


Good adequation between buoy and ferry data : good complementarity between the temporal HF (buoy) and the spatio-temporal HF (ferry)

Buoy and Ferry Box Real Time data transmission (Coriolis Data Center and MyOcean)

PROJET NAVOP
Ferrybox sur MV ARMORIQUE et PONT AVEN

Synoptique de la gestion des données



Data archiving: Data Base and Website (abims.sb-roscoff.fr/hf)



HF - High Frequency Data Repository - Campaigns

User
mhoebke
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Devices

- ASTAN
- Ferry Box Armorique**
- Ferry Box Pont-Aven

▼ List of measurement campaigns/tracks for Ferry Box Armorique

Filter Available Campaigns/Tracks

All Period Date Range From: To:

Show Only Valid Campaigns/Tracks

Campaigns/Tracks

Export Records of Selected Rows

69 items found, displaying 1 to 40. [First/Prev] 1, 2 [Next/Last]

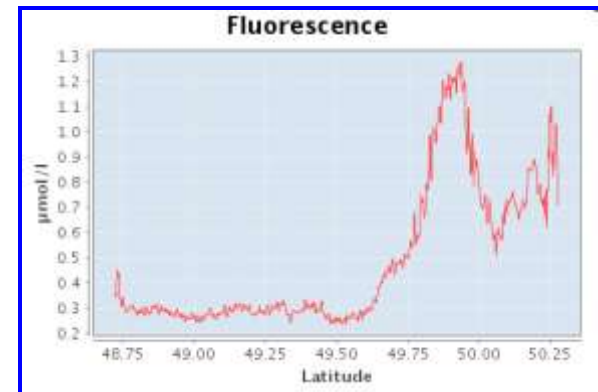
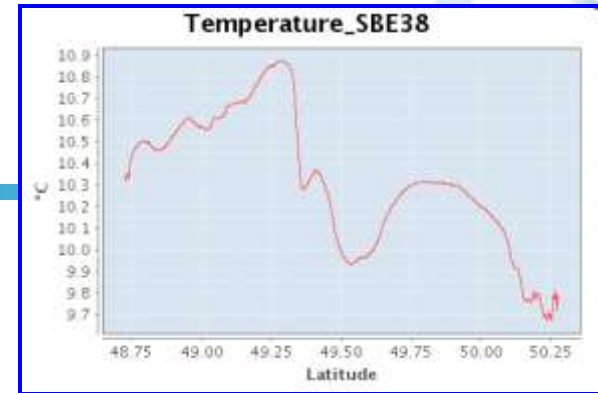
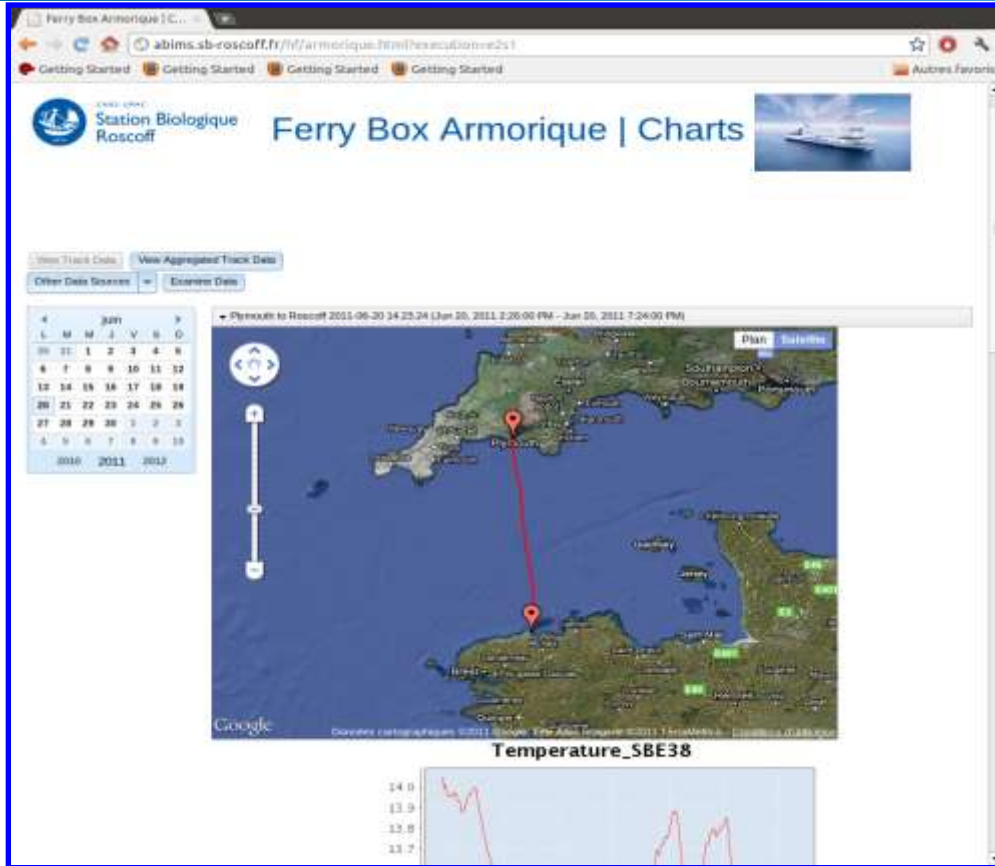
+/-	Name	Start Date	End Date	Charts
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<input checked="" type="checkbox"/>	Roscoff to Plymouth	2011-06-21 14:32:00.0	2011-06-21 05:10:00.0	
<input checked="" type="checkbox"/>	Plymouth to Roscoff	2011-06-21 07:33:00.0	2011-06-21 12:43:00.0	
<input checked="" type="checkbox"/>	Roscoff to Plymouth	2011-06-20 21:04:00.0	2011-06-21 05:10:00.0	
<input checked="" type="checkbox"/>	Plymouth to Roscoff	2011-06-20 14:26:00.0	2011-06-20 19:24:00.0	
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<input checked="" type="checkbox"/>	Roscoff to Plymouth	2011-06-19 14:59:00.0	2011-06-19 20:08:00.0	

