LOCODOX: a tool for Argo Oxygen correction

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https://archimer.ifremer.fr/doc/00630/74190/
https://github.com/euroargodev/LOCODOX

LOCODOX

- MATLAB interactive tool that corrects dissolved oxygen concentration data acquired by Argo profiling floats.

- It works with Argo v3.1 netcdf files and provides files with corrected and well formatted delayed mode Argo data compliant with the Argo format.

- LOCODOX corrects only oxygen data available in the vertical profiles (not in trajectory)

- Three types of correction are proposed:
    - a pressure dependent correction
    - a temporal drift correction
    - a slope (gain) and/or offset correction

- The methodologies are based on Takeshita et al, 2013, Bittig and Kortzinger, 2018 methods.

Steps

- Argo data reading and processing

- Reference data reading and processing; Colocalization of reference data to the argo trajectory, interpolation of reference profile data to the argo level;

- Pressure dependent correction

- Computation of the oxygen sensor temporal drift computed and application: 2 methods available (based on either WOA or inair measurements)

- Computation of the gain correction of the oxygen profiles and application (3 methods available: WOA, ref profile, in air);

- Correction applied and NetCDF fields updated following the Argo format v3.1 recommendations;

Pressure dependent correction

- DOXY_corr=DOXY * (1 + *coeff**PRES/1000)
- Coeff typically varies between 0 and 0.01
- Manual determination of the coefficient

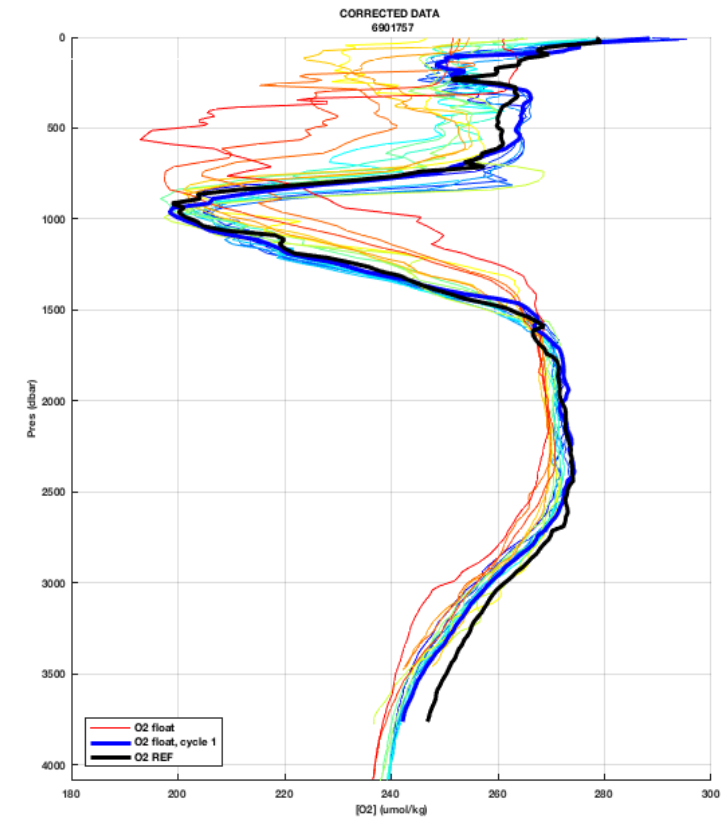# Additional pressure effect
Deep Argo float: 6901757

