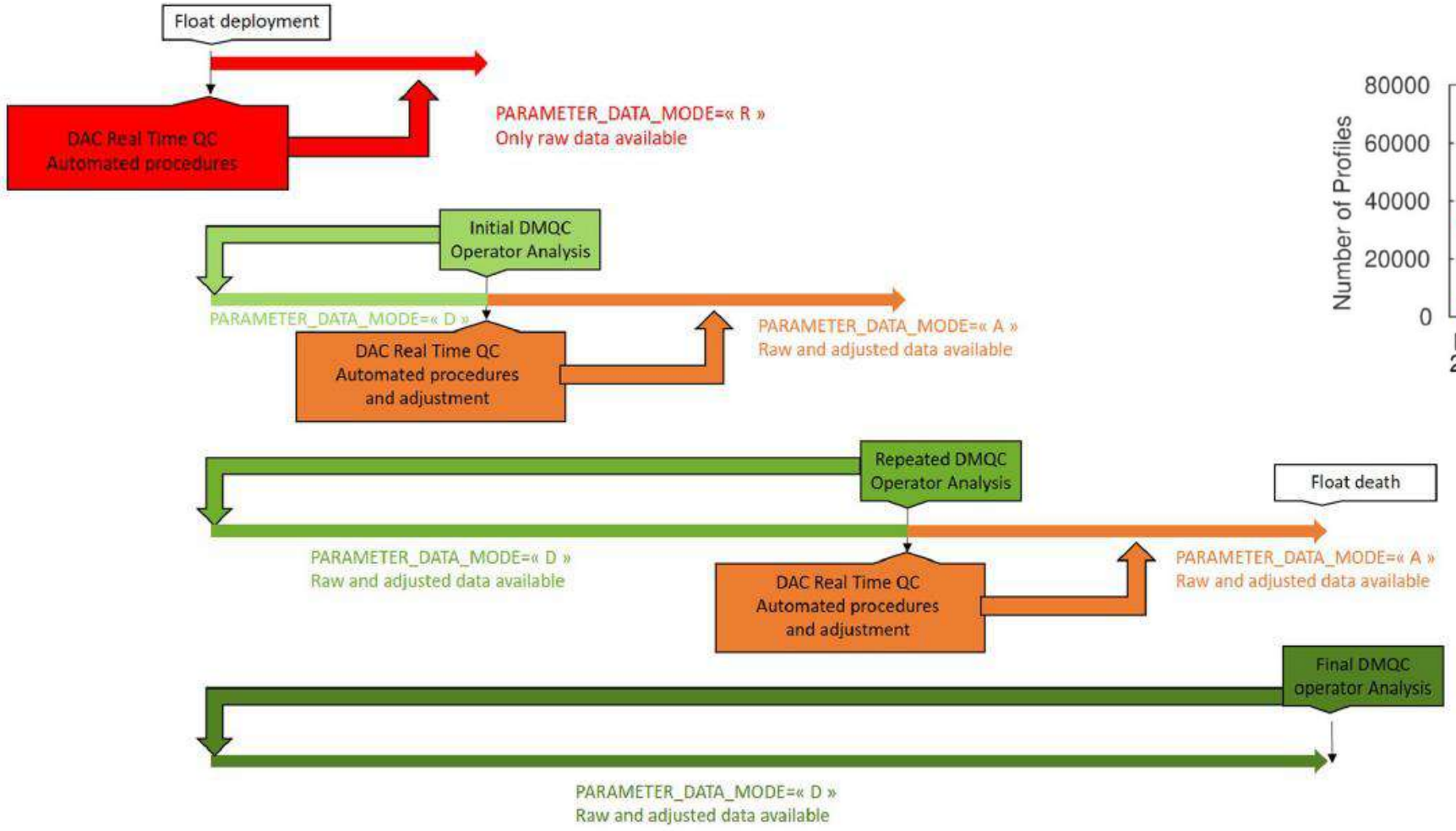
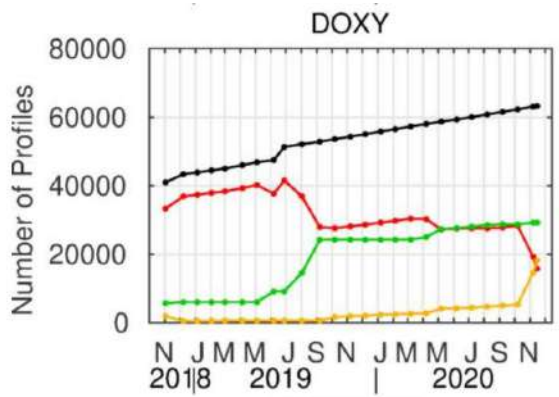
CES – ODATIS
ARGO – BGC O2
23/11/20

