Complementarity between Bio-Argo and OCR

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Quality control of the Bio-Argo

- The QC Real Time
- The QC Delayed Mode
- The QC tool

Cross comparison with Ocean Colour

Perspectives for OCR and Bio-Argo

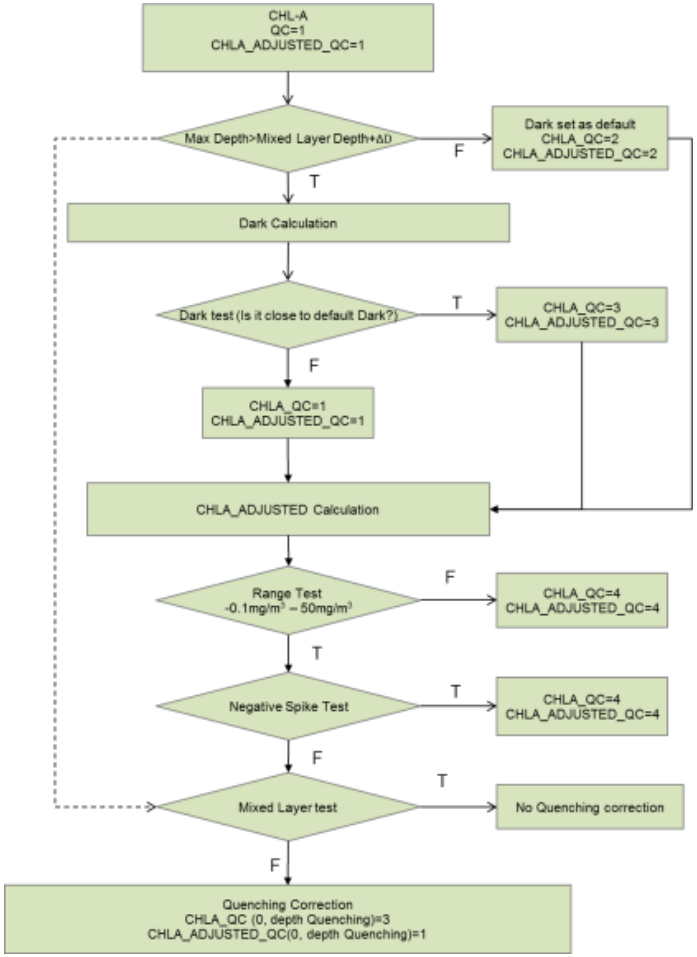
- **The QC Real Time**

Performed automatically – every day before data is made avalaible

The relevance of every single intermediate test has been analysed thanks to statistical tools.

Some tests may be redundant, not adapted to some seas, oceans or areas and have still to be optimised.

QC on Chl-a and bbp



The QC Delayed Mode

Performed semi automatically – every X months – and supervised by an expert / mission PI - before data is "certified"

Several test are done to provide metrics for quality (e.g here after for Chlorophyll)

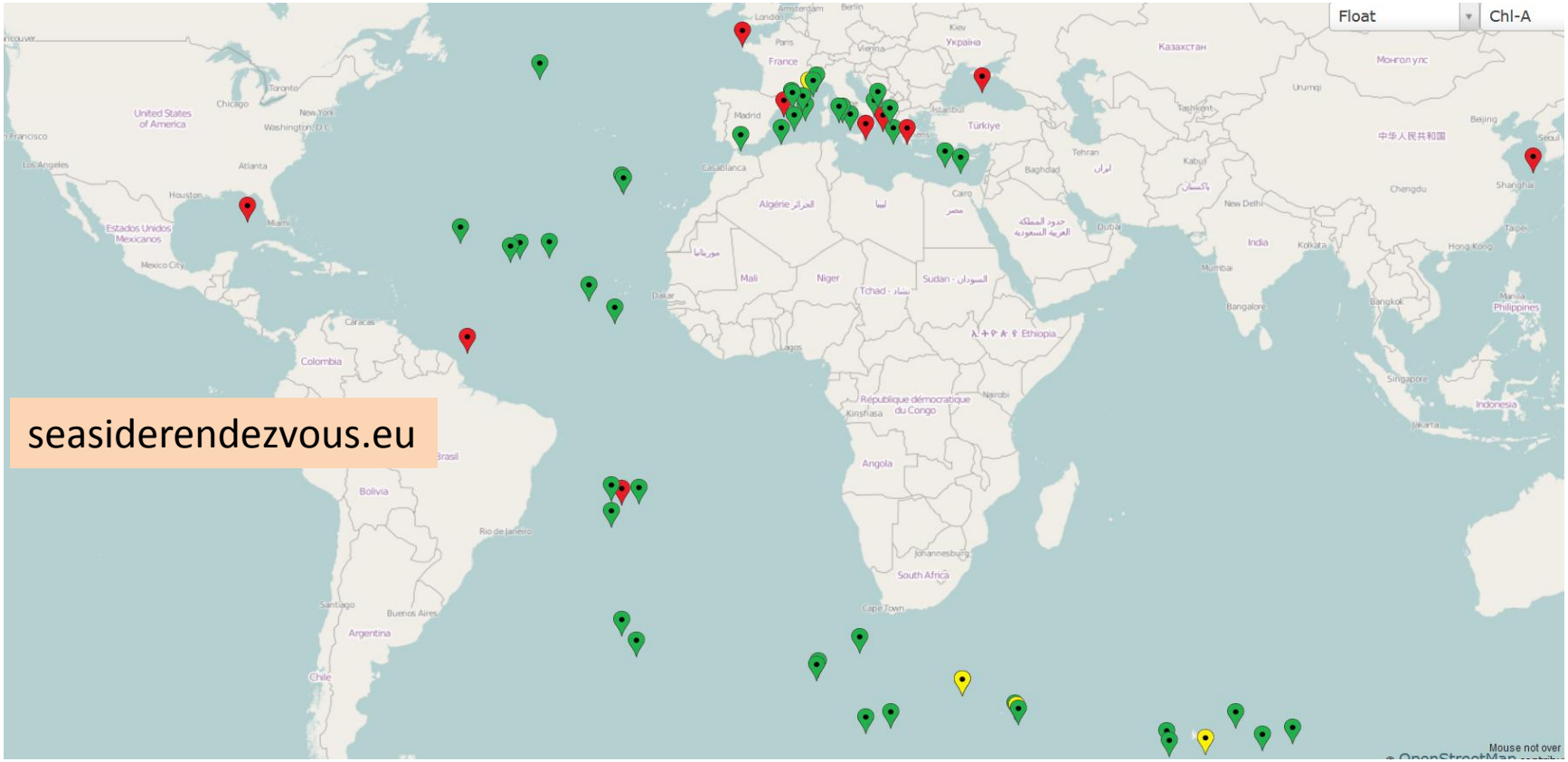
Level of noise on each profile of the same cruise.
Noise is computed as the residual of the signal after adapted filtering

Large depth Chloropyll value (dark value). This shall be stable or points towards a sensor troubles.

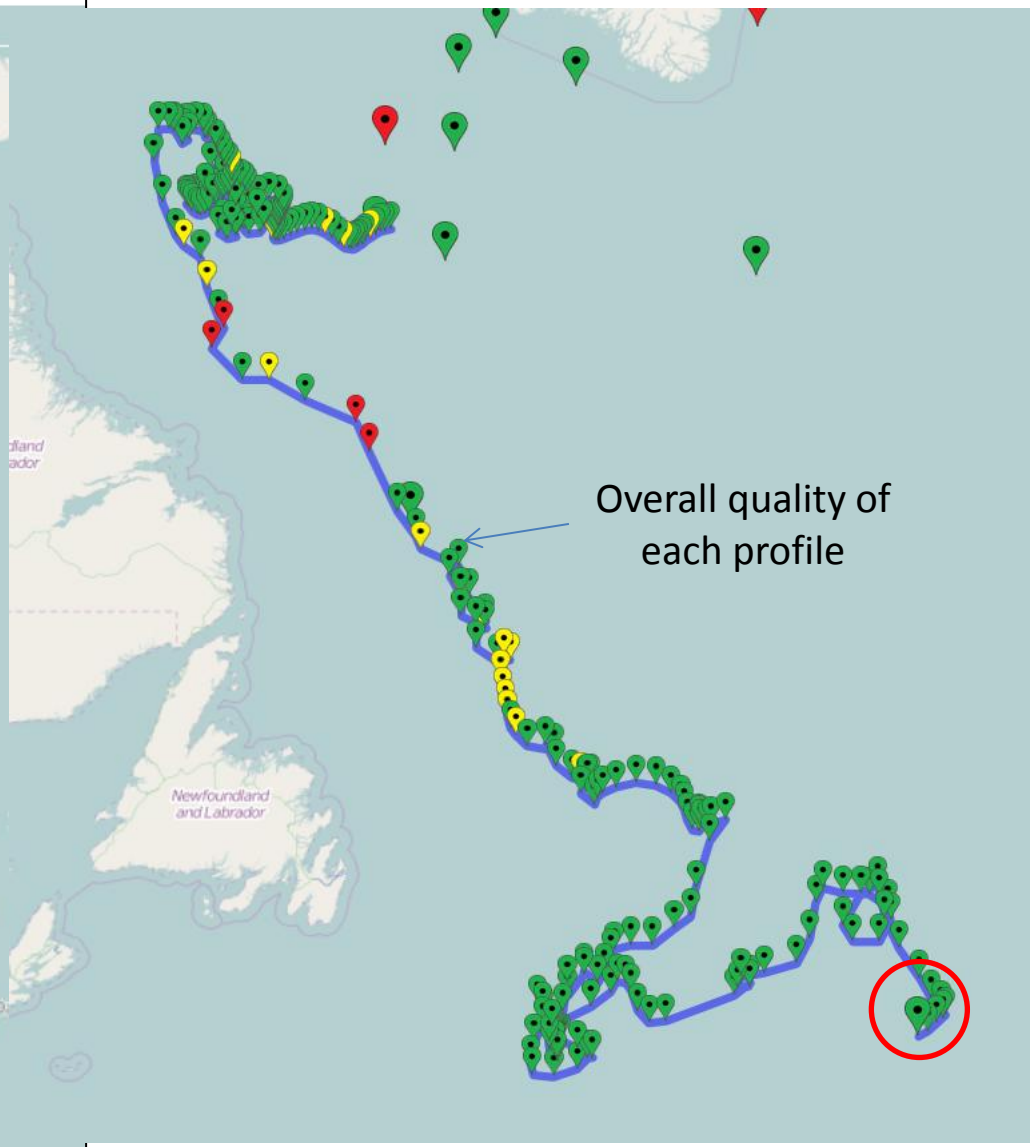
Cross-Correlation of each profile with its direct neighbourghs. It is assumed that successive profiles in a reasonably narrow time/space window have to be correlated.