6901757

After correction:
PSAT_adjusted=a*PSAT
It remains a pressure bias

Before correction
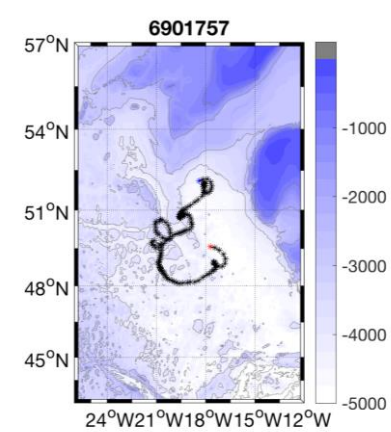
Argo profile to be compared to the refrence profile
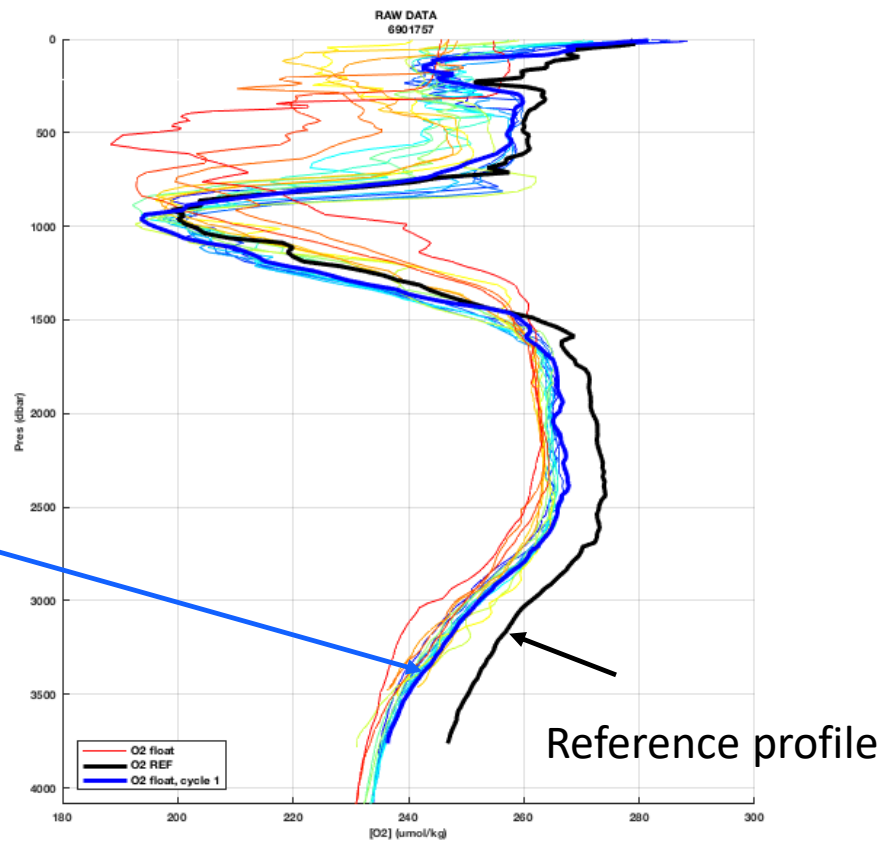
Reference profile
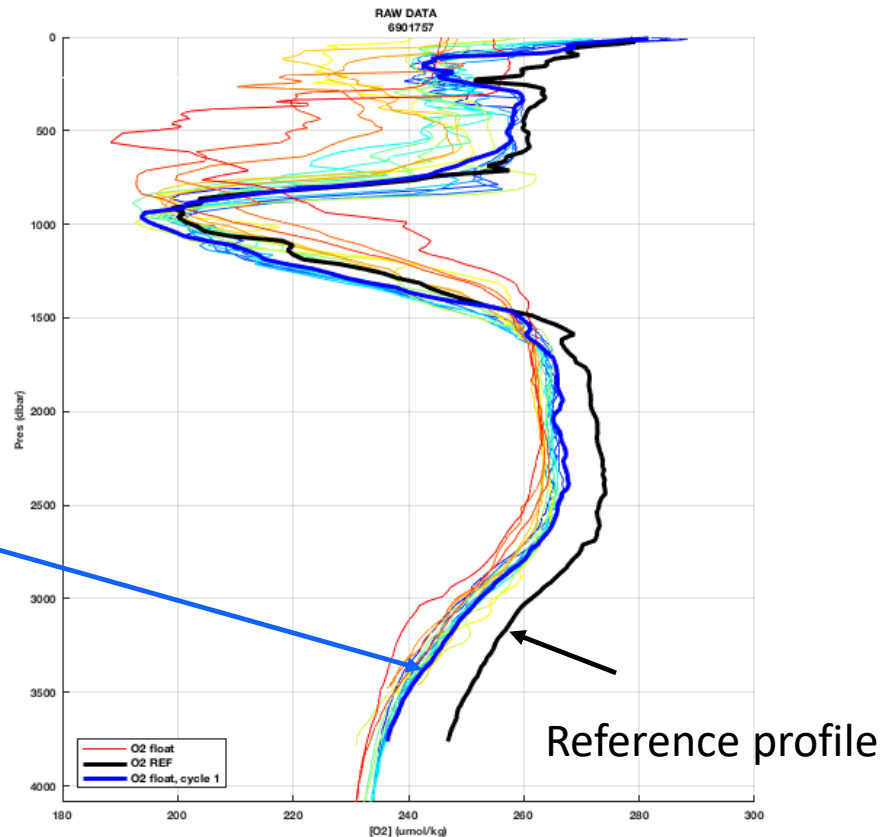
DOXY (mumol/kg)
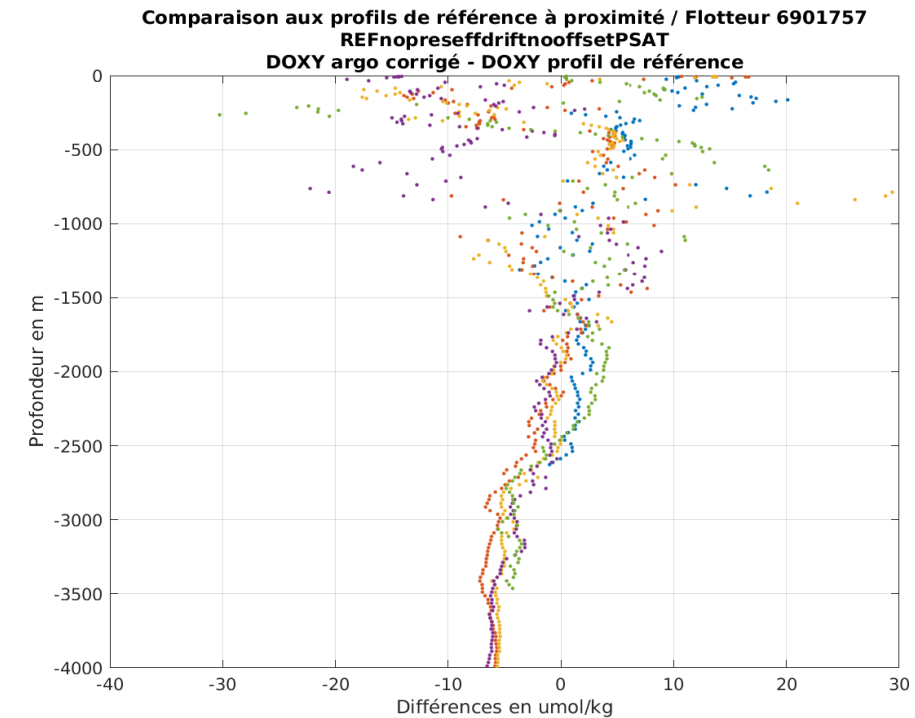
DOXY (mumol/kg)

Additional pressure effect
Deep Argo float: 6901757

6901757

Before correction

RAW DATA
6901757

Argo profile to be compared to the refrence profile

Reference profile

DOXY (mumol/kg)

Comparison to nearby CTD profiles
<50km
<2 years

Comparaison aux profils de référence à proximité / Flotteur 6901757
REFnopreseffdriftnooffsetPSAT
DOXY argo corrigé - DOXY profil de référence

Additional pressure effect
Deep Argo float: 6901757

Apply an additional pressure correction on the raw data

DOXY_corr=DOXY*(1+0.01*PRES/1000)

