

Calibration CTD-O2 et flux de données campagne

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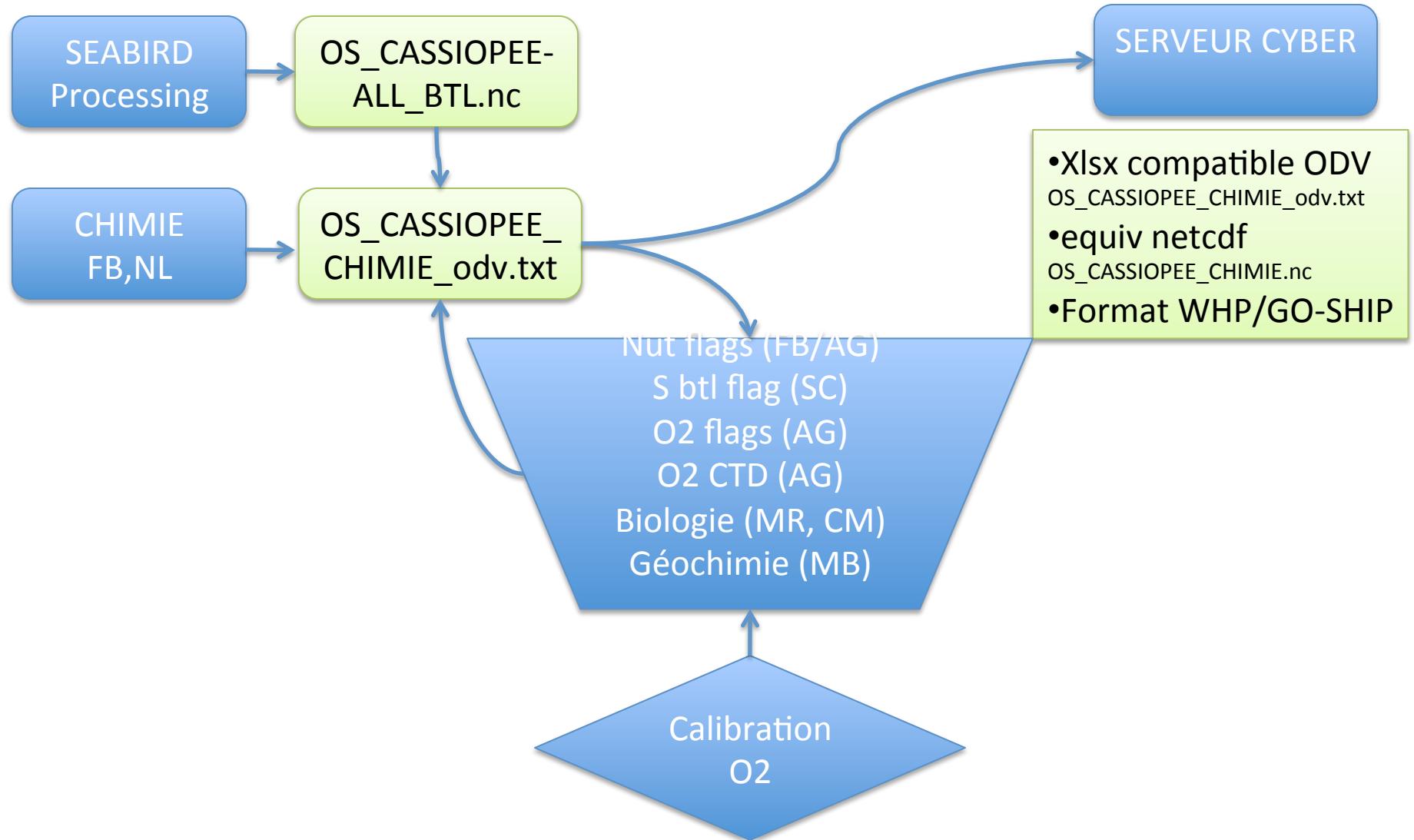
Carole Saout-Grit (Glazéo)



Références

- **Ushida**, H., GC Johnson and KE McTaggart 2010. CTD oxygen sensor calibration procedures. In: Swift, J. H., 2010. IOCCO Report 14, ICPO Publication series No 134 (<http://www.go-ship.org/HydroMan.html>).
- **Saout-Grit**, C., A. Ganachaud, C. Maes, L. Finot, L. Jamet, F. Baurand and J. Grelet, 2015 : Calibration of CTD oxygen data collected in the Coral Sea during the 2012 Bifurcation cruise, 52 (3), 34-38, <http://mercator-ocean.fr/>