ARGO – O2 and coriolis team

Real time adjustment procedure set up by DAC Coriolis

To improve DOXY quality in real time

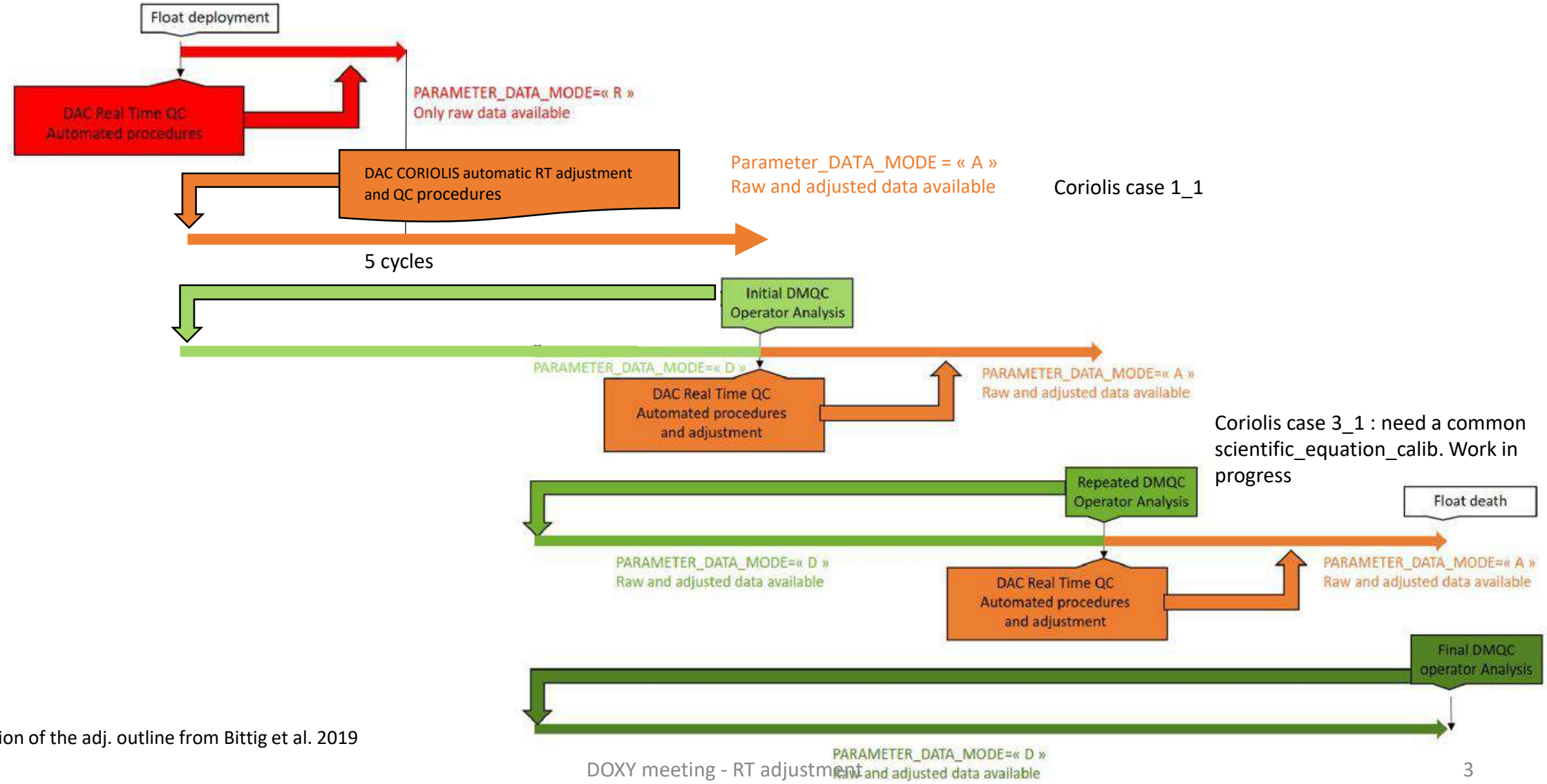




Bittig et al. 2019

Real time adjustment procedure set up by DAC Coriolis

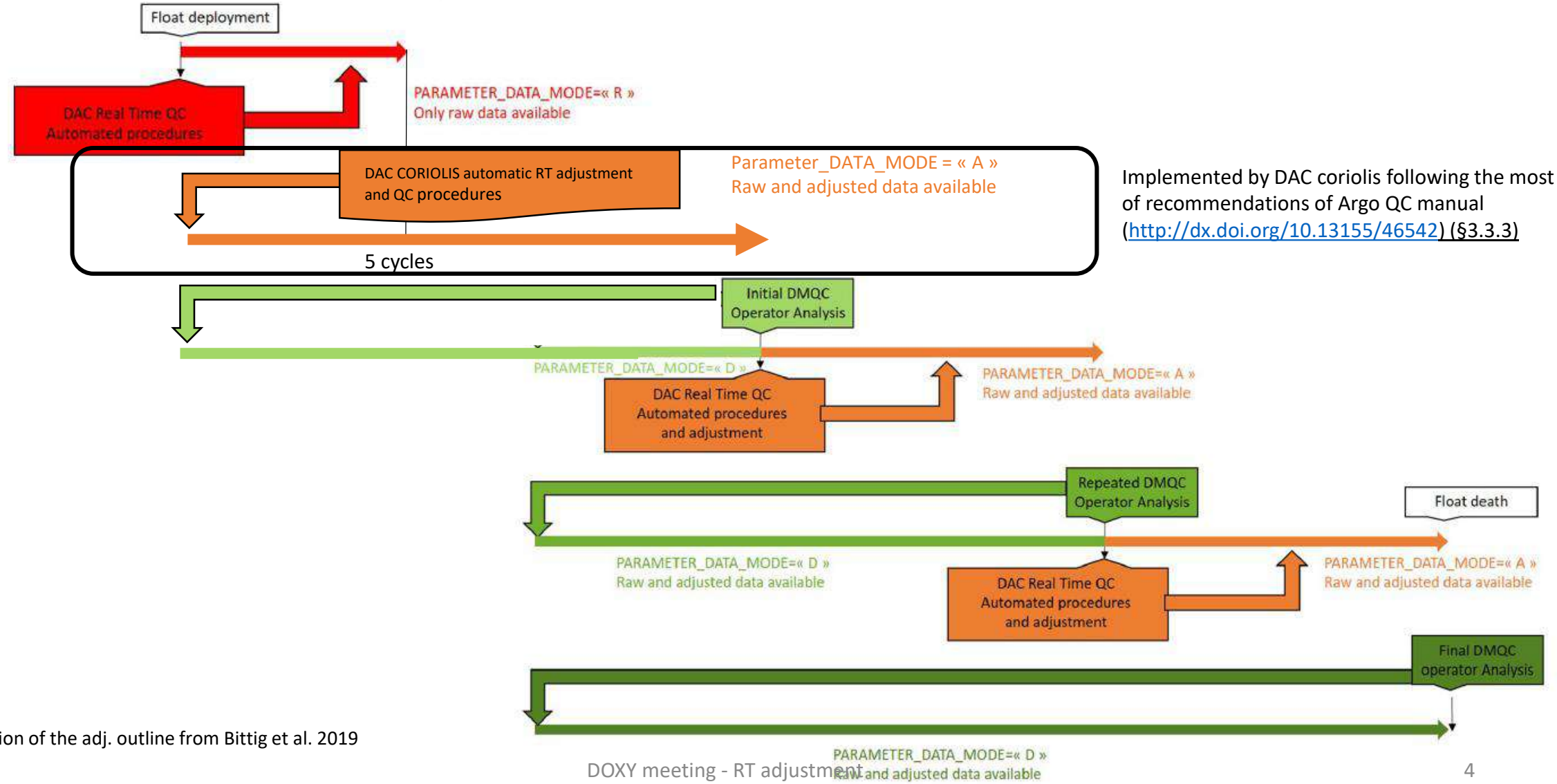
To improve DOXY quality in real time



Modified version of the adj. outline from Bittig et al. 2019

Real time adjustment procedure set up by DAC Coriolis

To improve DOXY quality in real time



Implemented by DAC coriolis following the most of recommendations of Argo QC manual (http://dx.doi.org/10.13155/46542) (§3.3.3)

Modified version of the adj. outline from Bittig et al. 2019

Real time adjustment procedure set up by DAC Coriolis

Method if no previous delayed-mode adjustment is available (https://doi.org/10.13155/76709)

- **Method # 1**: Adjustment by comparison of in water float data to WOA based on PSAT or PPOX

- **Description** : Gain estimated from the comparison between in water PSAT or PPOX from float and PSAT or PPOX from WOA climatology at most in the upper 20 dbar of the water column. WOA PPOX is computed from WOA PSAT and from TEMP and PSAL float data at the atmospheric pressure of 1 atm.