PSAT_adjusted=a*PSAT

Comparison to nearby CTD profiles
<50km
<2 years
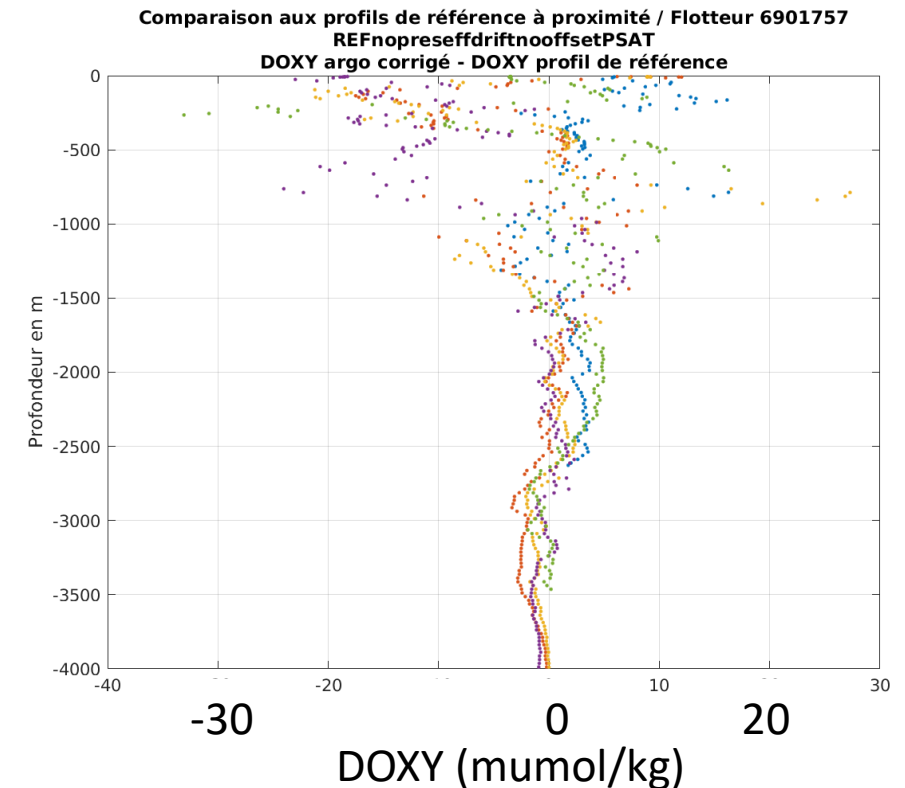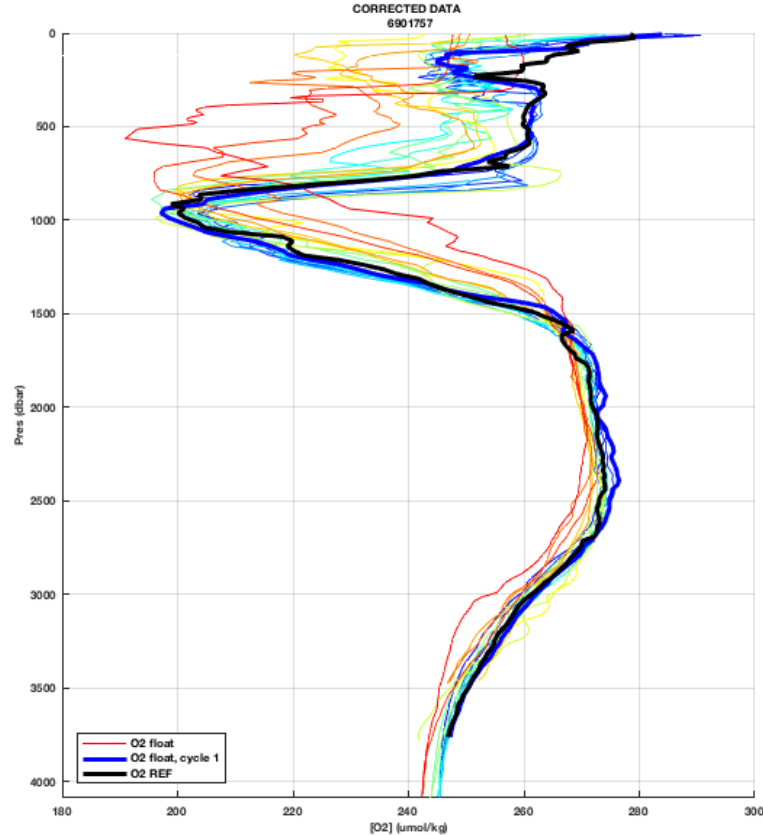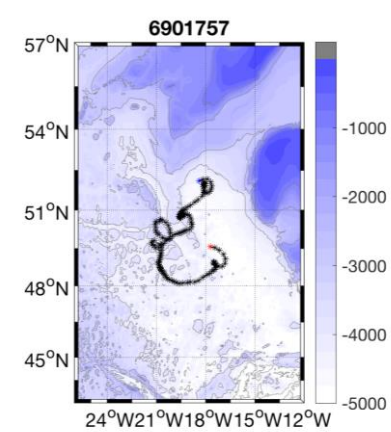