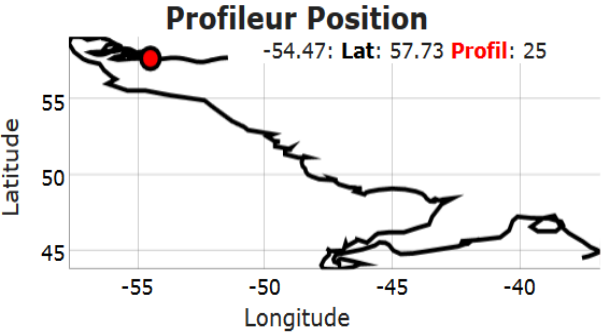
Matchups with coincident ocean colour (Globcolour). Different temporal window (+/-1j, 3j..) and macropixel size (3x3, 5x5) are used to check temporal-spatial variability. Also time series of difference (sat-float) are analysed.

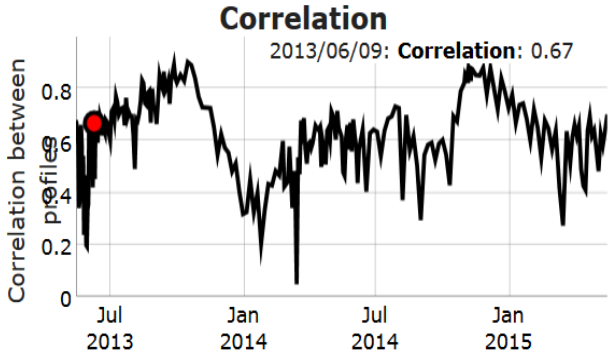
Quality control - tool

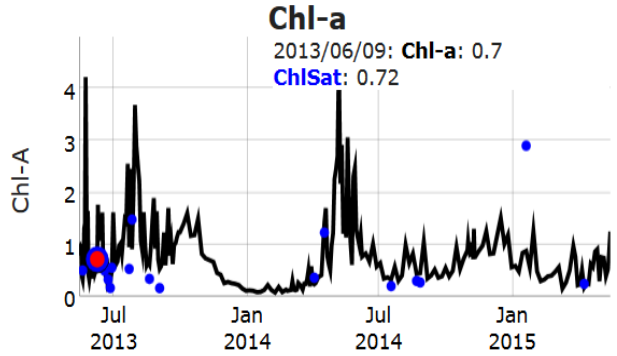


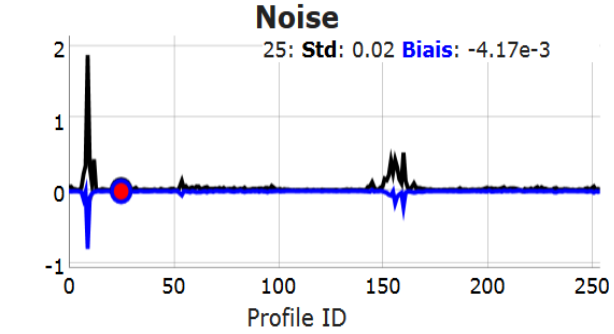
Quality control - tool

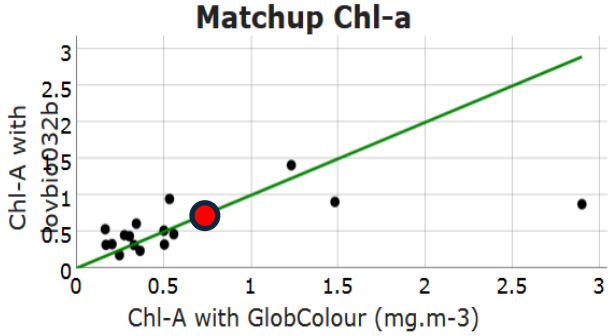


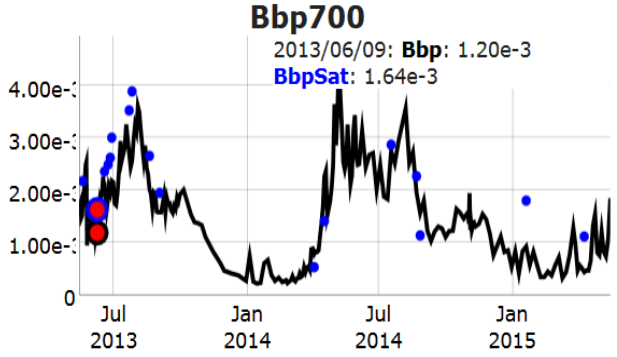


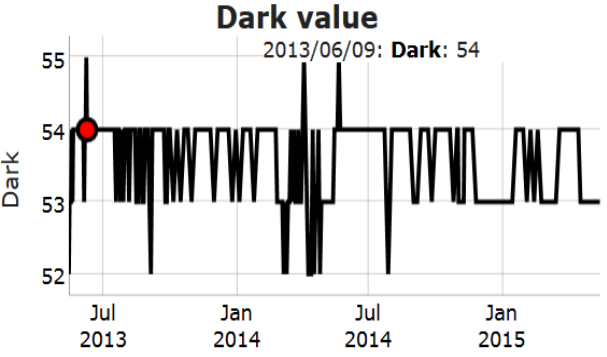












Check global Chl-a matchup

Check global Bbp matchup

Check lovbio032b_025_00

Log Scale Adjusted

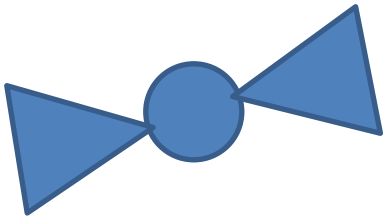
QC : All Envoyer Current selection : QC : **All**

lovbio032b

Previous float **Next float**

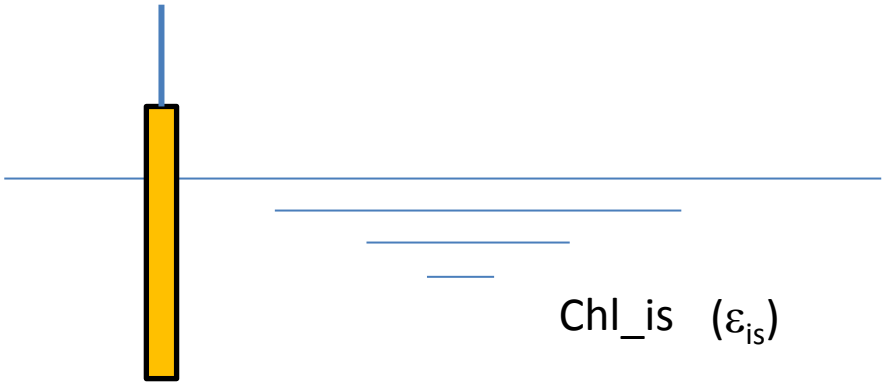
Maintained by ACRI-HE

What do we compare ?



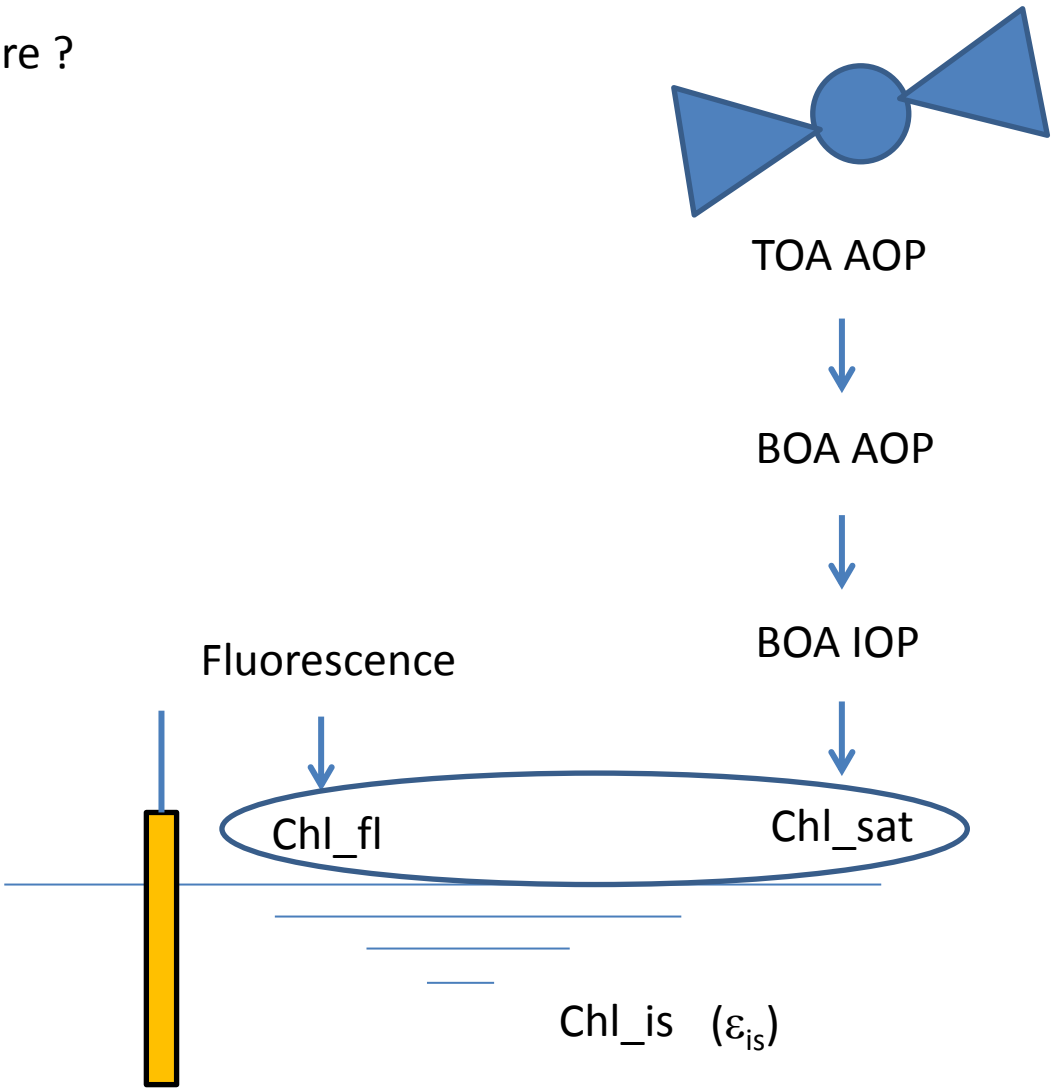
TOA AOP

Fluorescence



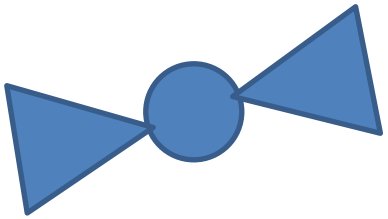
Chl_is (ε_{is})

What do we compare ?