DOXY_ADJUSTED = DOXY .* G

G (gain factor) = median(gi)

gi = (PPOX_woa/PPOX_DOXY_float)cycle i

With PPOX_woa{PSAT_woa,TEMP_float,PSAL_float,Patm = 1atm}
PPOX_float{MOLAR_DOXY_float,TEMP_float,PSAL_float,Patm = 1atm}

Real time adjustment procedure set up by DAC Coriolis

Method if no previous delayed-mode adjustment is available (https://doi.org/10.13155/76709)

- **Parametrization**

Climatology	WOA18 PSAT objectively analyzed mean
Climatology resolution	monthly
Climatology level	1 (depth = 0 m)
Profiles for G estimation	5st ascending profiles from cycle 2(and before cycle 20) with valid data (DOXY_QC & PSAL_QC~4, TEMP_QC and PRES_QC ~3 & 4) measured in the 10 first dbar (or 20 dbar) without profiles in greylist /under ice/ badly positioned

- **O_2 quantity conversion**

  SCOR WG 142 recommendations (#RD5)

Real time adjustment procedure set up by DAC Coriolis

Method if no previous delayed-mode adjustment is available (https://doi.org/10.13155/76709)

- **GO / No GO**

  Based on this study, we have devided to visualize all cycles for which :

  (1) Median Absolute Deviation > $MAD_{threshold}$(=10 /ppox_woa_monthly)
  (2) |median($PPOX_clim_1$–PPOX_adjusted)| > 10 in surface
  (3) |median($PPOX_clim_2$–PPOX_adjusted)| > 10 in surface (if no data from $clim_1$)
  (4) no data from $clim_1$ or $clim_2$ are available for comparison

Where $clim_1$= the mapped O_2 product GlodapV2.2016b
$clim_2$= the annual mapped O_2 product WOA18

- **To validate No Go**

  Coriolis is going to build a ‘in house’ reference data base

Building a reference database for ARGO-DOXY

ideas to lay the basis for future activities

What for ?

To be able validate our Real Time Adjustment (made on WOA) by comparison with an independent data set
To be able to compare our DM data with reference profiles
(in the futur) To raise alert automatically

Which datasets :

GLODAP data set (last release) merged with CARIMED to complete the Mediterranean Sea(Marta alvarez) data set

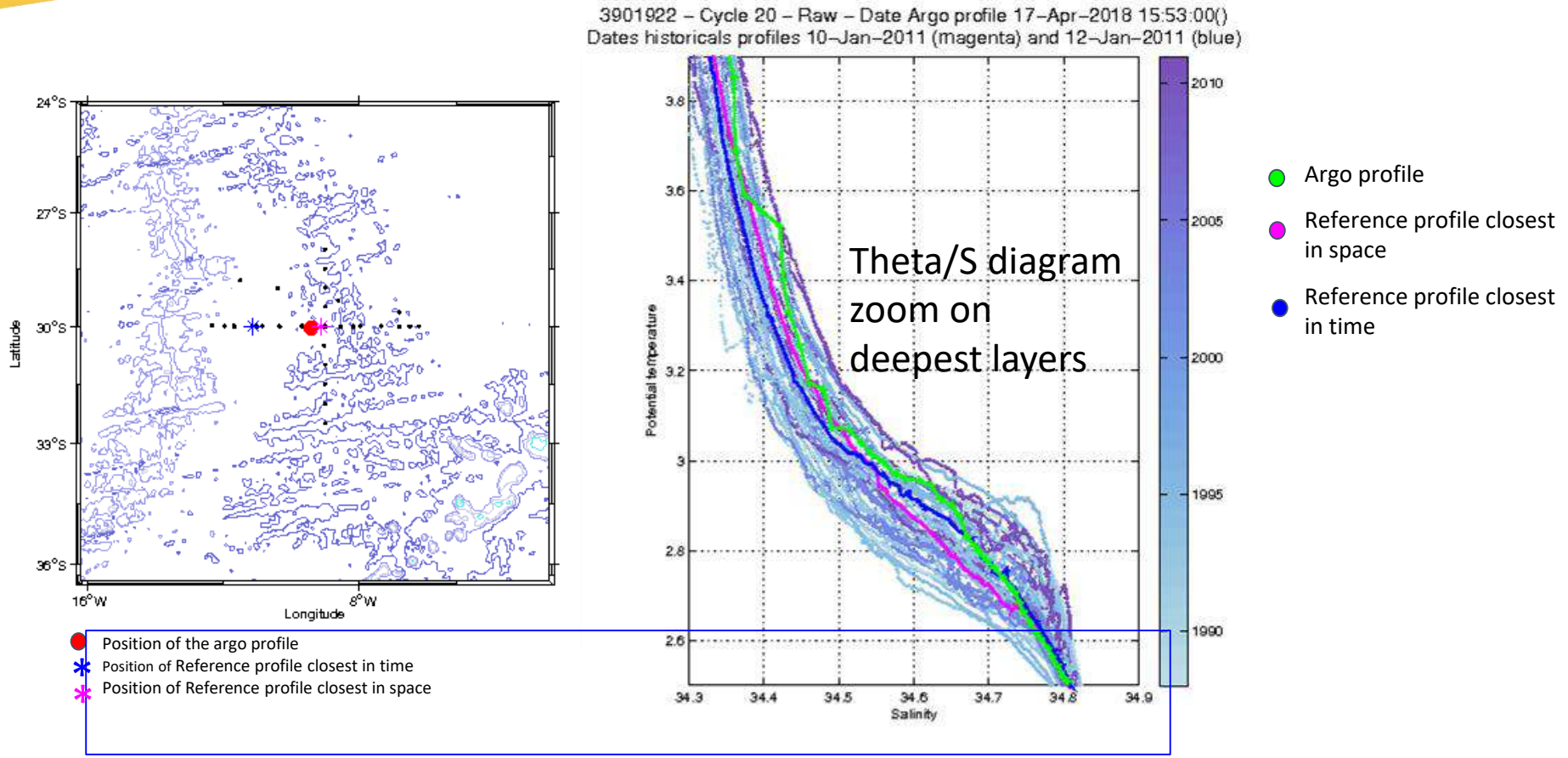
Selected DOXY profiles from BGC-ARGO floats

➔ only Float with multi-point calibration
➔ passing with success the glodap procedure ?

How?

- Not stored in the same database to be able to set up some metrics comparison on each dataset

- First step, using salinity correction expertise



- CTD Reference database organized in 10°x10° box .mat files
- Comparaison of the Argo profile to 50 selected reference CTD profiles.
- Selection of the 50 profiles => use of a correlation coefficient and defined covariance scales to be consistent with the selection done in the OWC software.

Slide from C. Cabanes, Iops, France

Building a reference database for ARGO-DOXY

ideas to lay the basis for future activities

What for ?