1-Données *bouteilles*

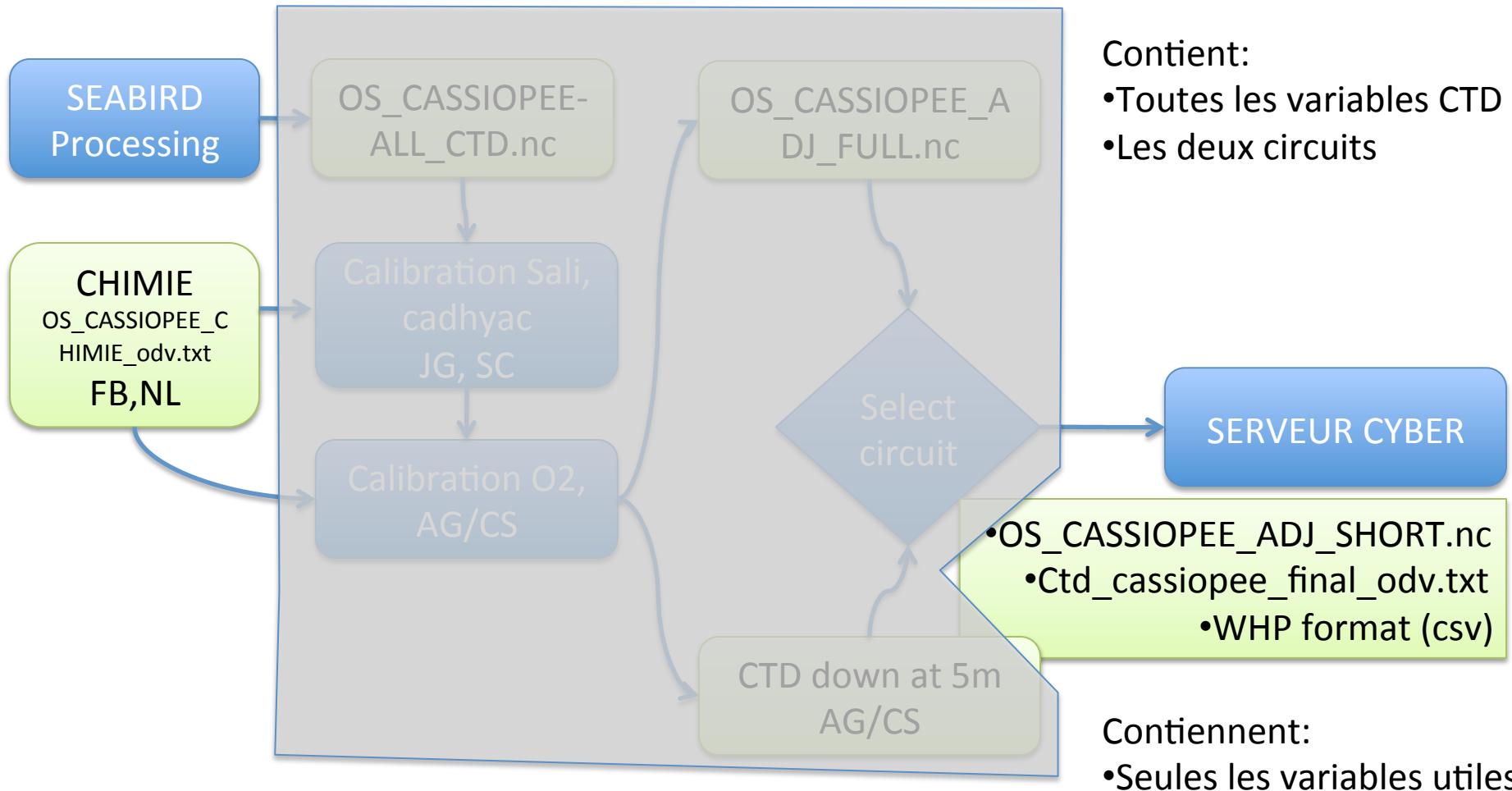


OS_CASSIOPEE_CHIMIE_odv.txt

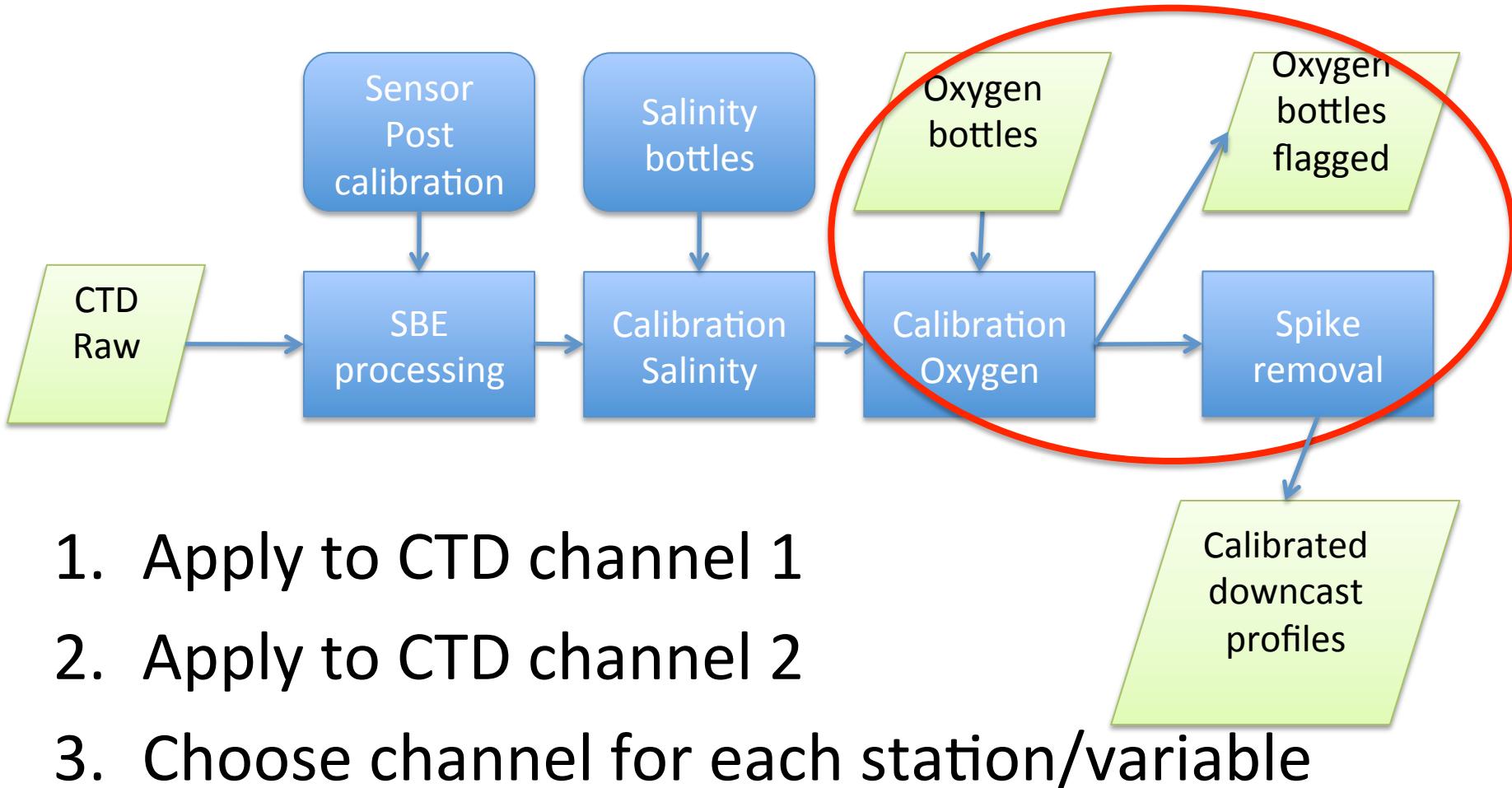
//ODV Spreadsheet file : M:\CASSIOPEE\data-processing\CHIMIE\CASSIOPEE_CHIMIE_odv.txt
//Data treated : 2015-08-22T11:43:39
//<InstrumentType>Chemical bottle analysis</InstrumentType>
//<Source>M:\CASSIOPEE\data-processing\CHIMIE\CASSIOPEE_CHIMIE.xlsx</Sources>
//<DataType>Bottles</DataType>
//<Creator>Jacques.Grelet@ird.fr</Creator>
//

Cruise	Station	Type	yyyy-mm-ddT	Longitude [degr]	Latitude [degr]	Bot. Depth [m]	DEPTH [m]	Bottle nb	PSAL [Psu]	DOX1 [ml/l]	DOX2 [micron]	NTIW [microm]	NTRI Q
CASSIOPEE	st001c01	B	2015-07-20T0 +168.007	-19.972		1004.0		22	34.455	3.923	170.69	0.00	
CASSIOPEE	st001c01	B	2015-07-20T0 +168.007	-19.972		1004.0		21	34.456	3.923	170.66	0.00	
CASSIOPEE	st001c01	B	2015-07-20T0 +168.007	-19.972		1004.0		20	34.455	3.922	170.60	0.00	
CASSIOPEE	st001c01	B	2015-07-20T0 +168.007	-19.972		1004.0		19	34.455	3.918	170.42	0.00	
CASSIOPEE	st001c01	B	2015-07-20T0 +168.007	-19.972		1004.0		18	34.455	3.947	171.72	0.00	
CASSIOPEE	st001c01	B	2015-07-20T0 +168.007	-19.972		1004.0		17	34.455	3.926	170.76	0.00	

