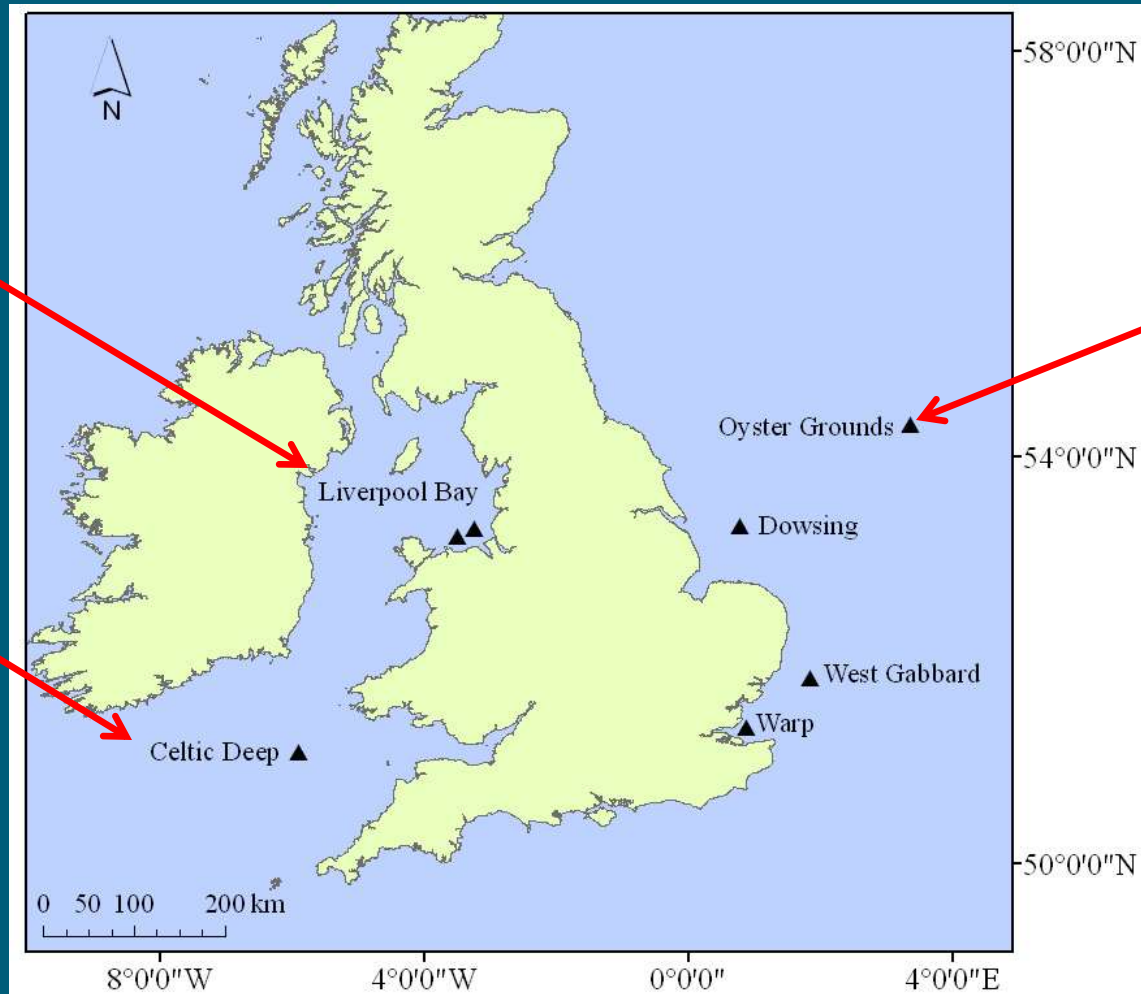


Best practice developed over eleven years of high frequency in situ measurements



SmartBuoy Locations

7 routine monitoring sites



Cefas/AFBI
/POL

Cefas/AFBI

Cefas/DNZ

SmartBuoy Configuration



Max. weight ca. 500kg

Variable	Sample frequency
Salinity	1Hz in 2 x 10 min burst/hr Data acquisition and control via ESM-2
Temperature	
Chlorophyll fluorescence	
Turbidity	
PAR irradiance	
Dissolved oxygen	
TOxN (total oxidisable nitrogen)	
Dissolved silicate	Up to daily
Phytoplankton counts and composition	Every 4 days



in situ
nutrient
analyser
(NAS-3X)