To be able validate our Real Time Adjustment (made on WOA) by comparison with an independent data set
To be able to compare our DM data with reference profiles
(in the futur) To raise alert automatically

Which datasets :

GLODAP data set (last release) merged with CARIMED to complete the Mediterranean Sea(Marta alvarez) data set

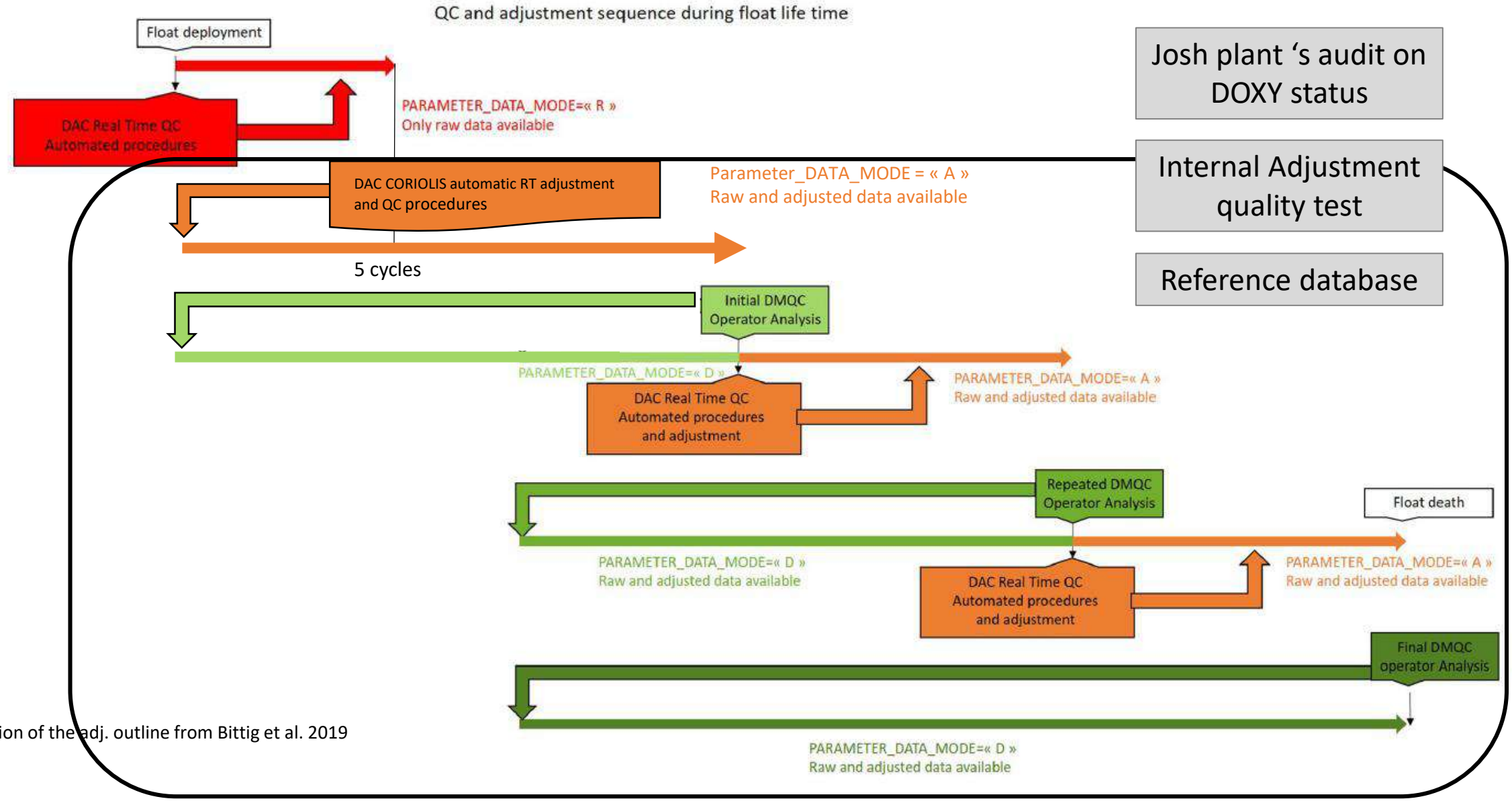
Selected DOXY profiles from BGC-ARGO floats

➔ only Float with multi-point calibration
➔ passing with success the glodap procedure ?

How?

- Not stored in the same database to be able to set up some metrics comparison on each dataset
- First step, using salinity correction expertise
- Second step (and later when we will have enough data) build a min/max O_2 gridded product to raise alert