What do we compare ?

- Measurement uncertainties needs to be considered
- Confidence factor in the quality of the matchup can be derived



TOA AOP

↓ ε_1

BOA AOP

↓ ε_2

BOA IOP

↓ ε_3

Fluorescence

↓ ε_4

Chl_fl Discrete

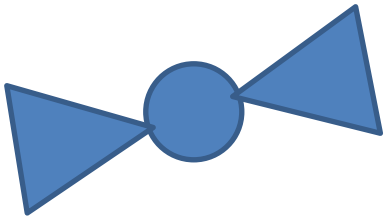
Chl_sat Vertically integrated

Chl_is (ε_{is})

What do we compare ?

- Measurement uncertainties needs to be considered
- Confidence factor in the quality of the matchup can be derived

Ocean Colour : Globcolour-like
Work on qualification of ε_4 for floats



TOA AOP

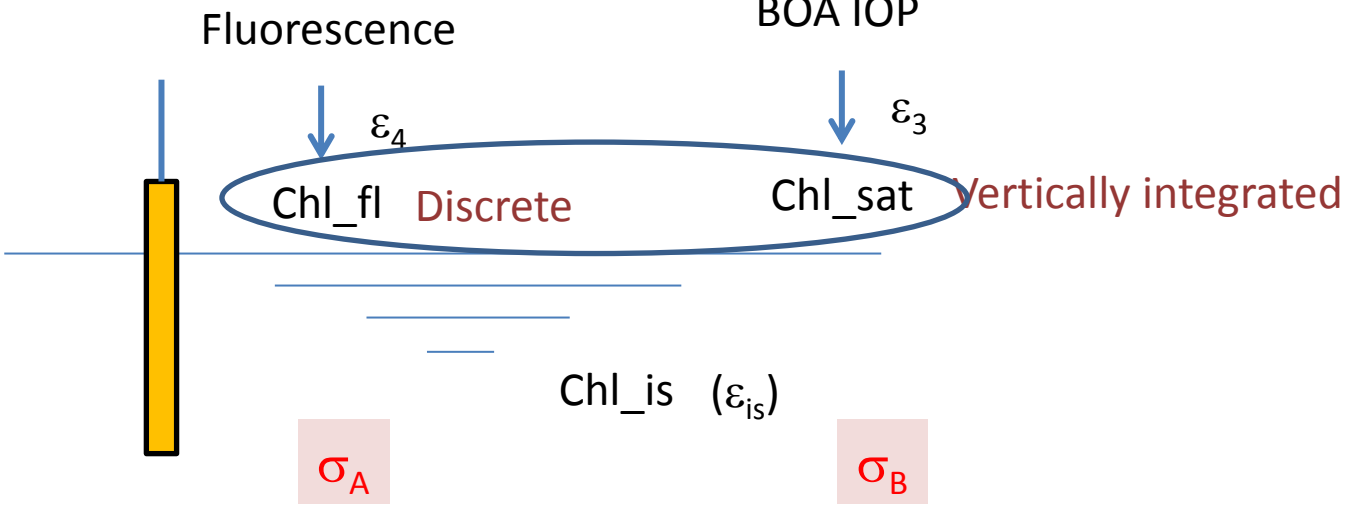
ε_1

BOA AOP

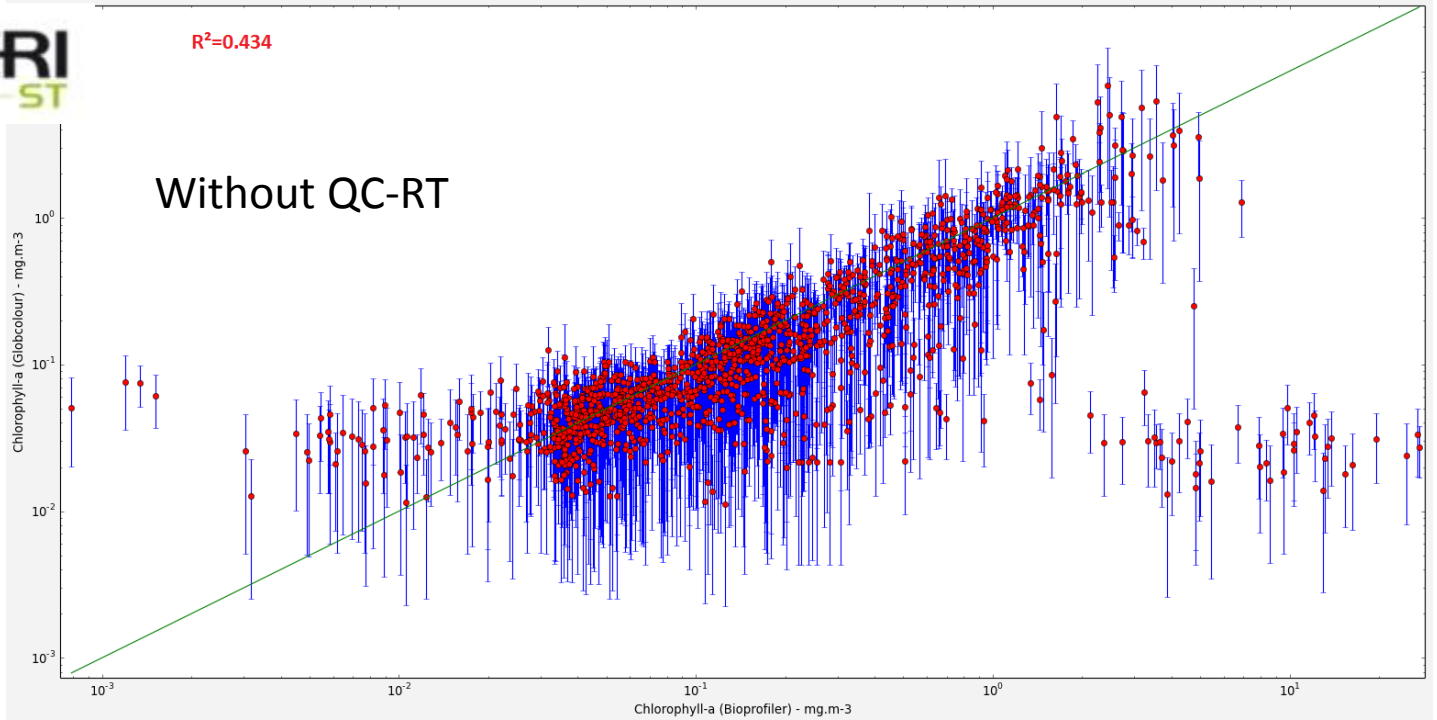
ε_2

BOA IOP

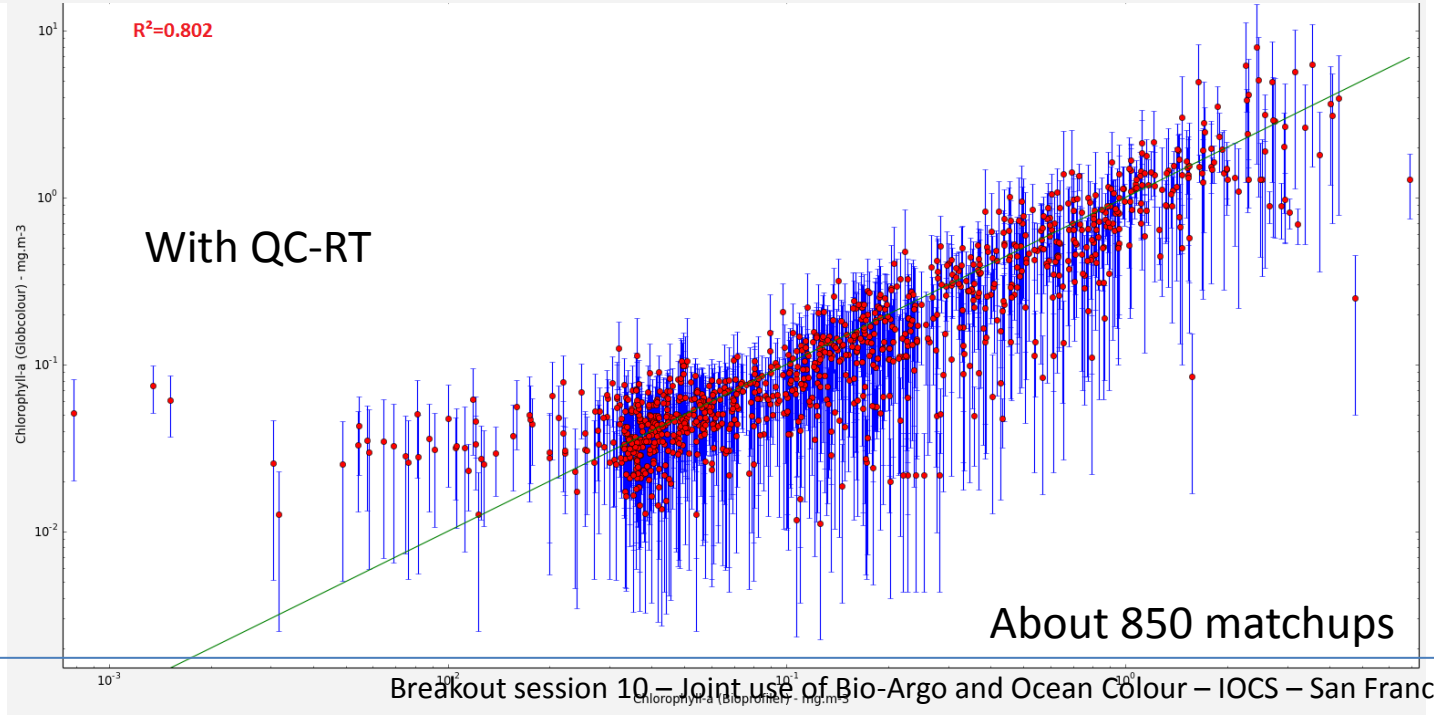
ε_3



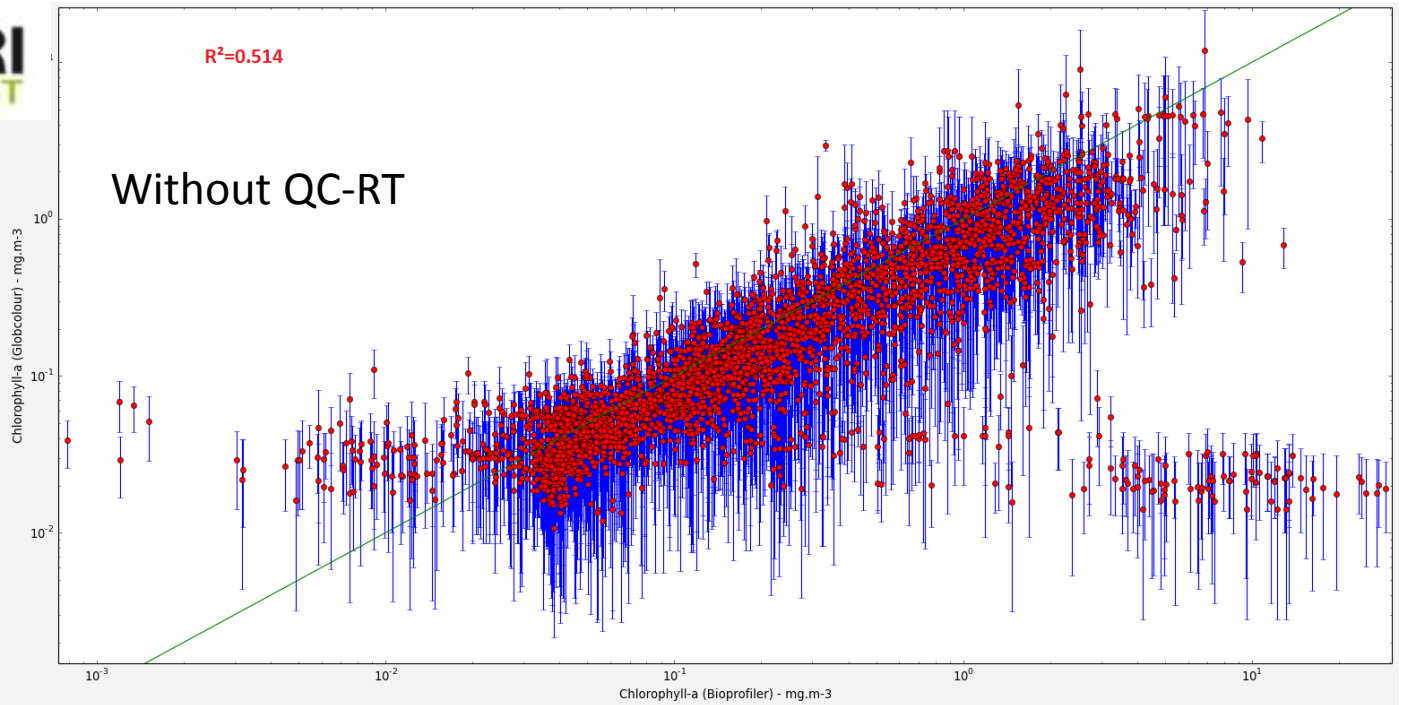
Matchups

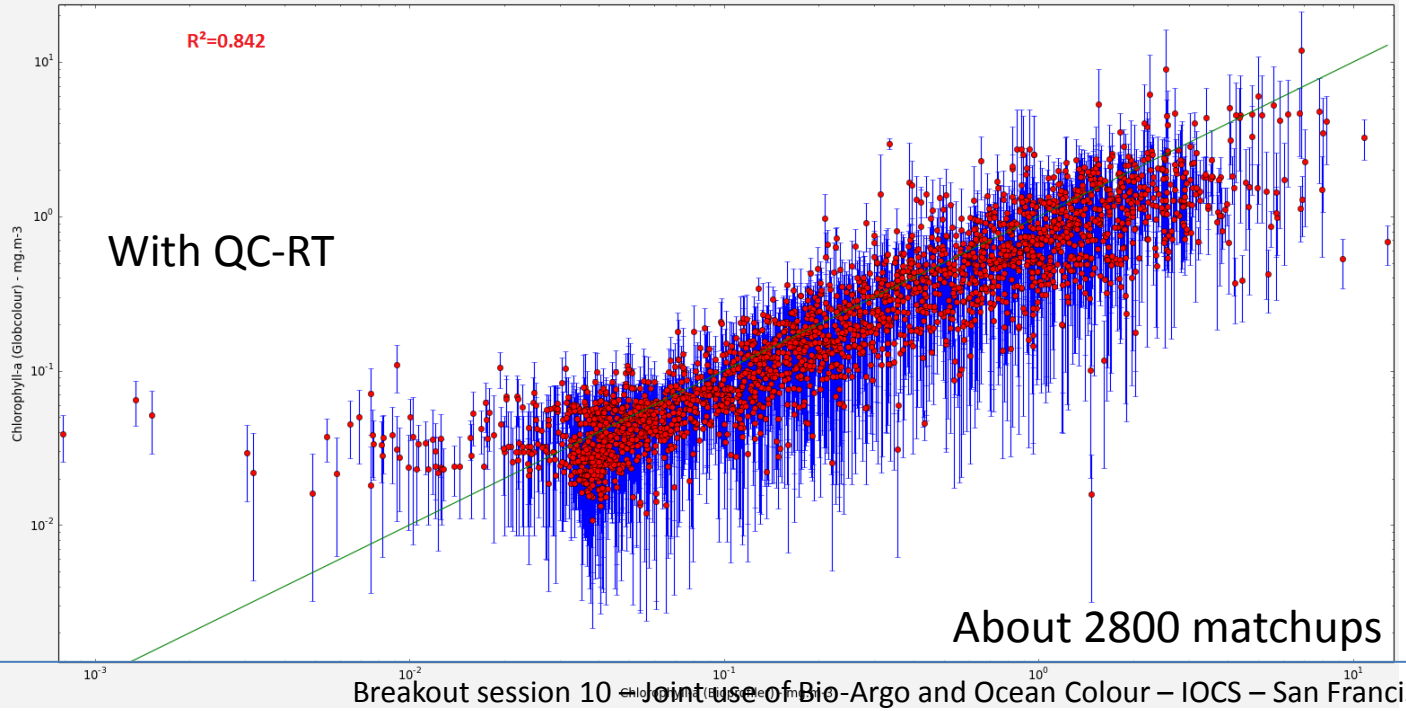


GlobColour
1 day
(MODIS)

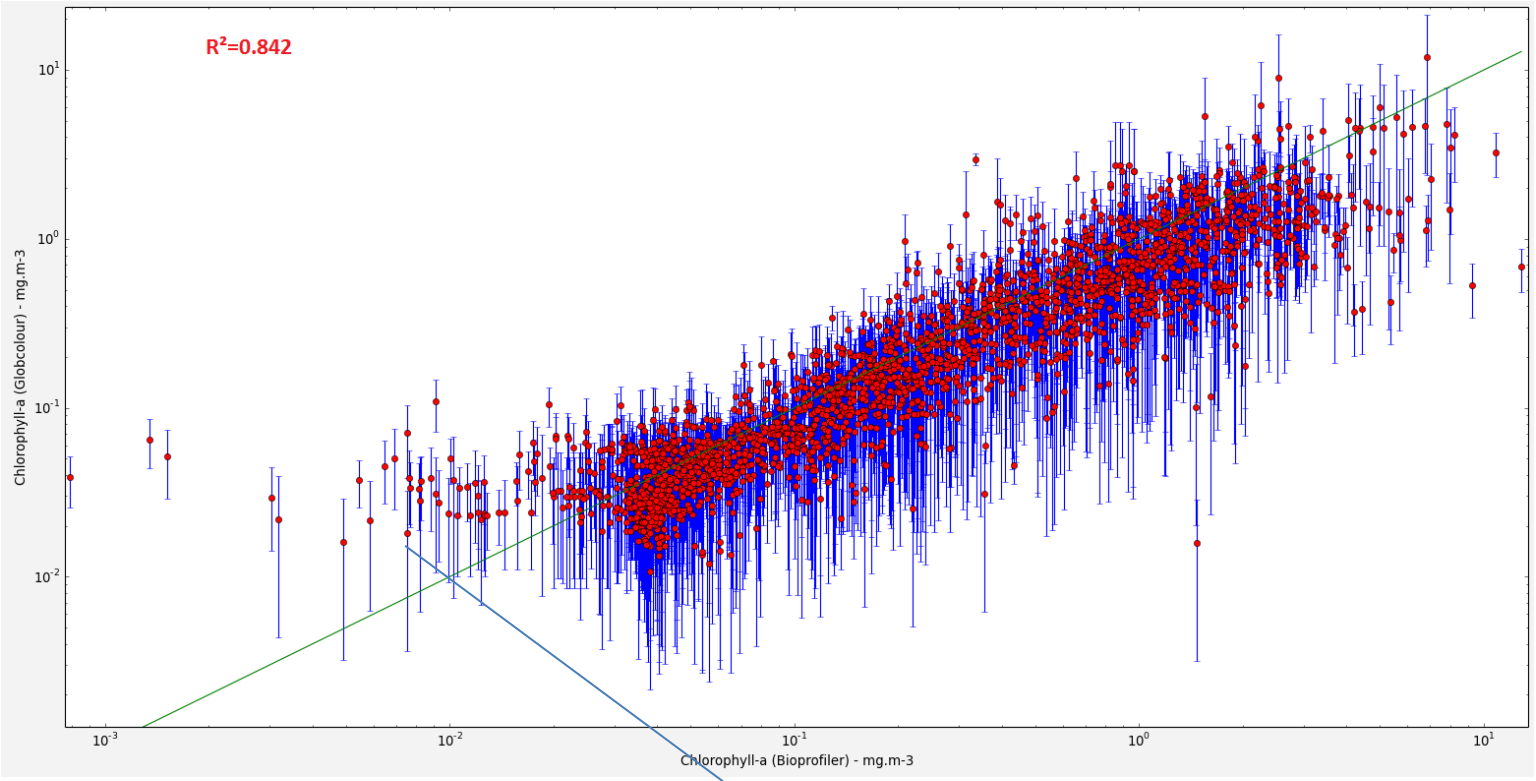


Matchups



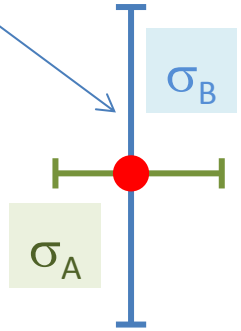


GlobColour
8 days
(MODIS)