TOxN

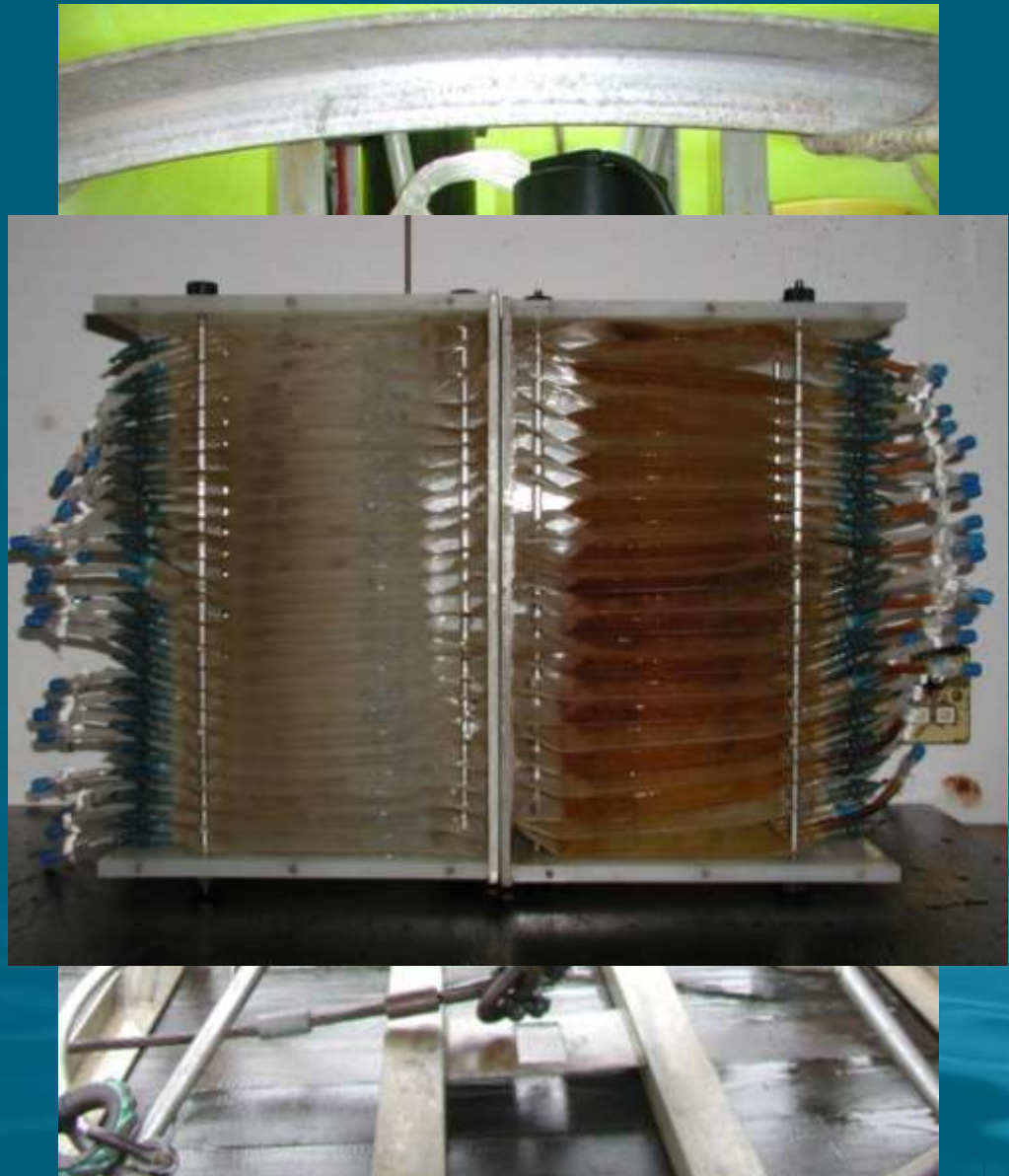
accuracy $\pm 10.6\%$
precision 5%



Water sampler (WMS-2)