Coriolis Strategy to detect adjustment anomalies and get rid of the backlog



Josh plant ‘s audit on DOXY status

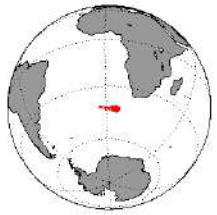
Internal Adjustment quality test

Reference database

Modified version of the adj. outline from Bittig et al. 2019

Internal Adjustment quality test

https://doi.org/10.13155/76709

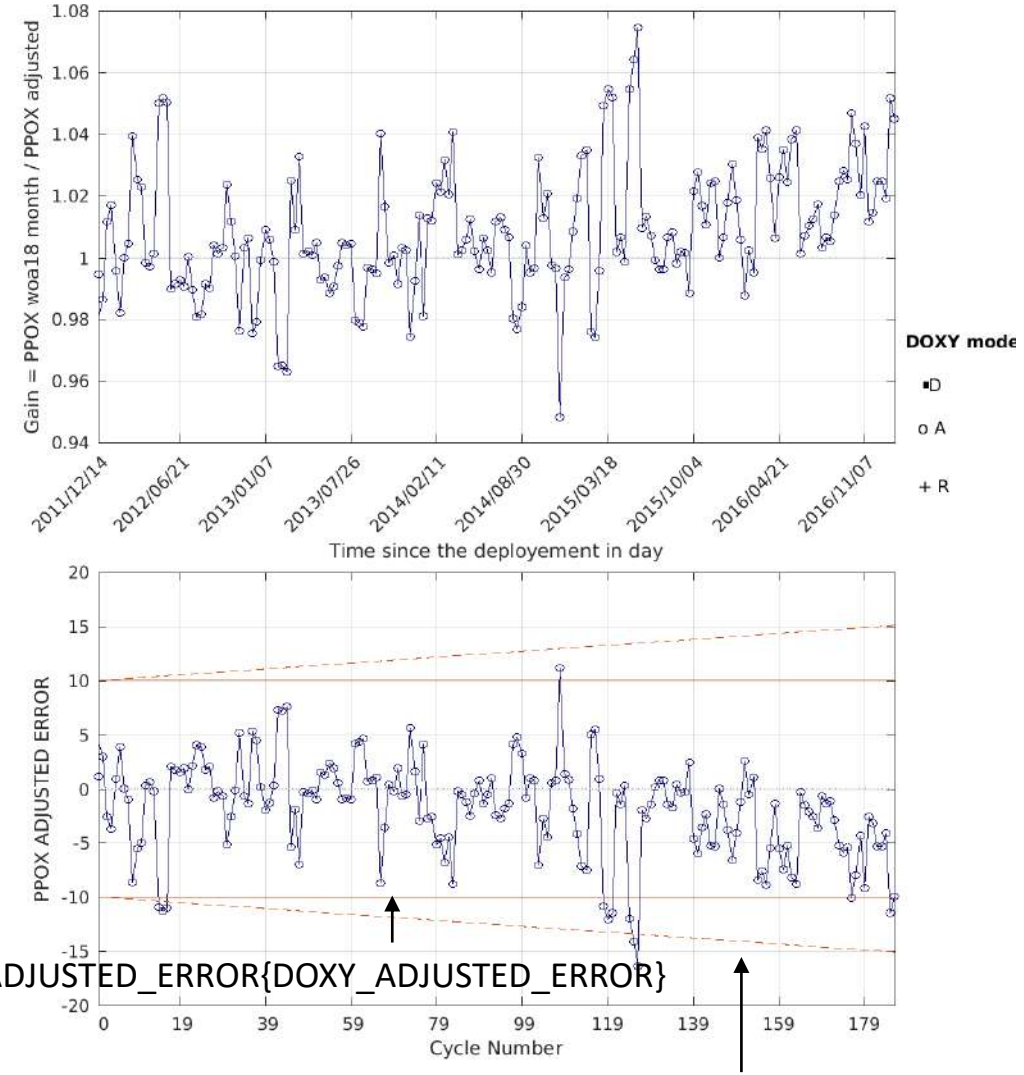


6900954 (coriolis)
PROVOR (AANDERAA OPTODE 3830)
PI : Sabrina SPEICH

- New estimation of the GAIN from DOXY_ADJUSTED variable

Adjusted_GAIN= PPOX_WOA18_monthly / PPOX_DOXY_ADJUSTED

PPOX_woa{PSAT_woa,TEMP_float,PSAL_float,Patm = 1atm}
PPOX_float{MOLAR_DOXY_float,TEMP_float,PSAL_float,Patm = 1atm}

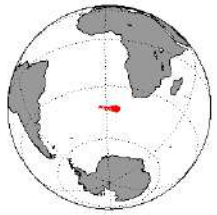


PPOX_DOXY_ADJUSTED_ERROR{DOXY_ADJUSTED_ERROR}

PPOX_ADJUSTED_ERROR with time evolution as recommanded in http://dx.doi.org/10.13155/46542 (soon)

Internal Adjustment quality test

https://doi.org/10.13155/76709



6900954 (coriolis)
PROVOR (AANDERAA OPTODE 3830)
PI : Sabrina SPEICH

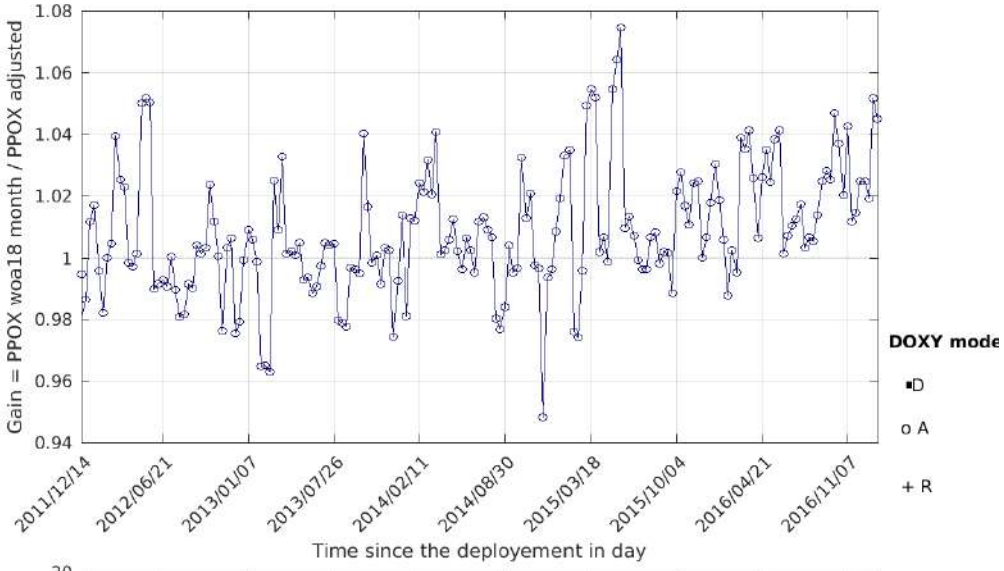
- New estimation of the GAIN from DOXY_ADJUSTED variable

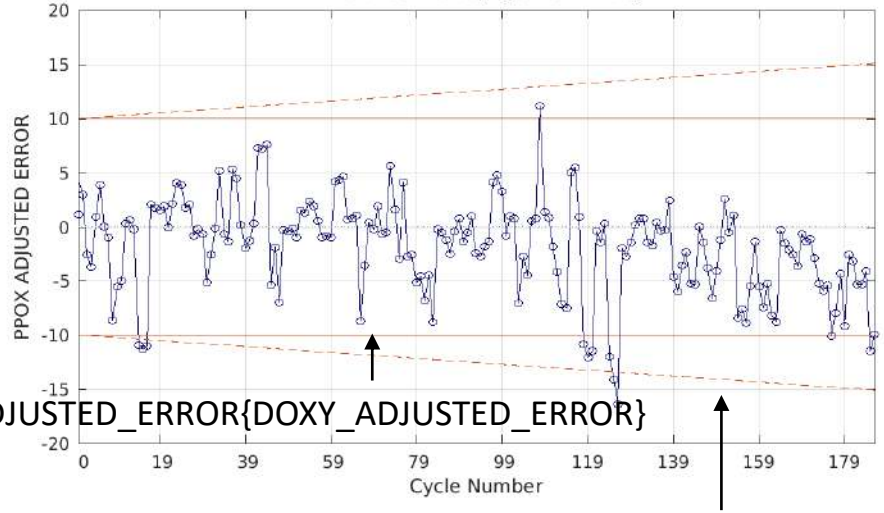
Adjusted_GAIN= PPOX_WOA18_monthly / PPOX_DOXY_ADJUSTED

PPOX_woa{PSAT_woa,TEMP_float,PSAL_float,Patm = 1atm}
PPOX_float{MOLAR_DOXY_float,TEMP_float,PSAL_float,Patm = 1atm}

- Error adjustment comparison with information available in the files (PPOX_DOXY_ADJUSTED_ERROR{DOXY_ADJUSTED_ERROR})