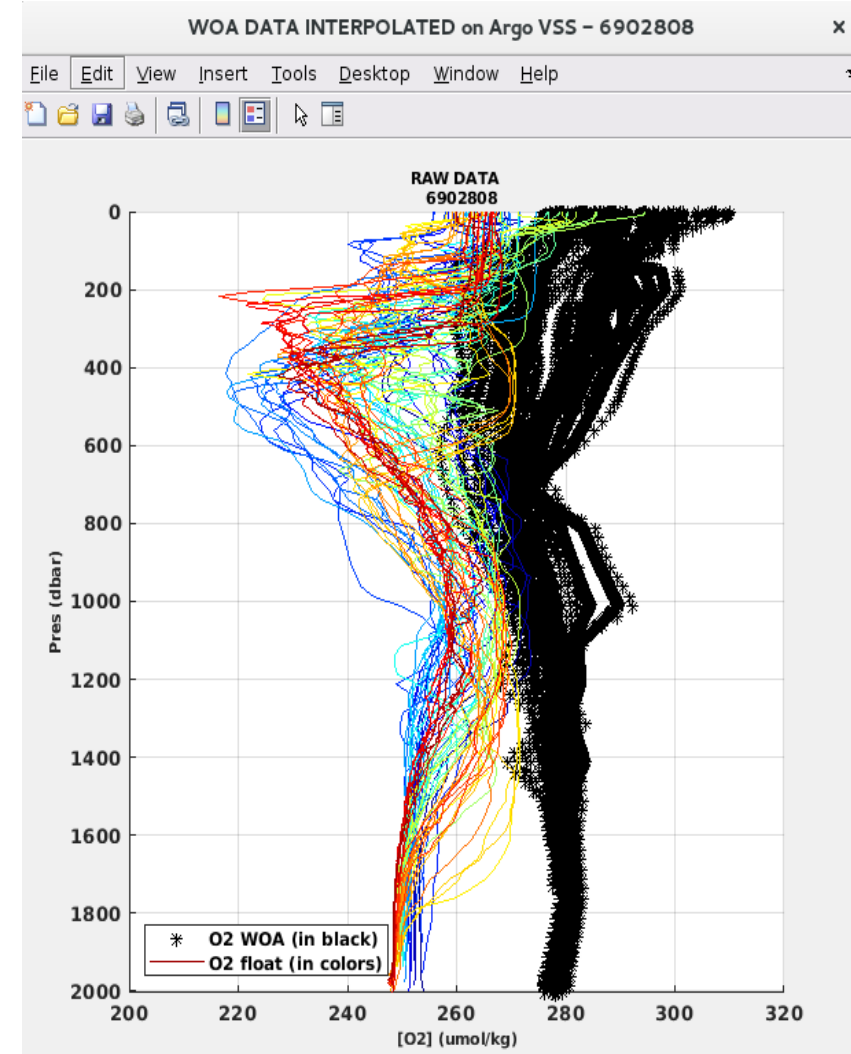# Drift computation
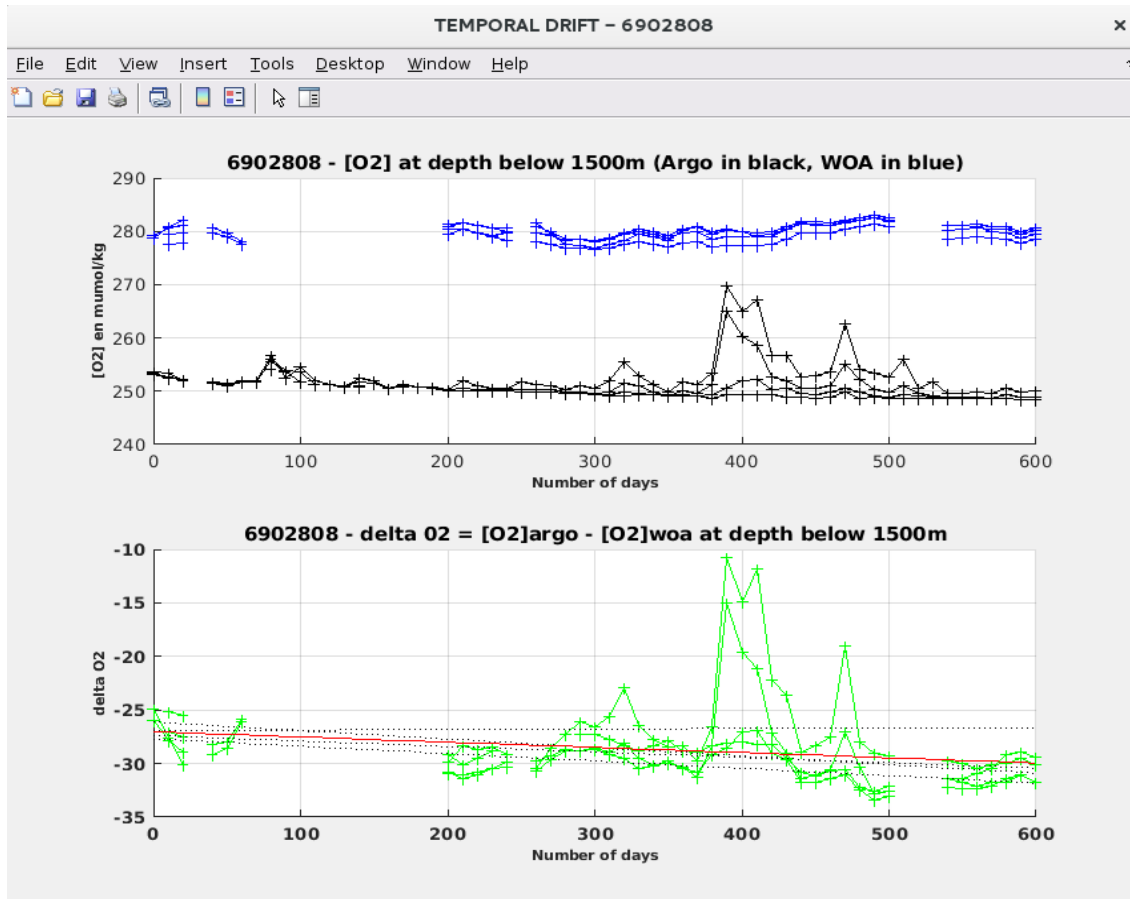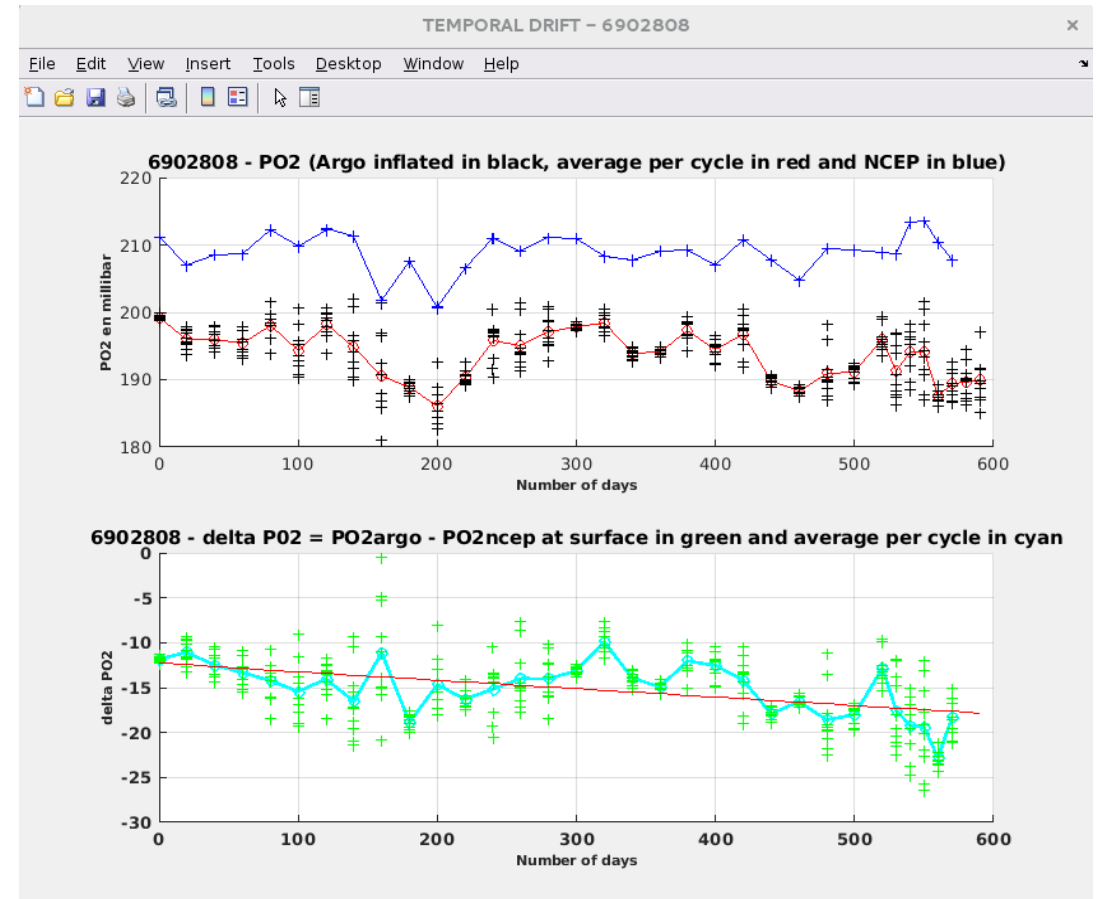
- Possibility to choose the drift equation (linear, polynomial) or to stop the drift after a given date
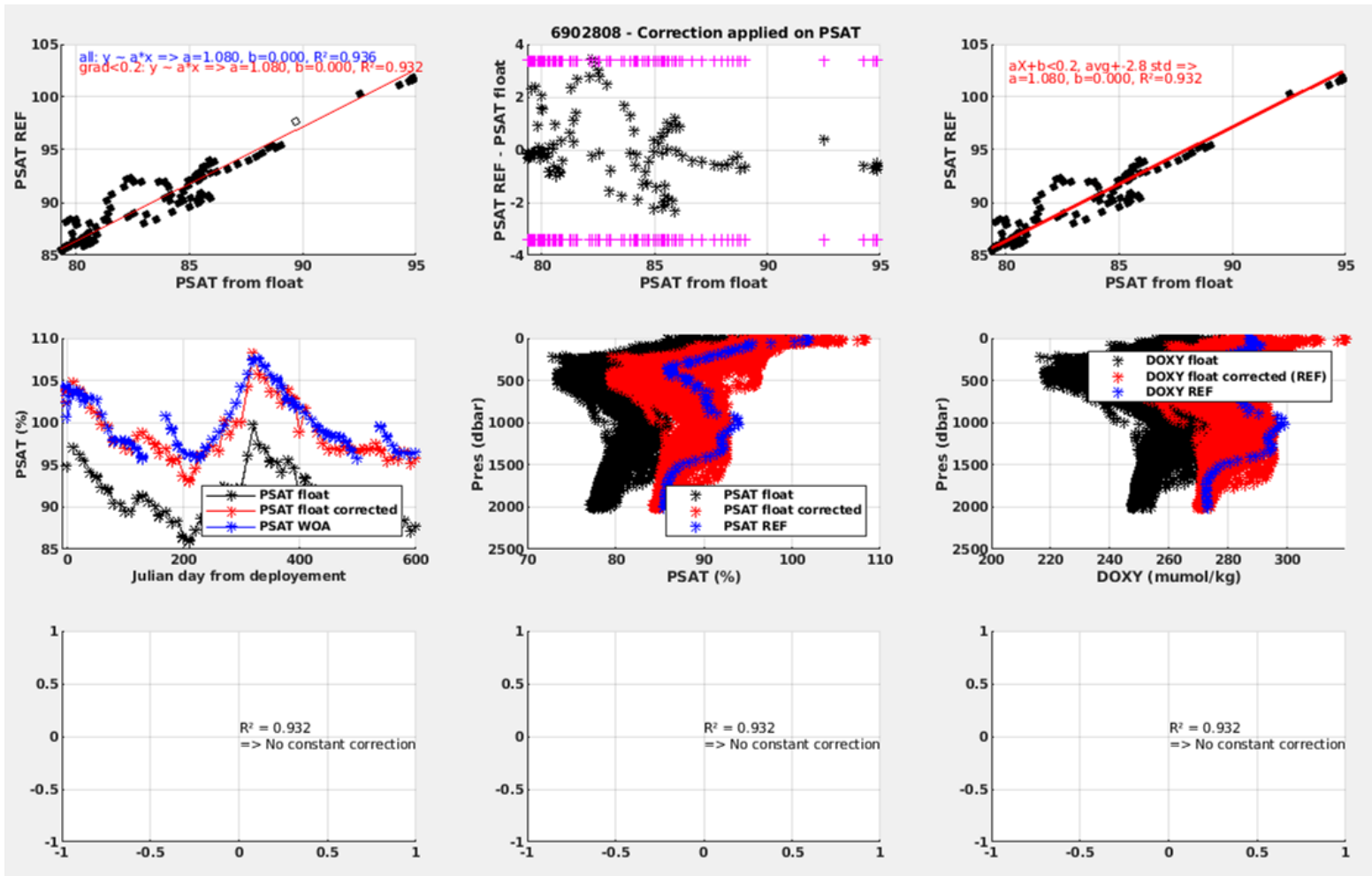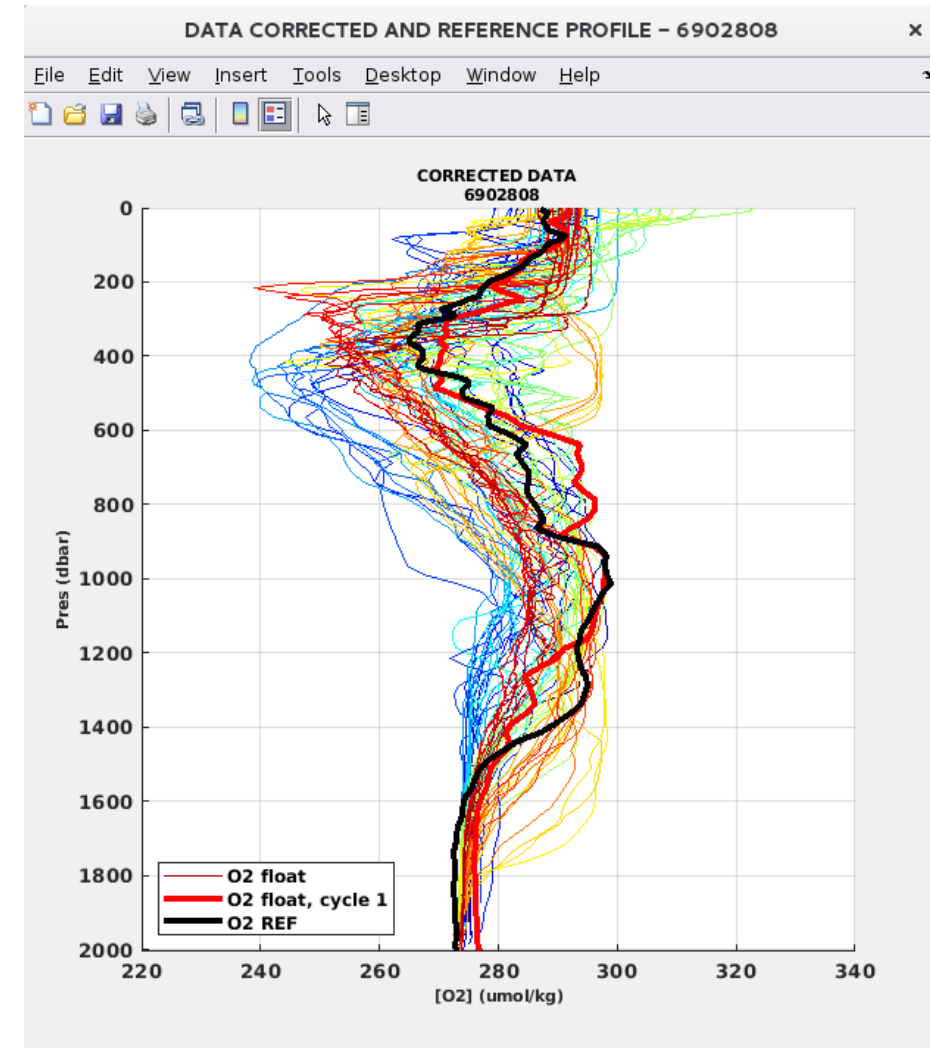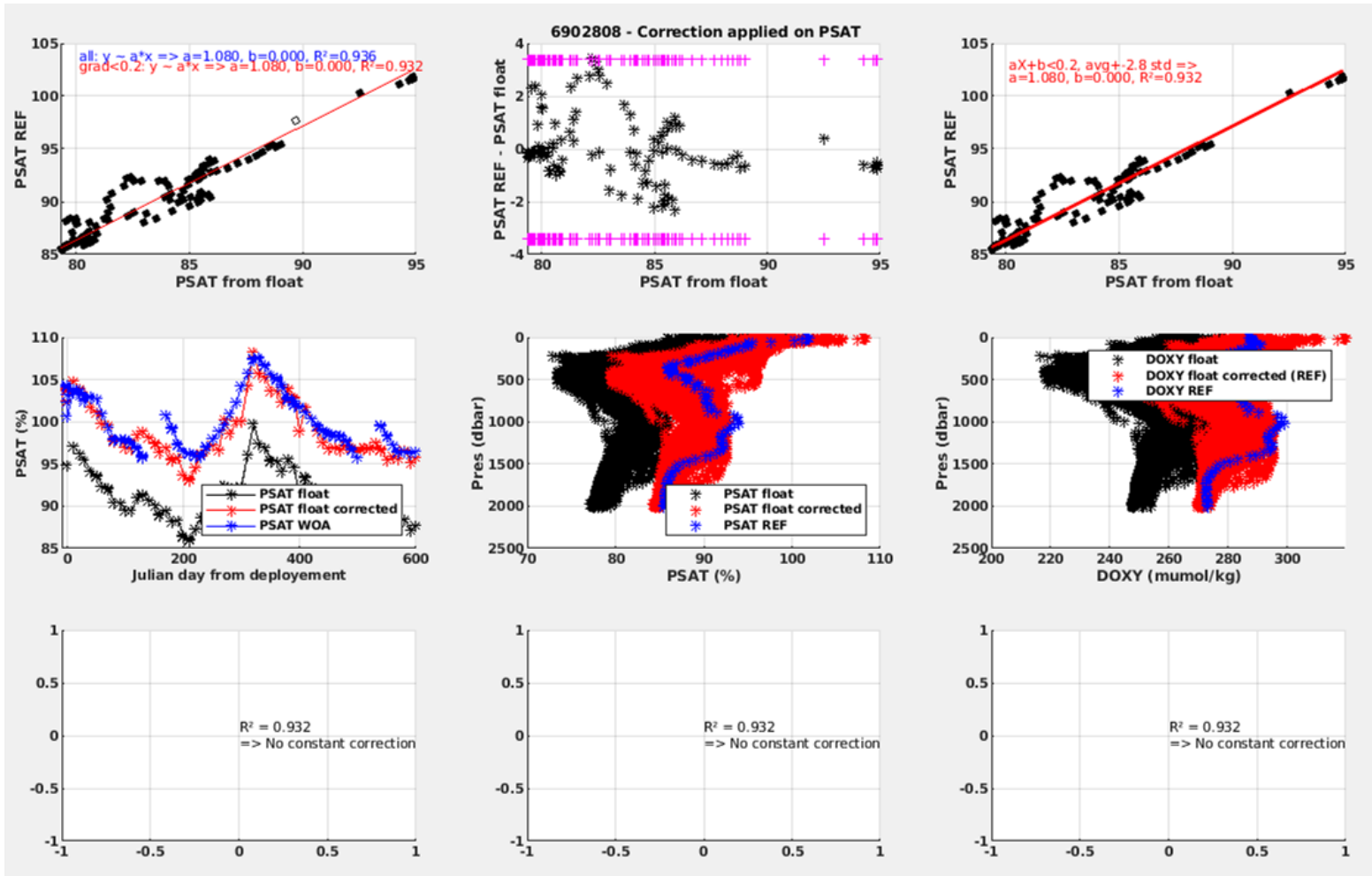
Gain correction