TOxN, Si,
PO₄

accuracy $\pm 4.0\%$
precision 4%



Overview of our “System”

- Cefas QA system (Project management, HSE PAG etc)
- Risk assessments (RA and COSHH)
- Standard Operating Procedures (SOP) for all tasks.
- SOP are bench tested and reviewed every two years.
- Checklists

Best Practice for SmartBuoys

- Maintenance
- Storage
- Transport
- Data transfer
- Data post process
- Other stuff..

Maintenance

- SmartBuoy Workshop – most preparation of instruments.
- 2 staff full time + 2 others to help
- Electronics Workshop – in-house instruments (ESM2, Mooring Locator, Water Sampler) .
- Less than 1 man year – from 3 staff

Storage

- Mainly at Cefas laboratory
- Hardware is nearby on a site with 5 industrial units and a big yard area. (all the stainless steel is kept indoors to prevent theft).
- Hardware is maintained by P&O Maritime Services who also look after the RV Cefas Endeavour.

Transport

- Locally all sensors and instrumentation are moved by the SmartBuoy team – rental vans.
- Pallet Line to Holland and Belfast (monthly)
- Hardware is moved by POMS
- Each survey has a (long) pre-requisite list of forms the SIC completes.

Data transfer

- Most of the SmartBuoys send back data every two hours (every 8th burst) via Orbcomm.
- Once the buoy is serviced the logger is downloaded and data uploaded to the database.