ERROR of the adjustment =
(1-adjusted_GAIN).* PPOX_WOA18_monthly



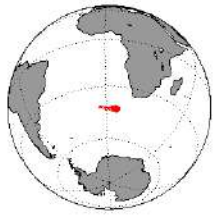


PPOX_DOXY_ADJUSTED_ERROR{DOXY_ADJUSTED_ERROR}

PPOX_ADJUSTED_ERROR with time evolution as recommanded in http://dx.doi.org/10.13155/46542 (soon)

Internal Adjustment quality test

https://doi.org/10.13155/76709

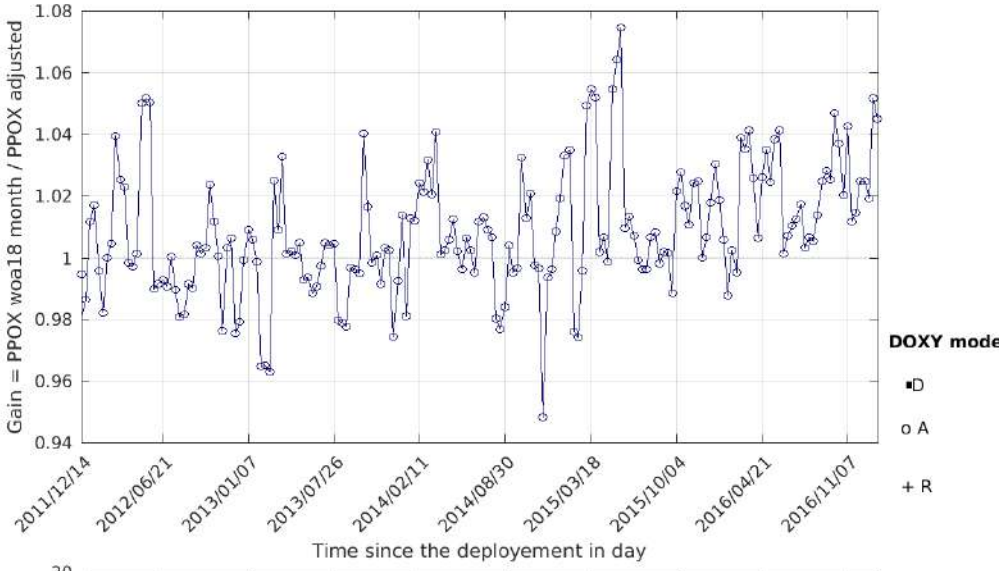


6900954 (coriolis)
PROVOR (AANDERAA OPTODE 3830)
PI : Sabrina SPEICH

- New estimation of the GAIN from DOXY_ADJUSTED variable

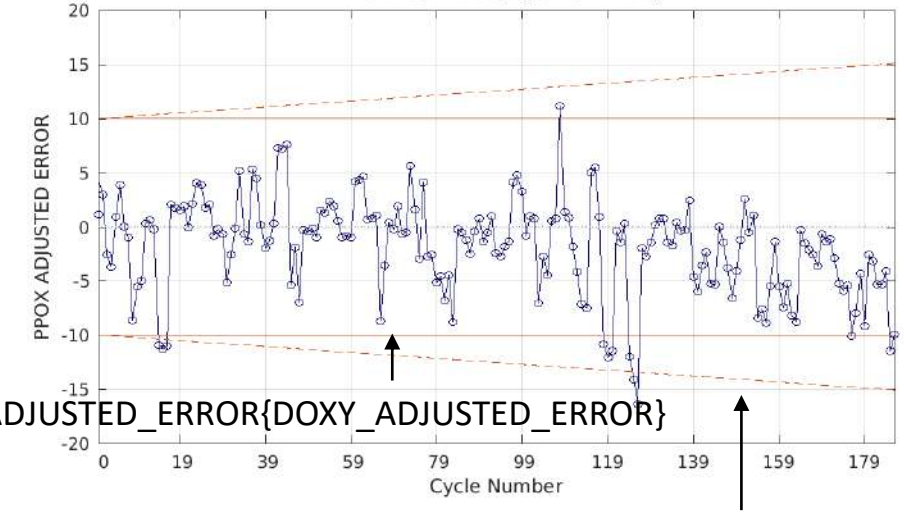
Adjusted_GAIN= PPOX_WOA18_monthly / PPOX_DOXY_ADJUSTED

PPOX_woa{PSAT_woa,TEMP_float,PSAL_float,Patm = 1atm}
PPOX_float{MOLAR_DOXY_float,TEMP_float,PSAL_float,Patm = 1atm}



- Error adjustment comparison with information available in the files (PPOX_DOXY_ADJUSTED_ERROR{DOXY_ADJUSTED_ERROR})

ERROR of the adjustment =
(1-adjusted_GAIN).* PPOX_WOA18_monthly

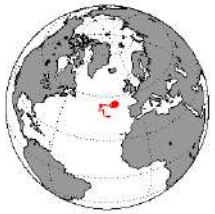


- Alert for 5 cycles = Inform PI that his float needs a DM adjustment
  for 10 cycles = cycles in greylist waiting PI action

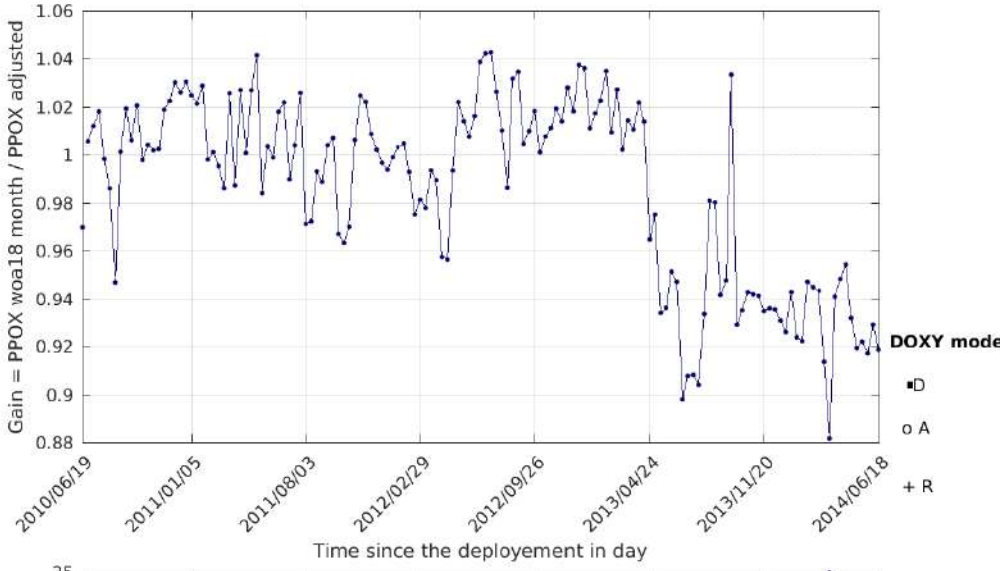
$ERROR_{adjustment}$ > PPOX_DOXY_ADJUSTED_ERROR