We need σ_B (error characterisation) that shall be given for OLCI

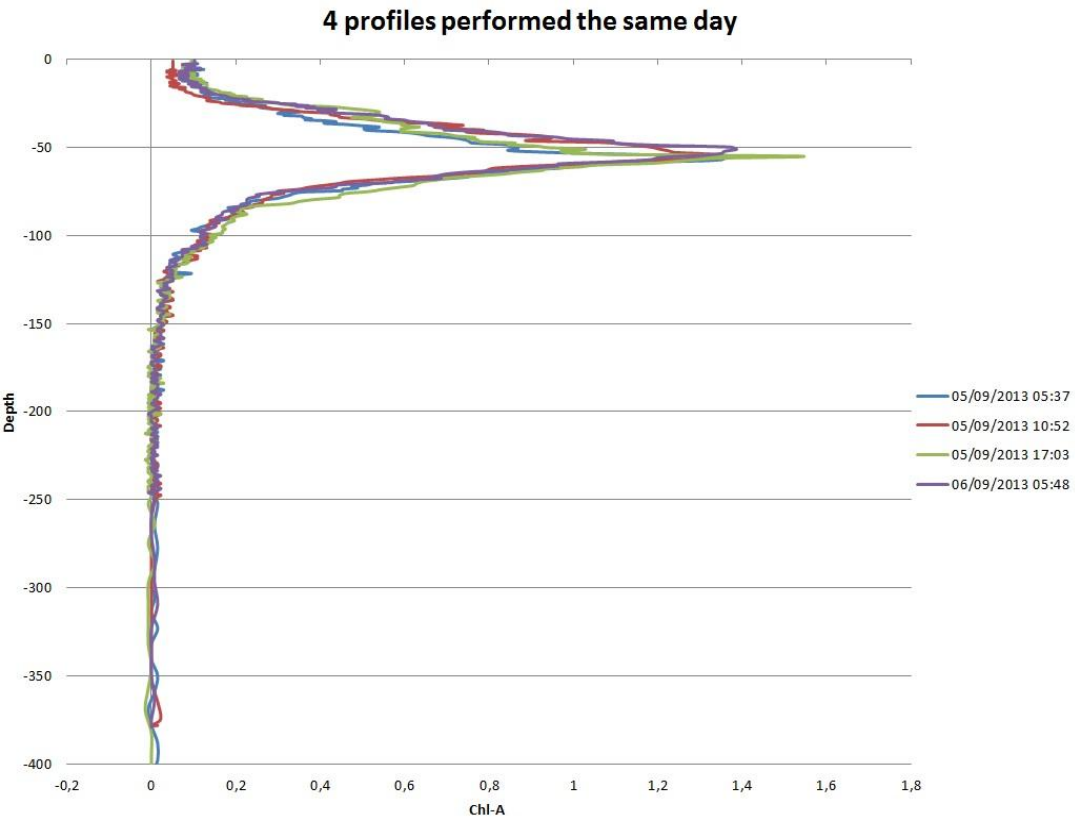
We are working on σ_A (bio-floats specific)

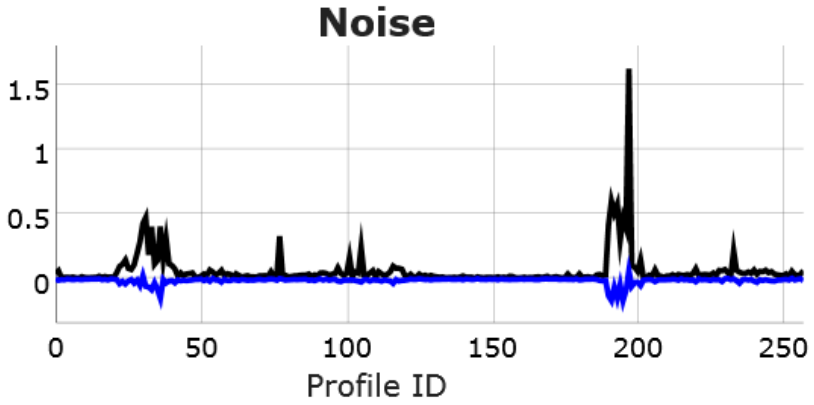


Both are needed to perform a good statistical job = reliable characterisation

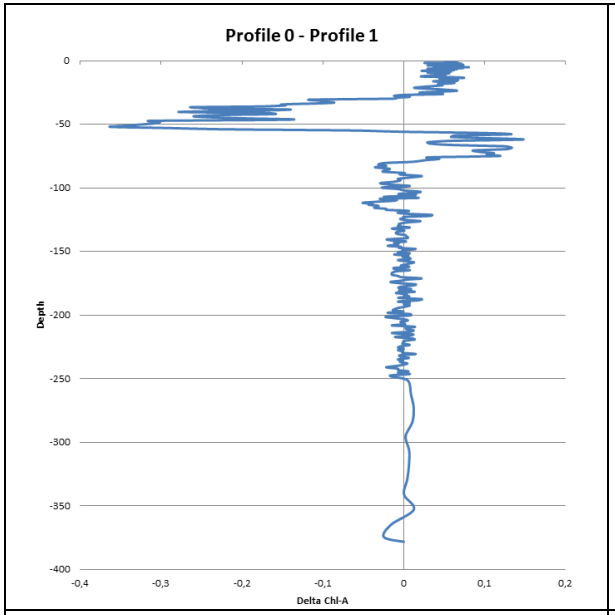
"Error" estimates of the observations from the bio-floats (at float level)

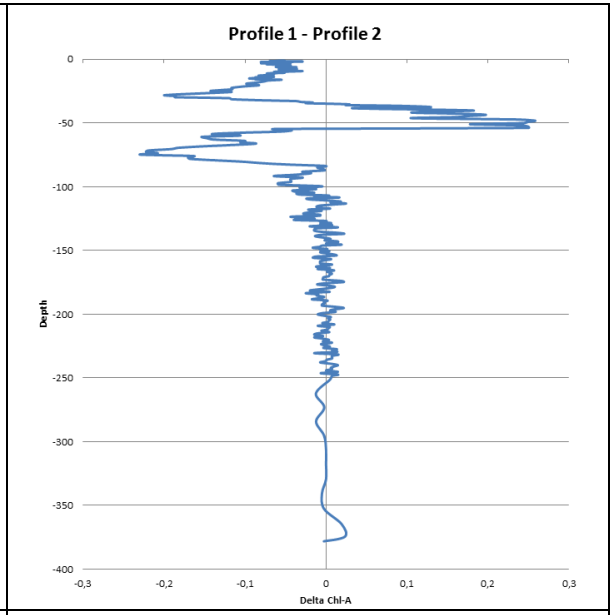
Random error (=residual after ***filtering*** = noise)





Random error





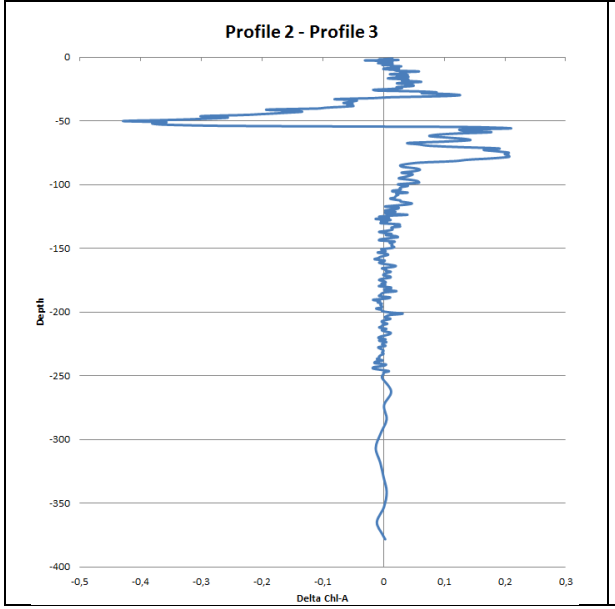


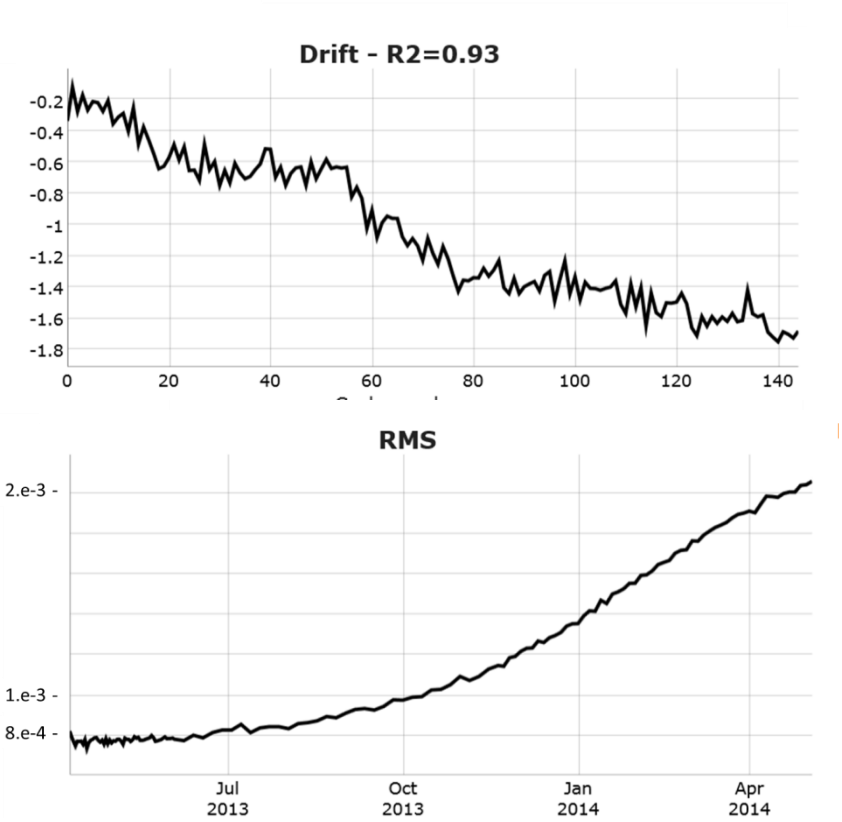
Figure 3b – Profiles of differences between two consecutives observations of Chlorophyll

The low frequency differences can be attributed to the variability of the observed field, while it is proposed that small scale fluctuations denotes the random error of the measurement combined with the detection noise of the sensor.