Comparison to an in situ ref profile (REF method)
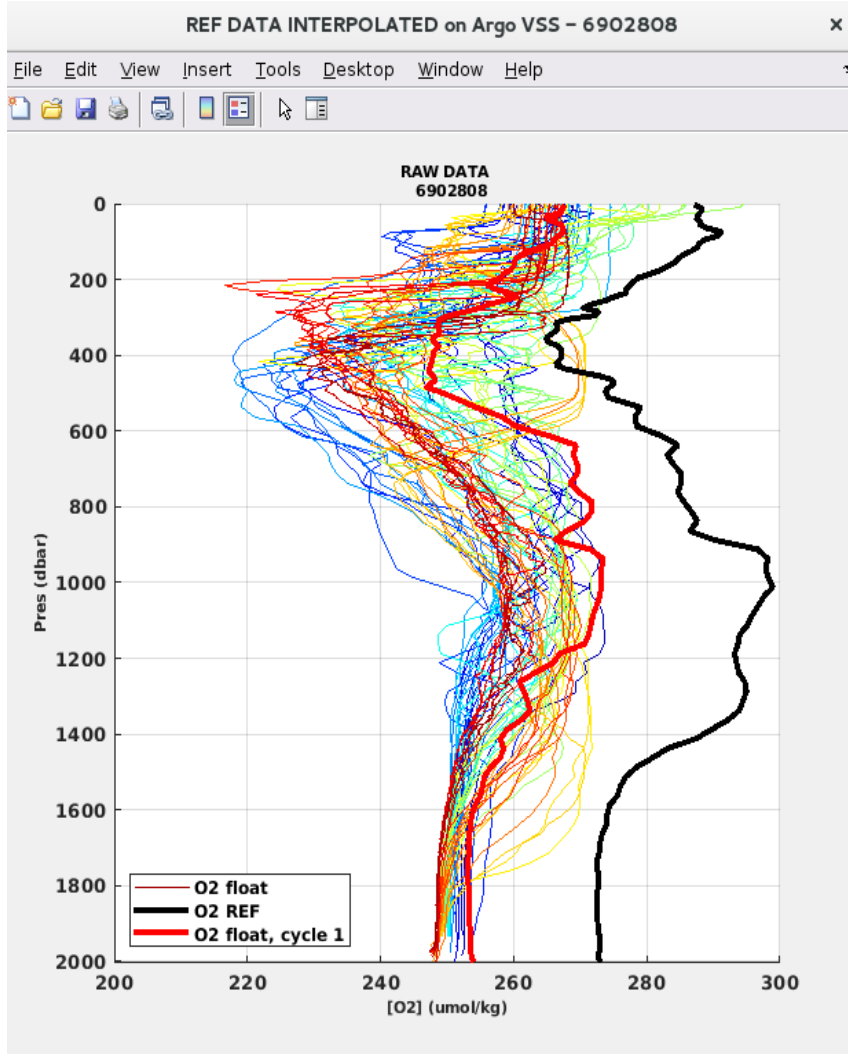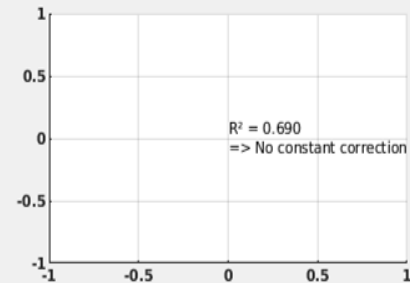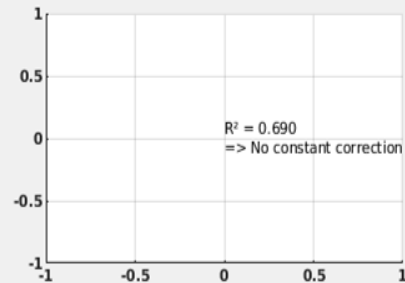
Comparison to WOA (WOA method)