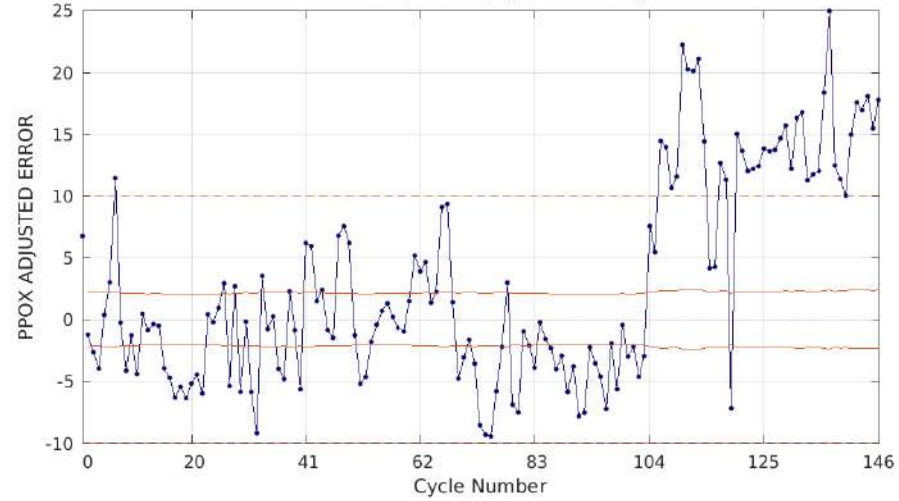
PPOX_DOXY_ADJUSTED_ERROR{DOXY_ADJUSTED_ERROR}

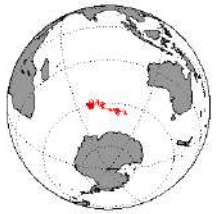
PPOX_ADJUSTED_ERROR with time evolution as recommanded in http://dx.doi.org/10.13155/46542 (soon)



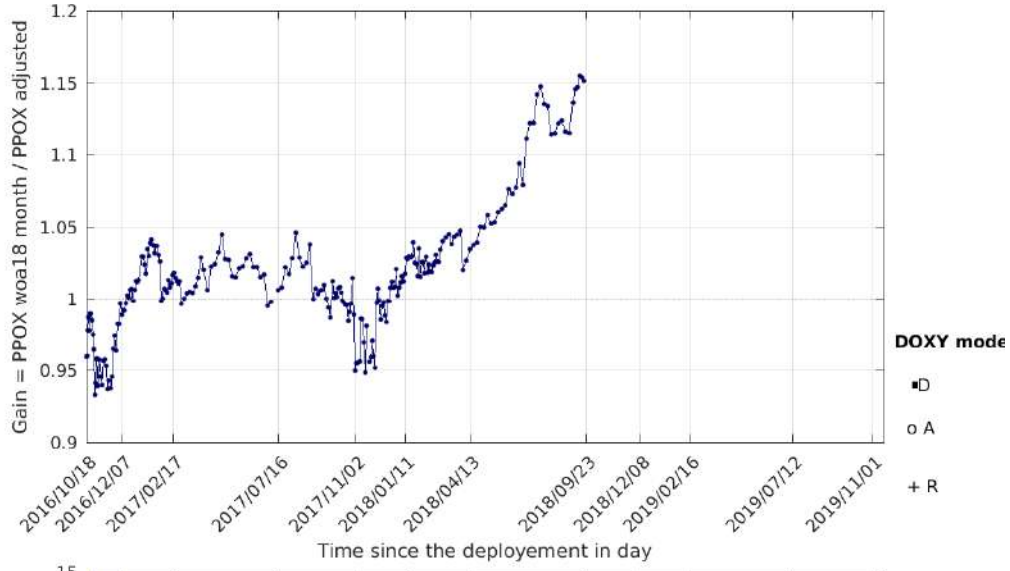
5902307 (coriolis)
PROVOR (AANDERAA OPTODE 3830)
PI : Virginie THIERRY

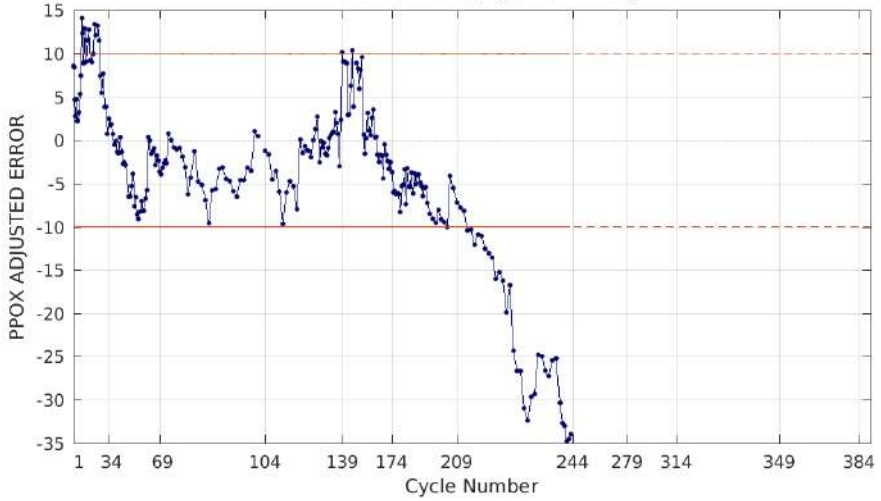


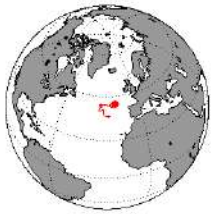




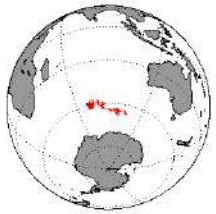
6902737 (coriolis)
PROVOR III (AANDERAA OPTODE 4330)
PI : Herve Claustre