(How to estimate) systematic error

- **Monitoring of dark signal**

Here NO3



- **Compatibility of observations on the same buoy**

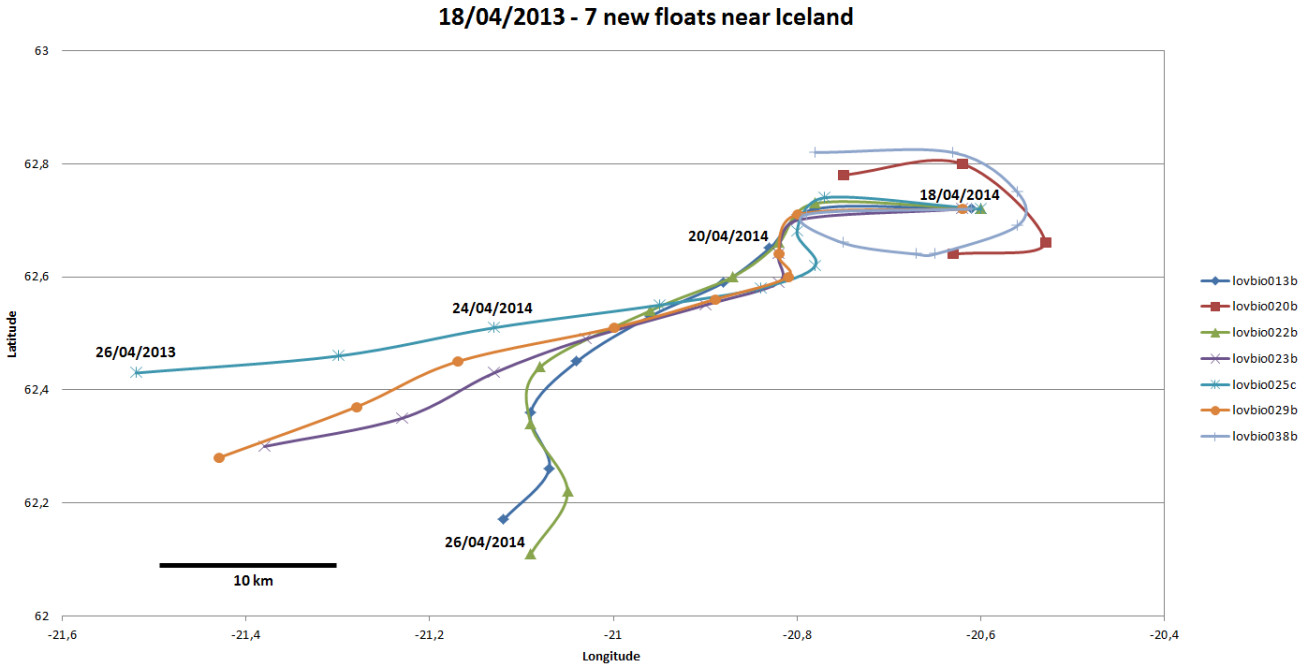
e.g. Kd, Chla, bbp

(How to estimate) systematic error

- **New opportunities**

GOCI (geostationary platform over Korea) vs bio-float in the area

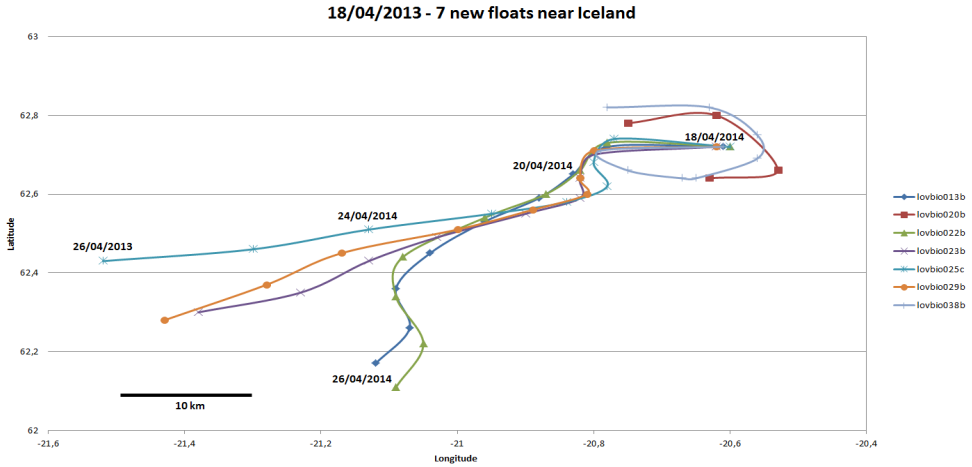
- **Inter-comparison of concomitant profiles**