Pre deployment

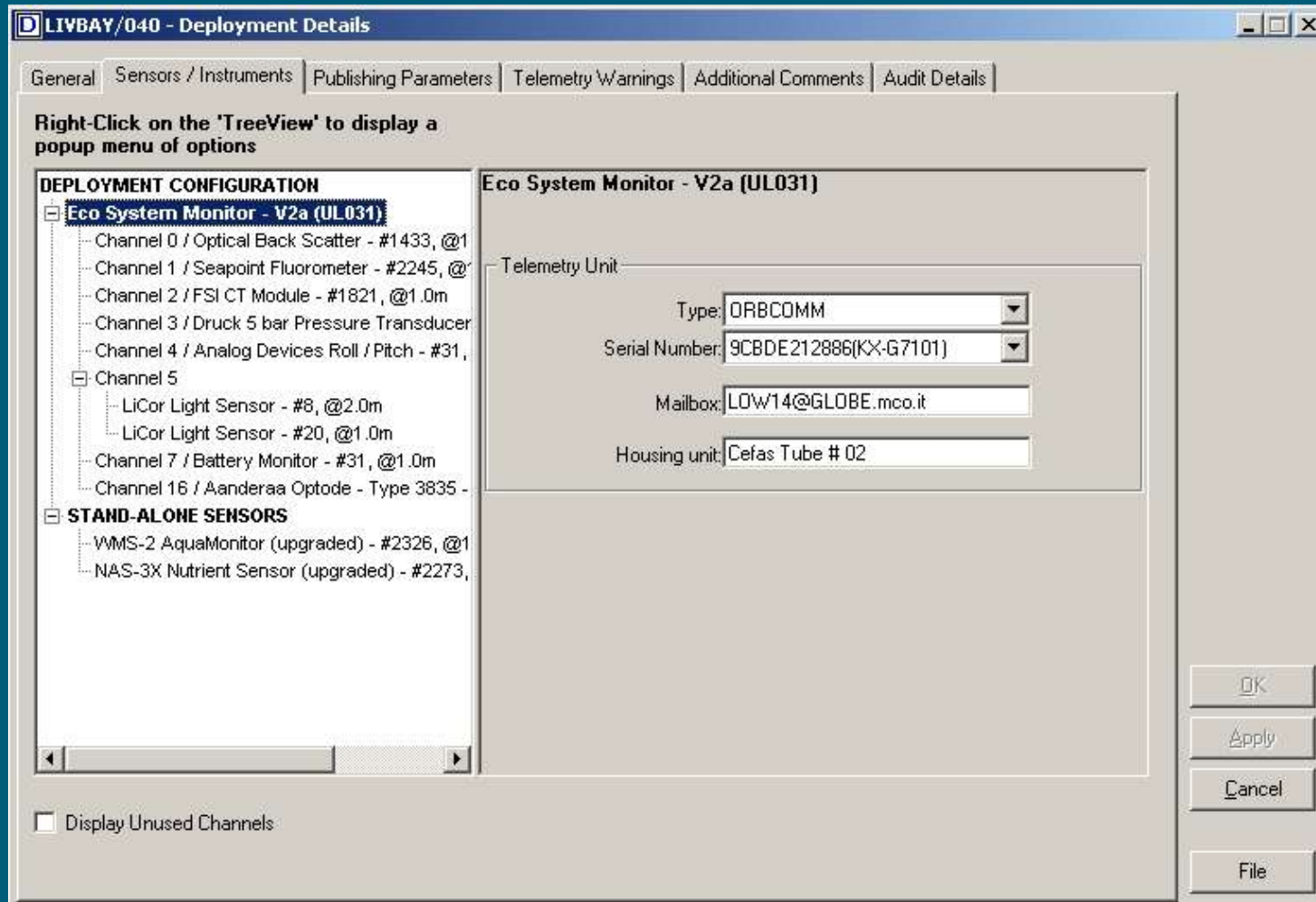
- Logger set up on database – checks on service history of sensors, looks at deployment length battery life etc
- Serviced instruments ready to deploy (i.e. two complete sets per site)
- Use the same sensors on rotation – helps a lot with calibration
- Build before you set sail (check telemetry)

Post deployment

- Photograph all sensors – helps when assessing fouling.
- Jet wash
- Dismantle and wash and clean everything in fresh water, pack into transit cases.
- Upload data to database overnight
- Service all instruments

SmartBuoy Data Management System – 1

Sensor and deployment configuration



SmartBuoy Data Management System – 2

QA Level 2 (manual QA by expert user)

Manual QA Analysis - to level 2 (for SmartBuoy)

Deployment: Liverpool Bay Coastal Observatory - 033
Liverpool Bay Coastal Observatory - 034
Liverpool Bay Coastal Observatory - 035
Liverpool Bay Coastal Observatory - 036
Liverpool Bay Coastal Observatory - 037
Liverpool Bay Coastal Observatory - 038
+ Liverpool Bay Coastal Observatory Site 2
- Lowestoft Lab Test Site

Sensor: Aanderaa Optode - Type 3835 - #127

There are a total of 2016 bursts
Select number of Records to be viewed at one time:-
 All Records
 100 500 1000
 2000

Highest QA level: 4

Burst	Date	Oxygen concentration	Oxygen percent saturation	Temperature
773	07-Oct-2006 12:30:00	7.7646	96.0006	15.7856
774	07-Oct-2006 13:00:00	7.8197	96.615	15.769
775	07-Oct-2006 13:30:00	7.8415	96.8458	15.7643
776	07-Oct-2006 14:00:00	7.8563	97.0231	15.7639
777	07-Oct-2006 14:30:00	7.8142	95.2461	15.2997
778	07-Oct-2006 15:00:00	7.8292	95.7116	15.4068

Liverpool Bay Coastal Observatory - 036
Aanderaa Optode - Type 3835 - #127, @1.0m

Legend:
 Oxygen concentration (mg/l)
 Oxygen percent saturation (%)
 Temperature (°C)