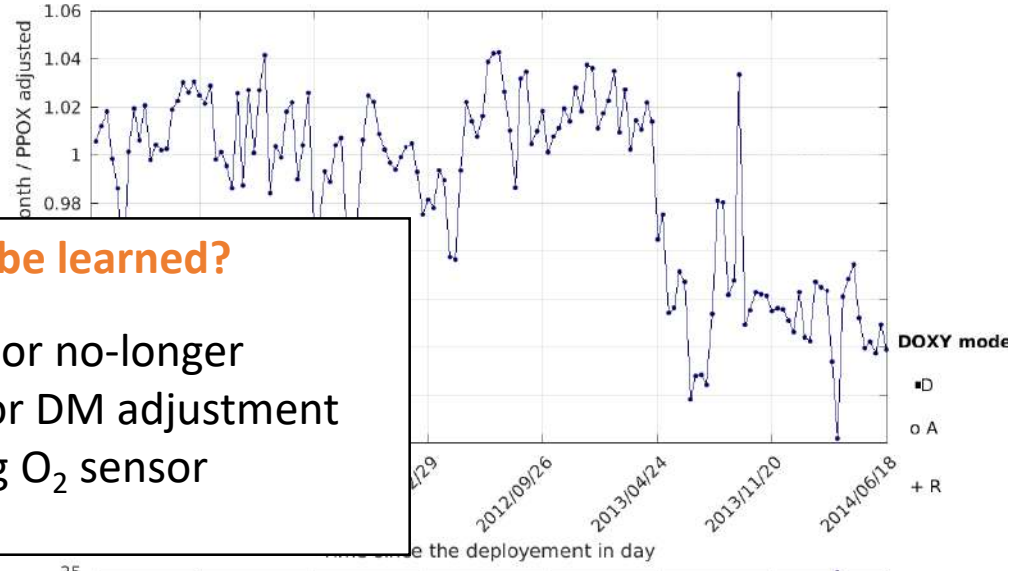


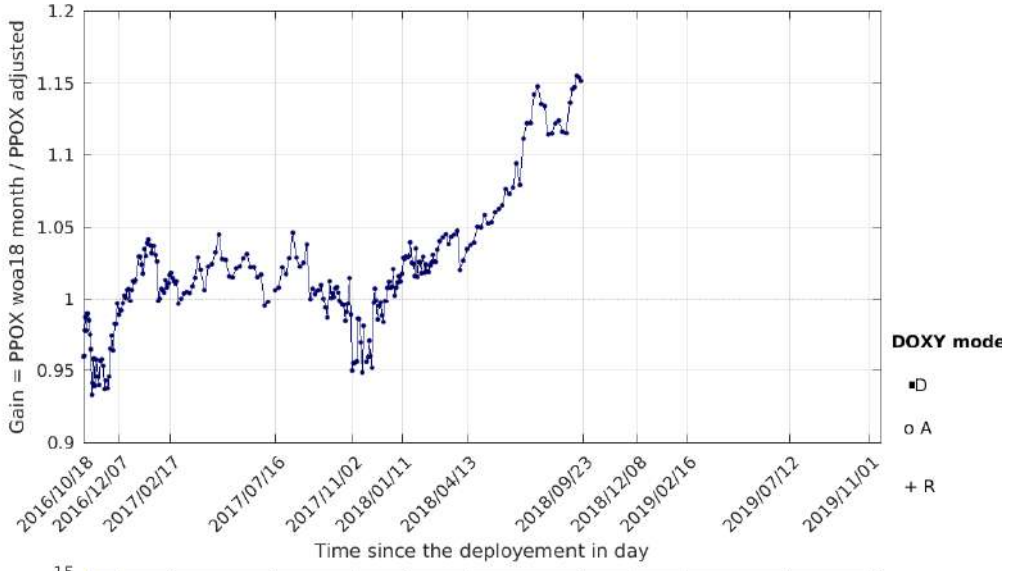


5902307 (coriolis)
PROVOR (AANDERAA OPTODE 3830)
PI : Virginie THIERRY



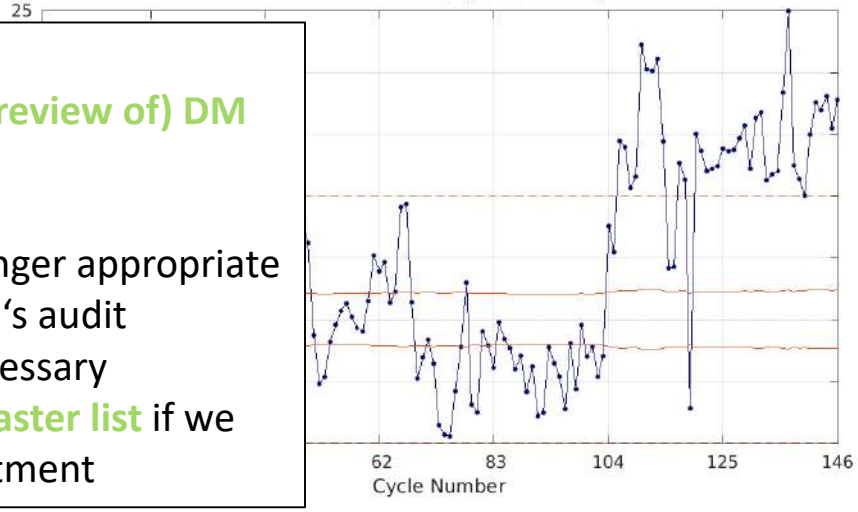
6902737 (coriolis)
PROVOR III (AANDERAA OPTODE 4330)
PI : Herve Claustre

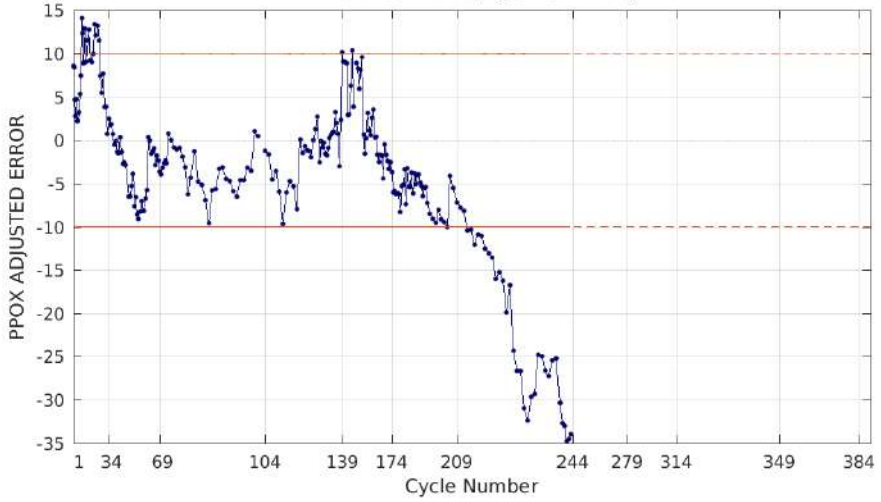




Which information to be learned?

- Potential wrong or no-longer appropriate RT or DM adjustment
- Highlight drifting O_2 sensor





Floats in charge

➔ **Prioritize float for a (review of) DM adjustment**

- Drifting sensor
- Mode A with no longer appropriate adjustment in Josh ‘s audit

➔ **Change QC flag** if necessary

➔ **Add in the coriolis master list** if we are sure of our adjustment