Gain correction: based on *in situ* reference profile

Gain correction: based on *in situ* reference profile

Gain correction: based on WOA
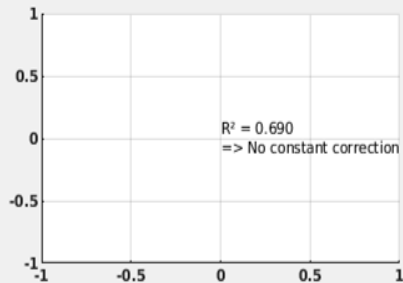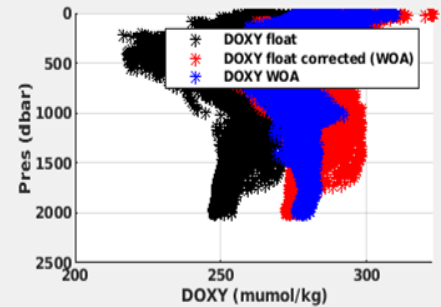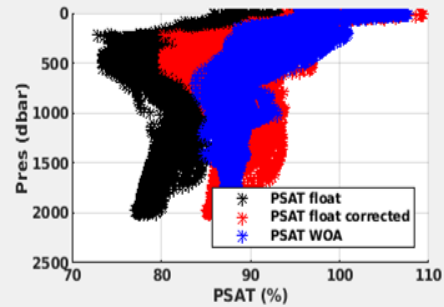
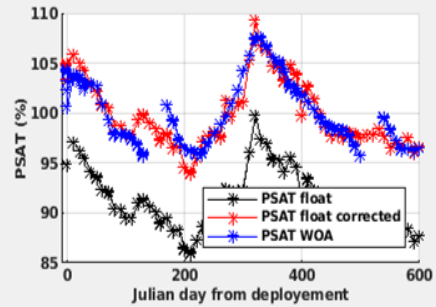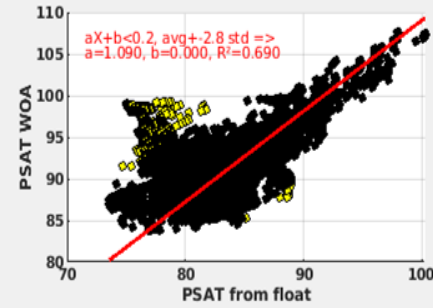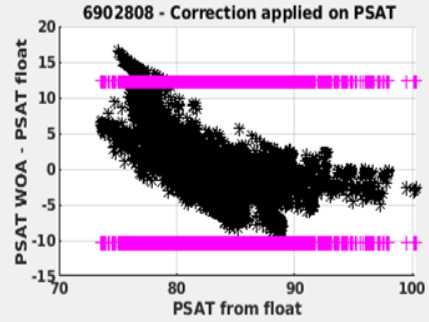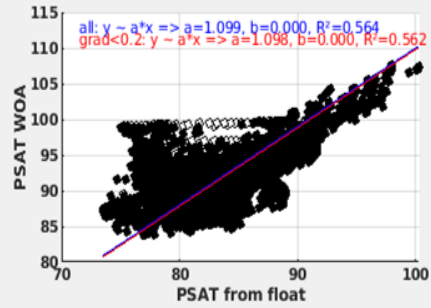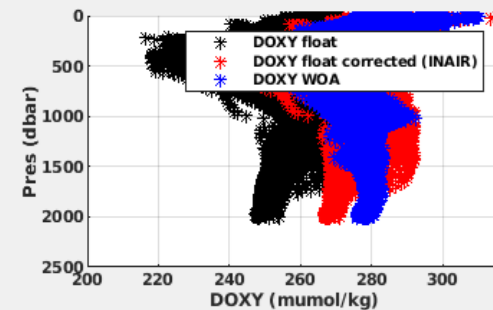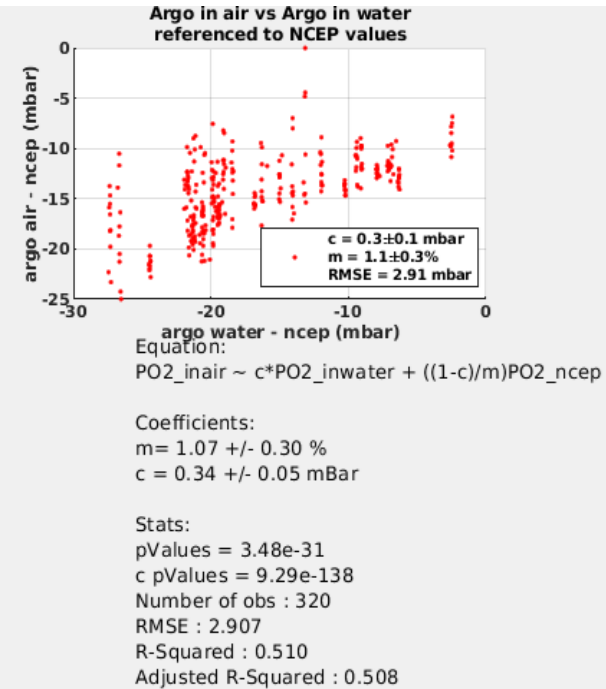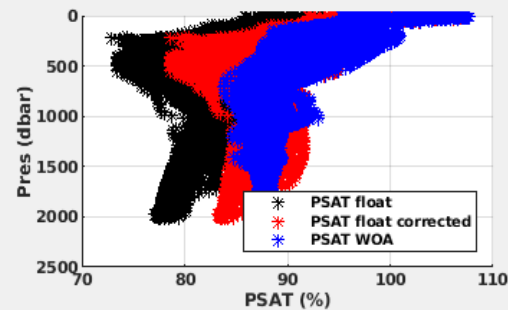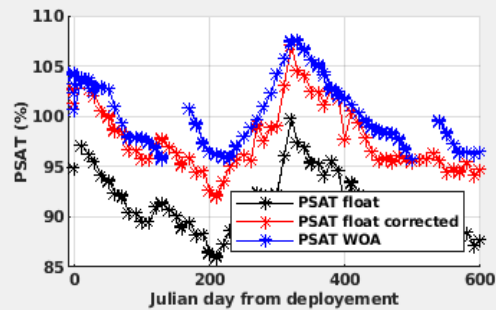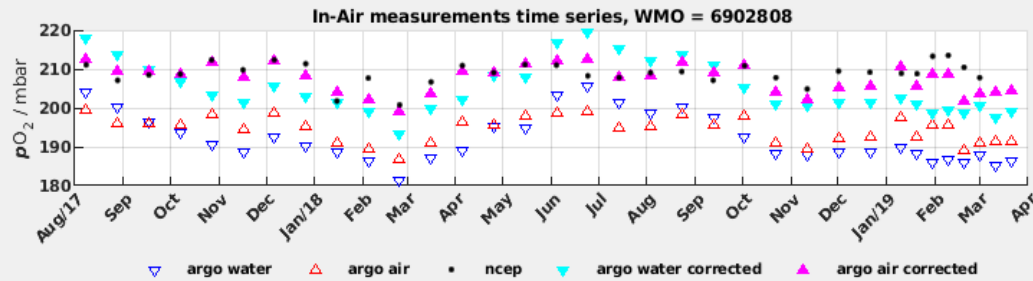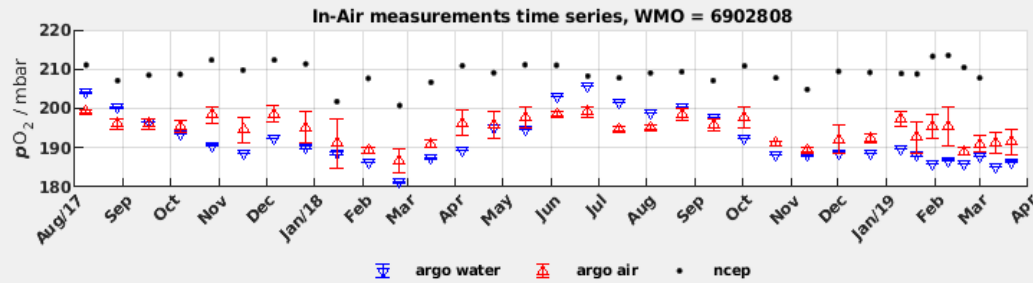# Gain correction: based on in air measurements