Actions ...
Enable Rejection Reasons
Enable Zoom/Scroll
Stop Graph
Save
Close

SmartBuoy Data Management System – 3 QA Level 3 (applying field calibrations)

QA3 Factor Data

Deployment:

- Liverpool Bay Coastal Observatory - 036
- Liverpool Bay Coastal Observatory - 037
- Liverpool Bay Coastal Observatory - 038
- Liverpool Bay Coastal Observatory - 039
- Liverpool Bay Coastal Observatory - 040
- Liverpool Bay Coastal Observatory Site 2**
- Liverpool Bay WaveNet Site**

Sensor: Optical Back Scatter - #10933, @1.0m

Sensor Parameters: Turbidity (SP) (FTU) Resultant Factored Data: Suspended load (mg/l)

Offset: 0 X Factor: 1

FTU U/Limit: 500 FTU L/Limit: 0.1 SUSPLD U/Limit: 500 SUSPLD L/Limit: 0.1

View Original Data

Factor All Factor Bulk Factor Daily View Factored Data View Both Error Value:

Original Only

Data for Liverpool Bay Coastal Observatory - 037 Optical Back Scatter - #10933, @1.0m Turbidity (SP)

Buttons:

- Apply Factoring To Turbidity (SP) To Create Suspended load
- Undo Factoring in DB
- View Audit Trail
- Stop Graph
- Save Factored Data
- Cancel

Web access to data



[Home](#) [Site map](#)

You are in: [Data](#) ▶ [Marine monitoring](#) ▶ [SmartBuoy Basic Map](#)

Marine monitoring

▶ [Data policy](#)

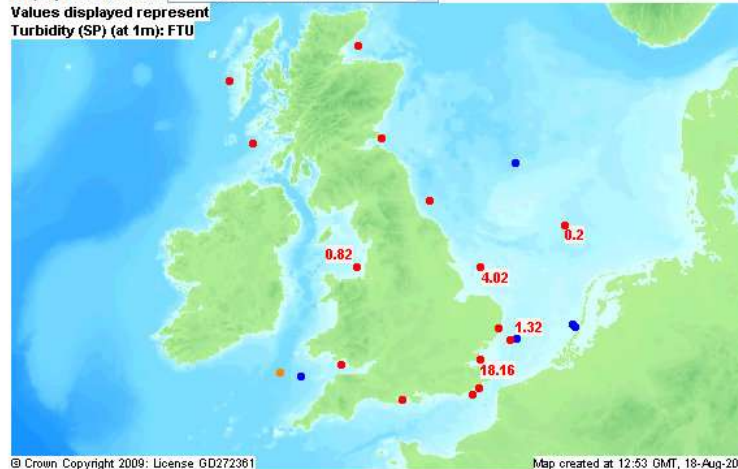
Marine monitoring

SmartBuoy Basic Map

Hover the mouse-pointer over a buoy location to view the latest data from that buoy

Display the value for:

Values displayed represent
Turbidity (SP) (at 1m): FTU



Acknowledgements

- Active buoy (outline only represents data >6 hours old).
- Inactive buoy (no data for >36 hours).
- Future location.
- Inactive location.

[More Info](#)

Centre for Environment, Fisheries & Aquaculture Science (Cefas)

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Website: www.cefas.co.uk/monitoring

Cefas

Other Stuff

- Housings – If Cefas built then generally locally hand-made pressure housings (rated 200 and 450m).
- All wet pluggable connectors – mainly SubCon micro but occasionally Impulse.
- Mooring locator uses Iridium (costs around \$25 per month)

More Other Stuff

- SmartBuoy database is SQL 2008
- SmartBuoy QA software is currently being re-written in .NET (from VB6) - due March 13?
- SmartBuoy logger is being re-developed – due 2014
- FerryBox database and QA system now operational

Yet More Other Stuff

- Anti-fouling measures using Zebratech wipers – OBS, Seapoint Flu and Licor PAR
- Due to trial AAI optode wiper next month
- Full SB trial for 3 months Oct to Feb