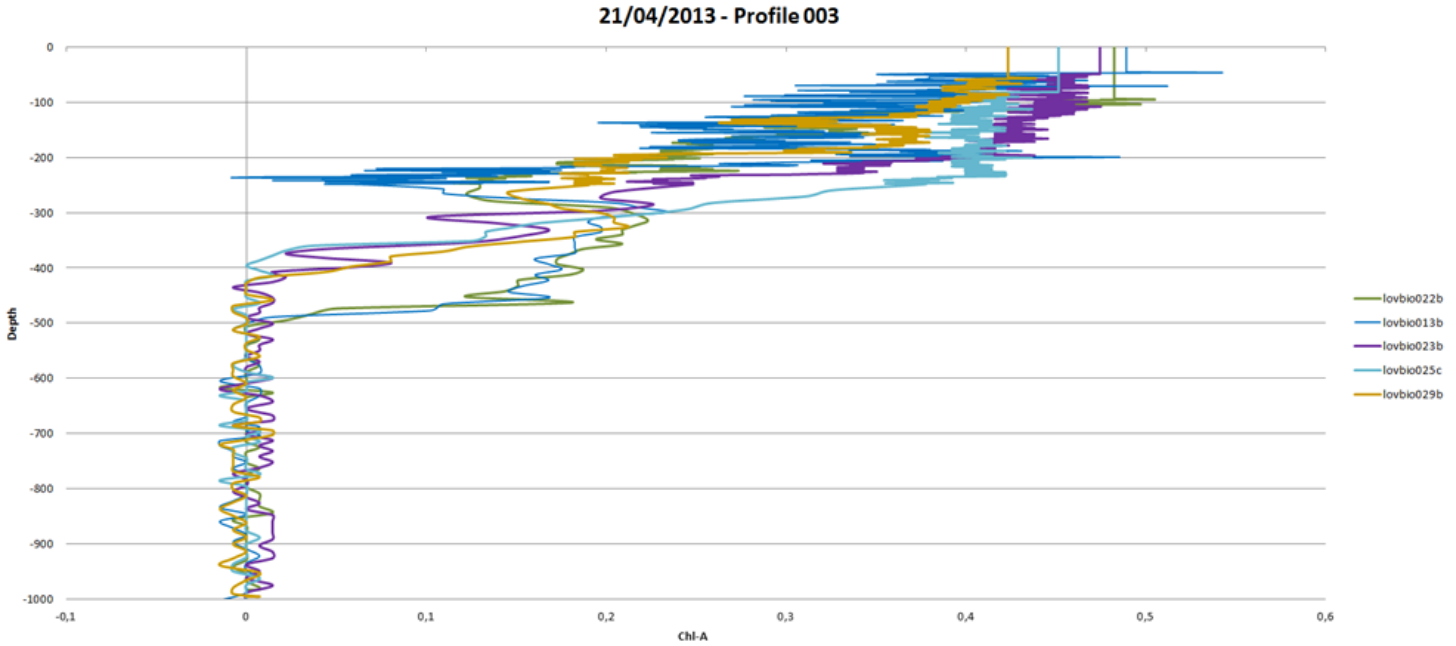


(How to estimate) systematic error

- **Inter-comparison of profiles**

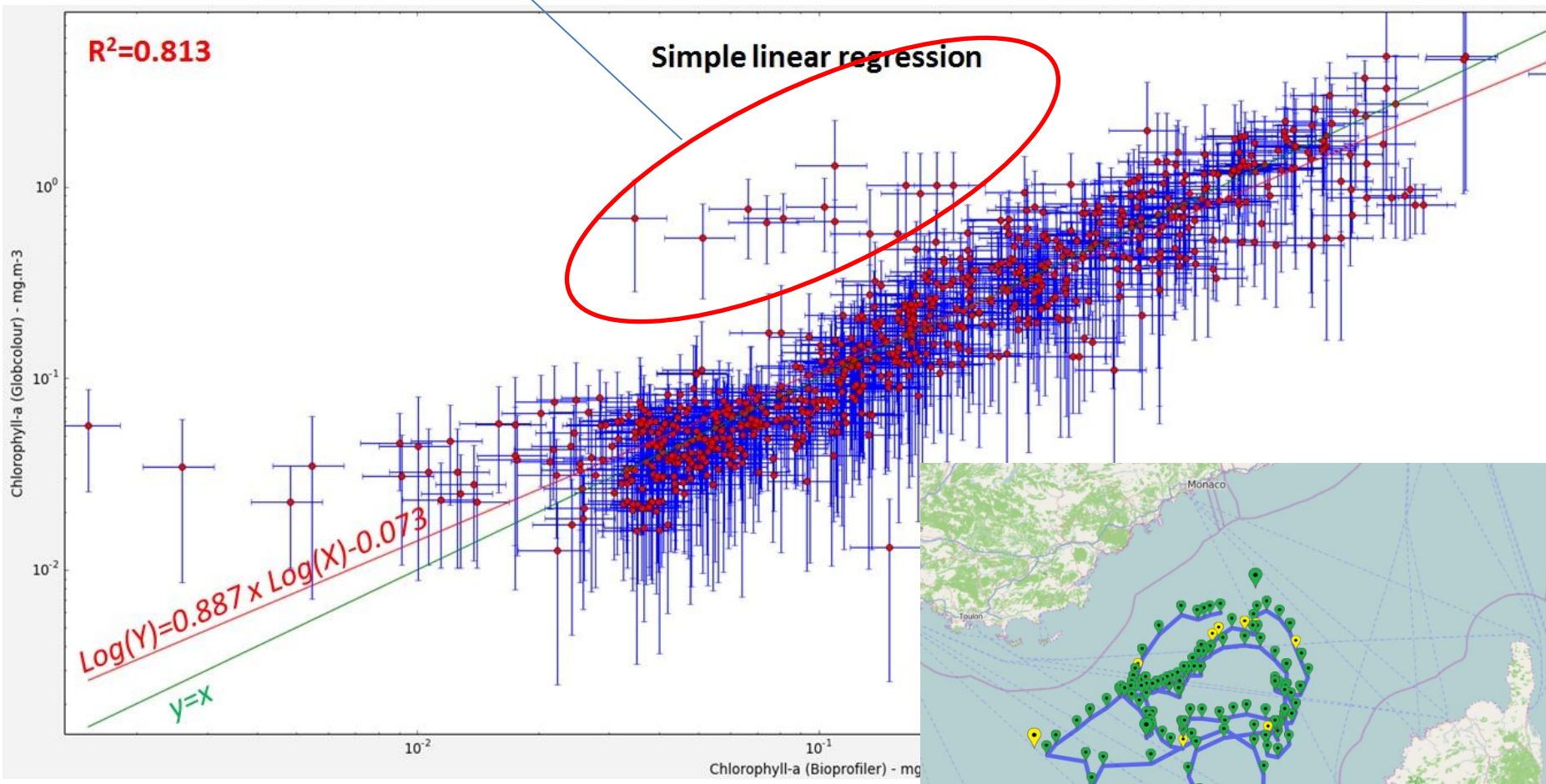
Here Chla

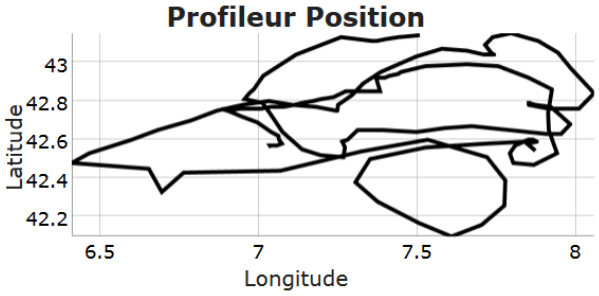


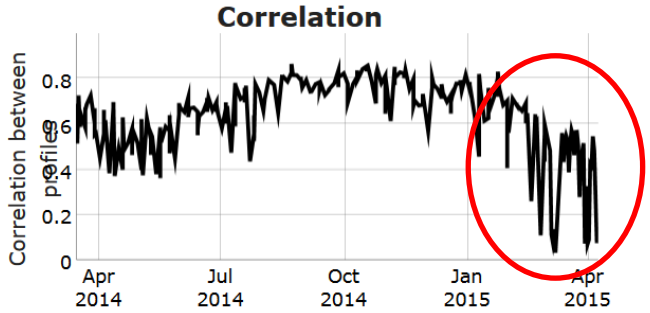


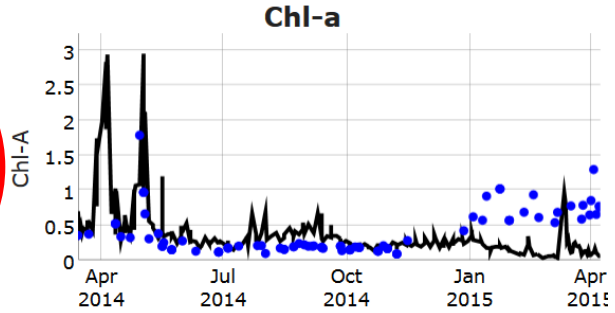
lovbio064c

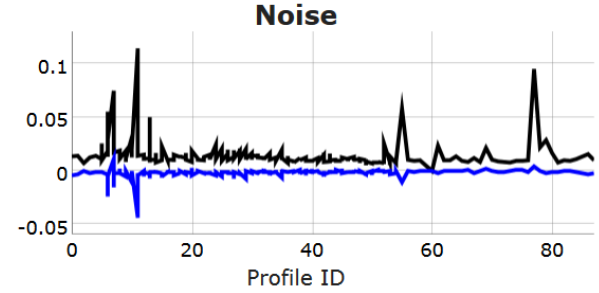
Matchups

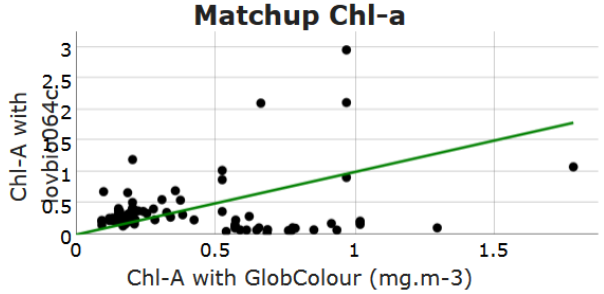


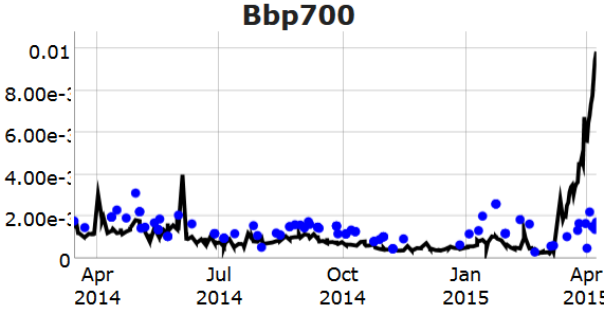


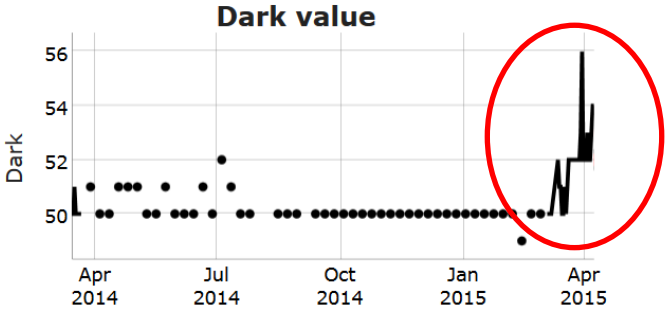












Check global Chl-a matchup
Check global Bbp matchup

Log Scale Adjusted

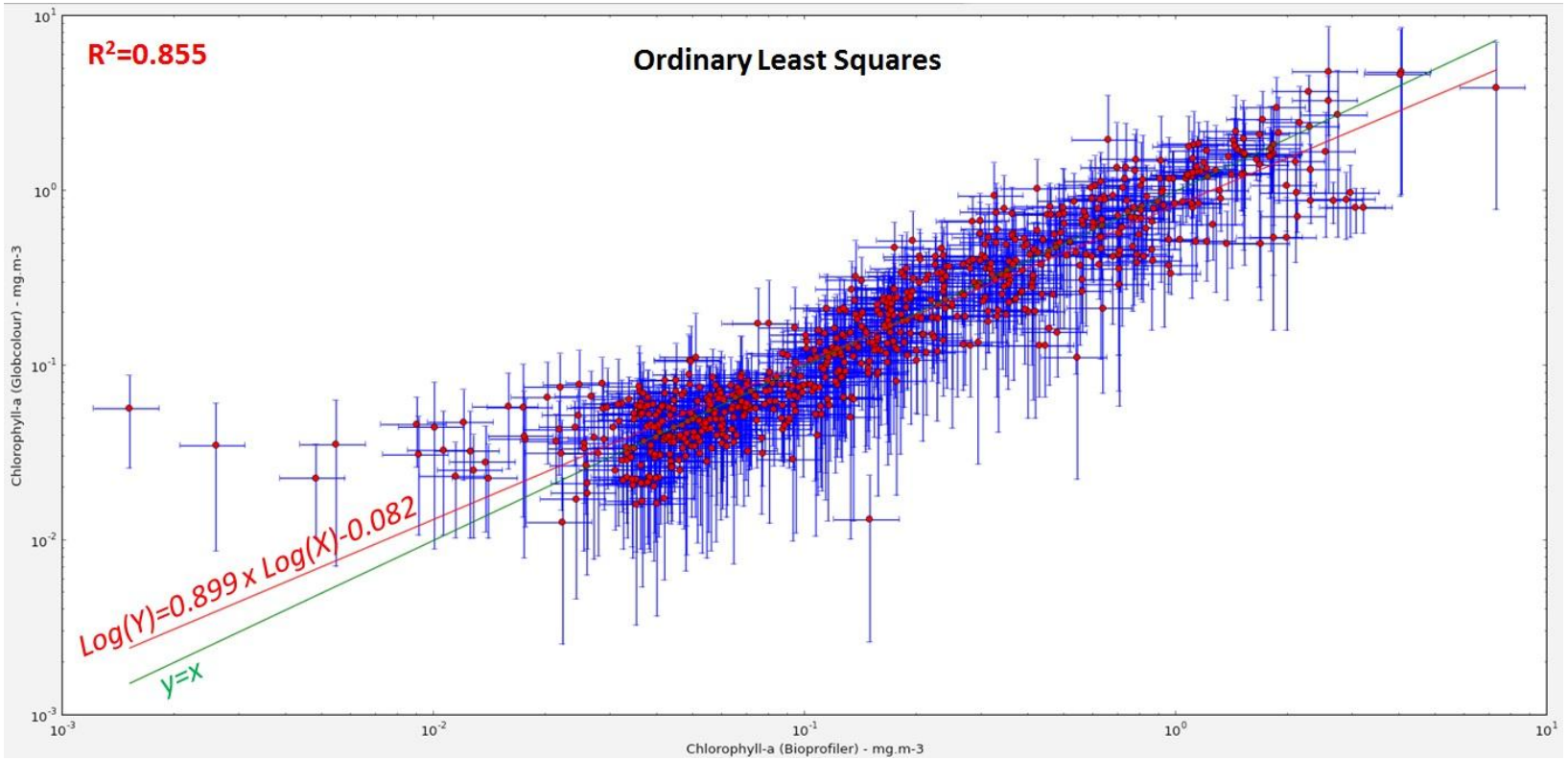
QC : All Envoyer Current selection : QC : **All**