Files writting
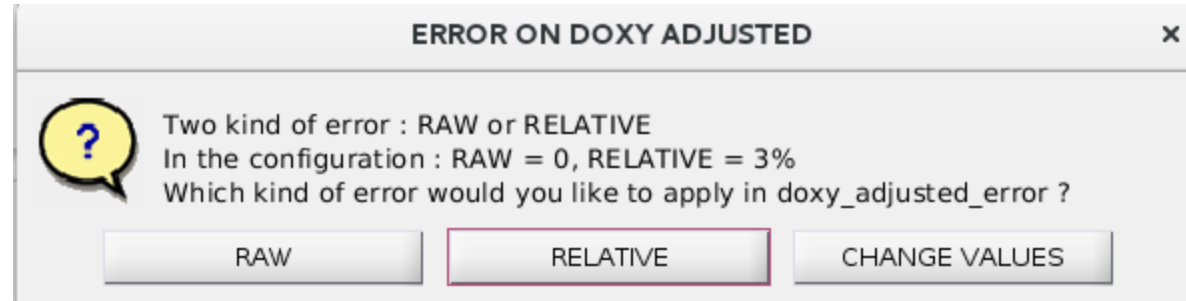
- Write netcdf files that can enter the Argo data flow as is (with all ADJUSTED fields updated)

Output files: fully compliant with Argo rules

- SCIENTIFIC_CALIB_EQUATION (N_CALIB=1)=
PPOX = f(DOXY); PPOX1=PPOX - drift_coef

- SCIENTIFIC_CALIB_EQUATION (N_CALIB=2)= PSAT=f(PPOX1);
PSAT_ADJUSTED=A*PSAT+B;DOXY_ADJUSTED=f(PSAT_ADJUSTED)

- SCIENTIFIC_CALIB_COEFFICIENT (N_CALIB=1) = « drift_coef = -0.01 »

- SCIENTIFIC_CALIB_COEFFICIENT (N_CALIB=2) = « A=1.077; B=0 »

- SCIENTIFIC_CALIB_COMMENT (N_CALIB=1) = « PPOX converted from DOXY; Time drift correction on PPOX (drift computed from NCEP data) »

- SCIENTIFIC_CALIB_COMMENT (N_CALIB=2) = Percent saturation corrected as a linear function of PSAT; Comparison to the reference profile ov18_d_102 (isobaric match as in Takeshita et al. (2013)) on cycle 1; PSAT converted from DOXY and DOXY_ADJUSTED converted from PSAT_ADJUSTED

Some comments

- The REF method needs a user defined reference data base

- The locodox_config.m files define some user choices
  - Path and directories
  - O2 correction parameter
    - Include or not carry over effect
    - Drift equation type and depth to be considered for drift calculation based on WOA
  - Data selection parameter
    - Use DM or RT PRES, TEMP and PSAL data
    - QC to be used for PRES, TEMP, PSAL and DOXY
    - Measurement codes for In-Air and Near-surface samples
  - Other choices relative to plots, configuration, etc..

https://github.com/euroargodev/LOCODOX
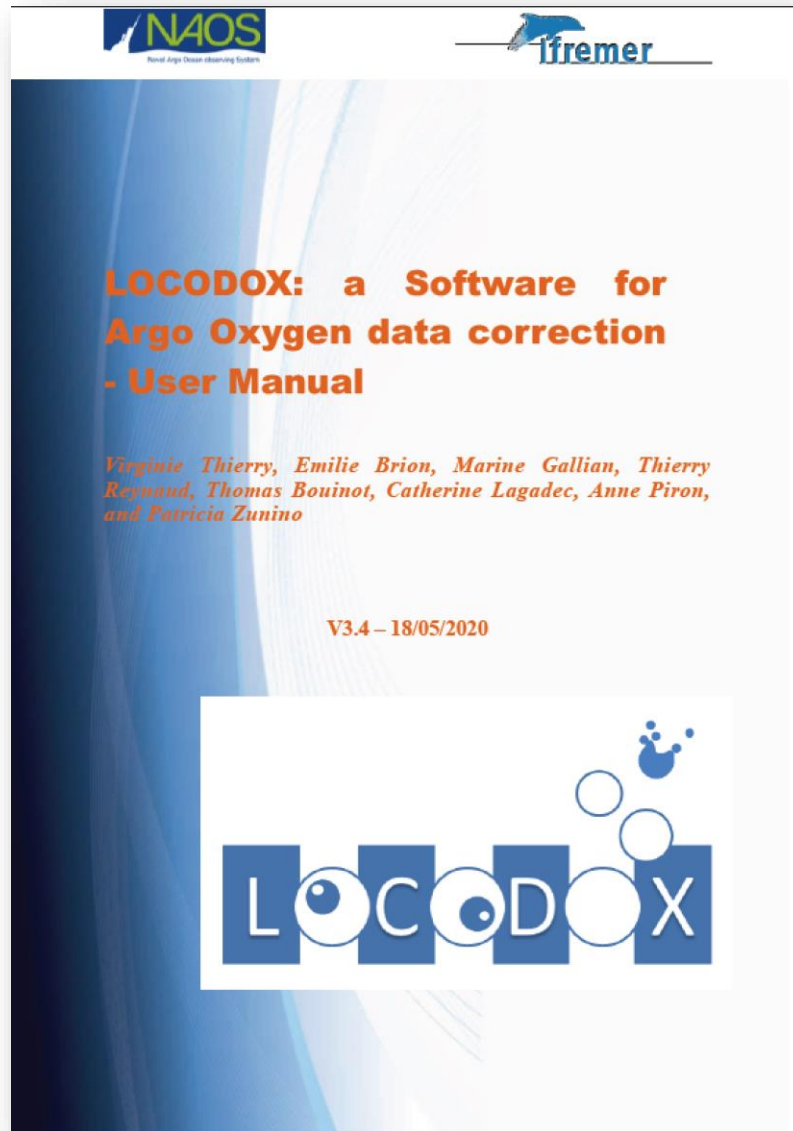
Software provided as it is
Contact:
T. Reynaud (thierry.reynaud@ifremer.fr)

https://archimer.ifremer.fr/doc/00630/74190/

Some comments

- LOCODOX works with either DOXY or PSAT
  - ➢ Need to implement the possibility to work with PPOX

- The correction equation is in the form:
  - DOXY_corr1 = DOXY * (1 + *coeff**PRES/1000)
  - DOXY_corr2 = DOXY_corr1 + A*time
  - DOXY_ADJUSTED=Gain*DOXY_corr2
  - ➢ Need to implement the recommended equation (see Catherine's presentation), particularly to be able to propagate DM adjustment in real-time

- ➢ Need to add the possibility to have break point on drift computation

- Need to improve documentation (User Manual and Github repository)

- I would like to perform an intercomparison of the different methods and to compare with SAGEO2 outputs