Data sources

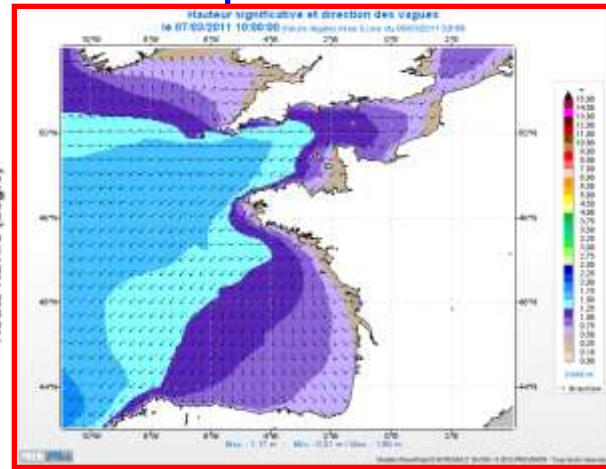
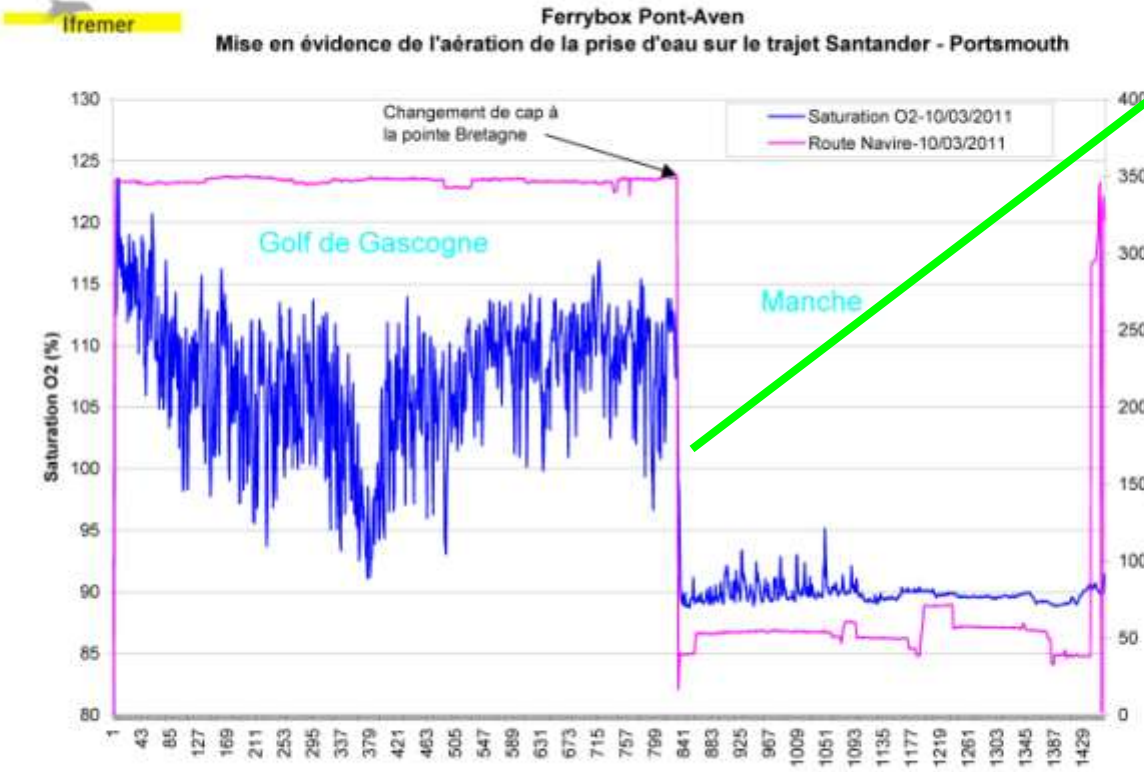
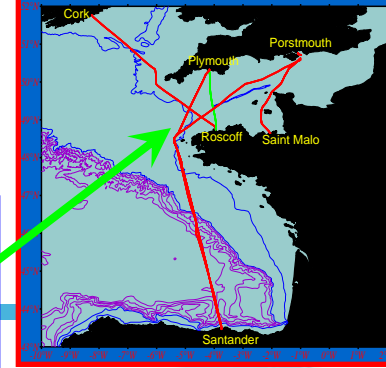
Data transects

Graphiques

Visualisation of ferry routes



**Example of problems we met:
Air bubbles with rough sea in bay of Biscay**



Waves height and direction (blue = 1.5 to 2m)

Solution: deeper water inlet (7m)