lovbio064c

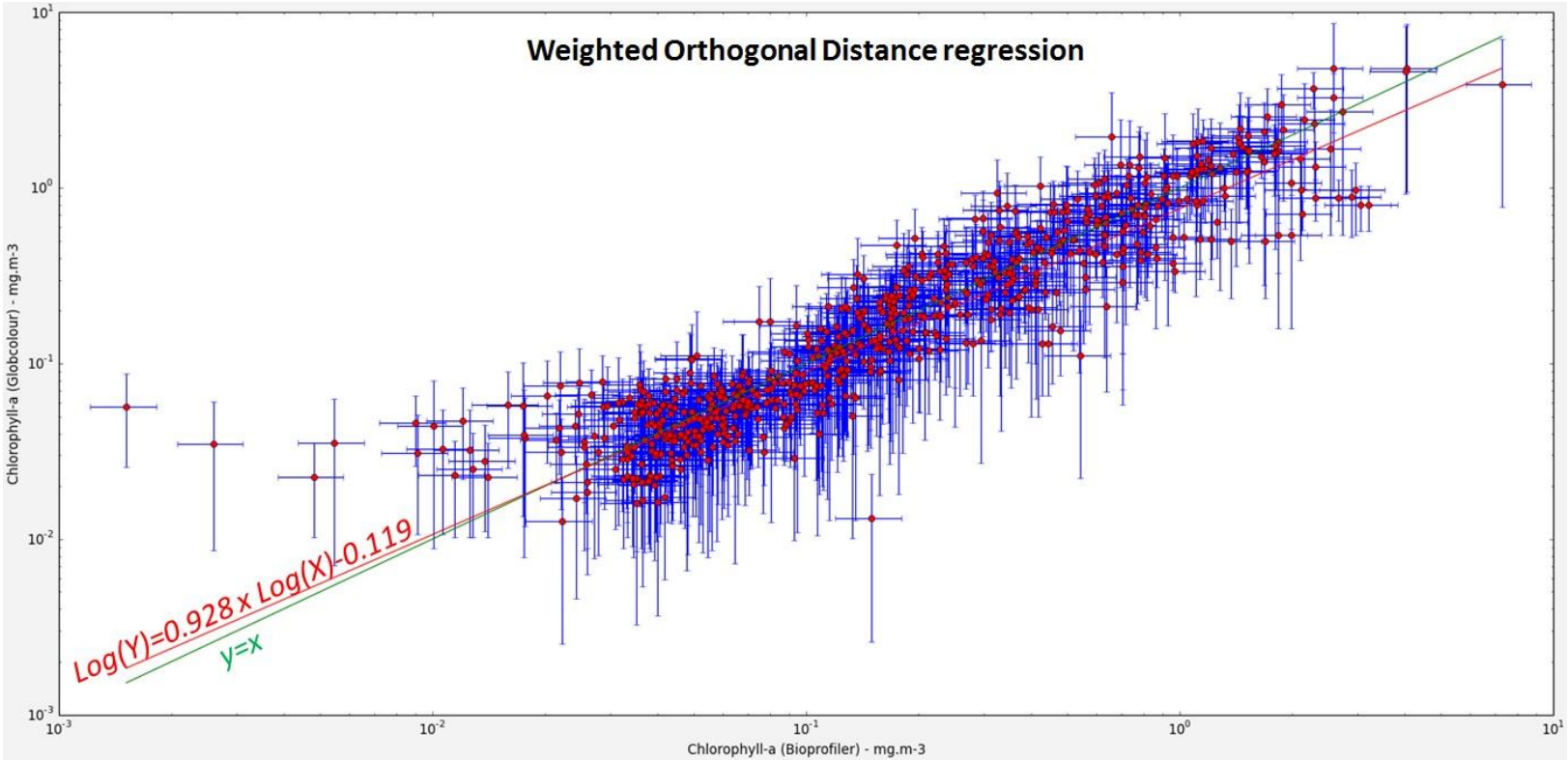
Previous float Next float

Maintained by ACRI-HE

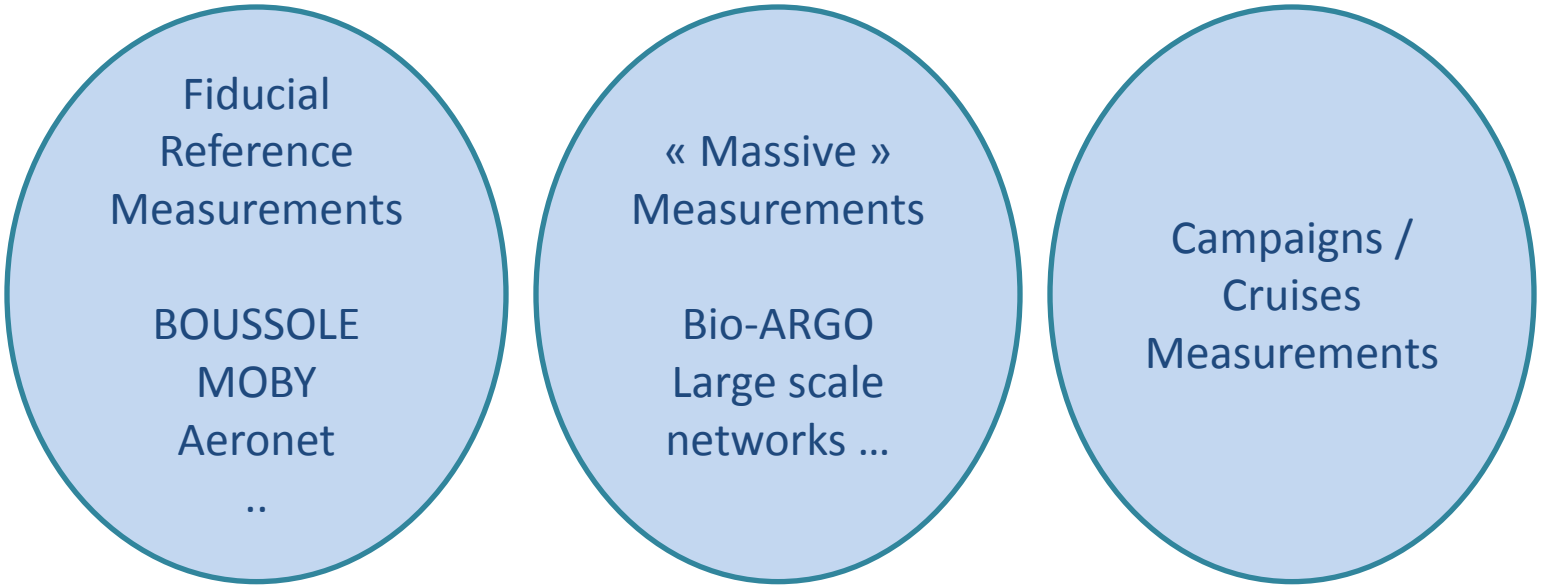
Matchups


R²=0.855
Ordinary Least Squares
Log(Y)=0.899 x Log(X)-0.082
y=x
Chlorophyll-a (Globcolour) - mg.m-3
Chlorophyll-a (Bioprofiler) - mg.m-3

Matchups


Weighted Orthogonal Distance regression
Chlorophyll-a (Globcolour) - mg.m-3
Chlorophyll-a (Bioprofiler) - mg.m-3
Log(Y)=0.928 x Log(X)-0.119
y=x

Means for Calibration / Validation / and QC (anomalies detection)



Use for Ocean Colour

CAL		
VAL(recurring)	VAL/VER (geostat.)	VAL/VER (punctual)
	QC (geostat.)	QC

ProVal – technical feature

- New Provor CTS5 (NKE)
- High speed, bidirectional Iridium telemetry

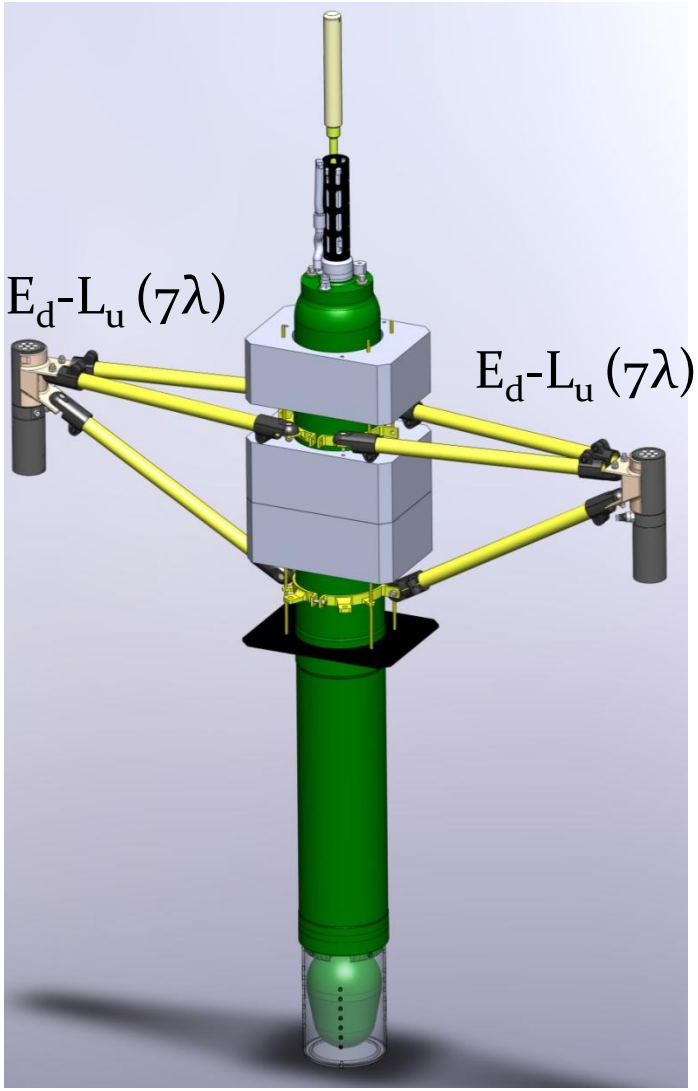
Sensors:

- 2 sensors E_d-L_u

E_d : 380, 412, 443, 490, 510, 560, 665 nm + PAR

Lu : 380, 412, 443, 490, 510, 560, 665 nm

- Tilt and compass sensors
- possibility of additional sensors (Chla, backscattering, …)



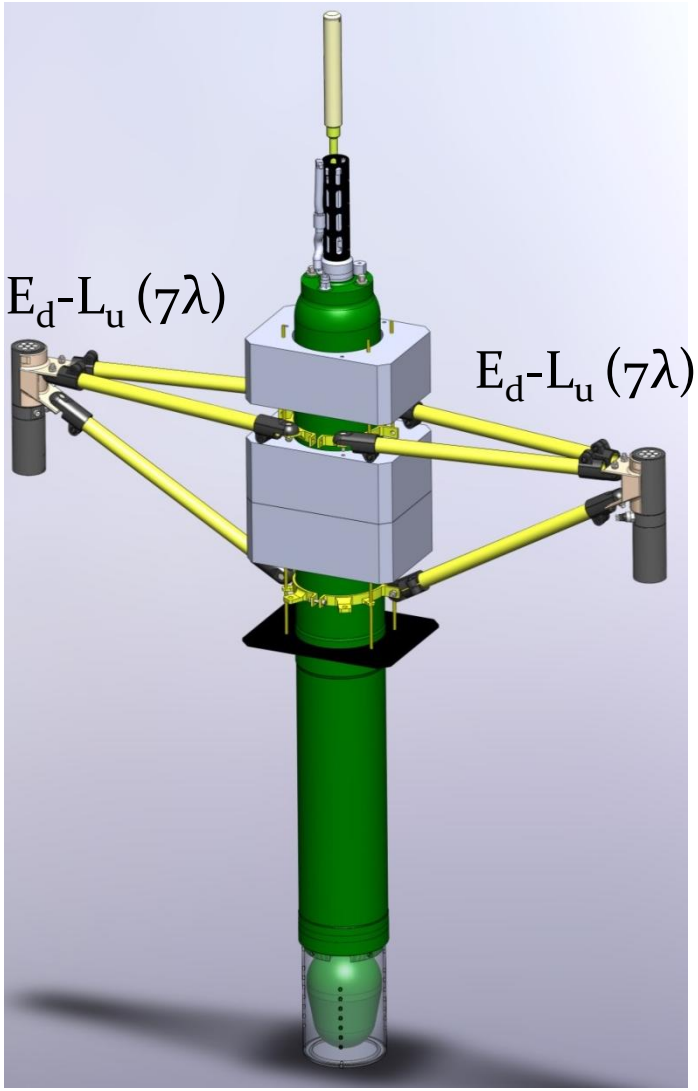
ProVal – Data Quality

Enhanced data quality:

- Depth capability up to 800m to limit bio-fouling at parking depth.

ProVal's original features:

- Sensors redundancy
- designed to minimize self-shading



Summary

Today

- Bio-ARGO is in operational status of ARGO thanks to significant effort of bio-community

- The QC RT has been implemented (dec. 14) in the Corilolis centre and has started operational QC and delivery in // to ARGO

- After some regular QC and specific care about systematic error between floats, we believe that bio-floats could be a very good contributor to operational OC/OLCI verification and to validation to some extent

- « Proval » float is proposed as a complementary means for validation and calibration (not autonomous deployment).

Next steps

Underway – bio-provinces characterisation / validation
Short term – Kd validation and better sensor error characterisation

Thanks for attention

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