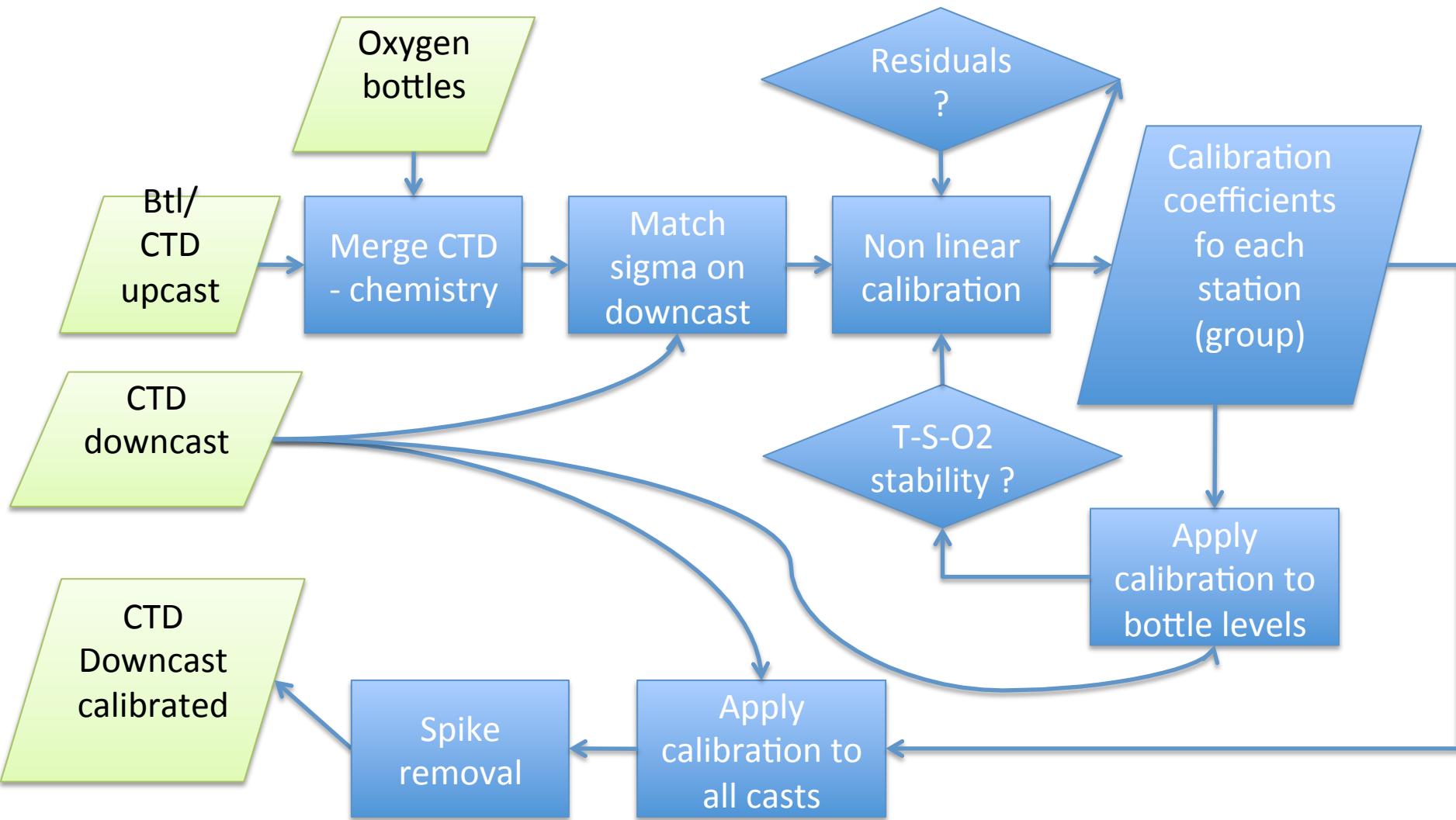
2-*Profils* CTD et Calibration



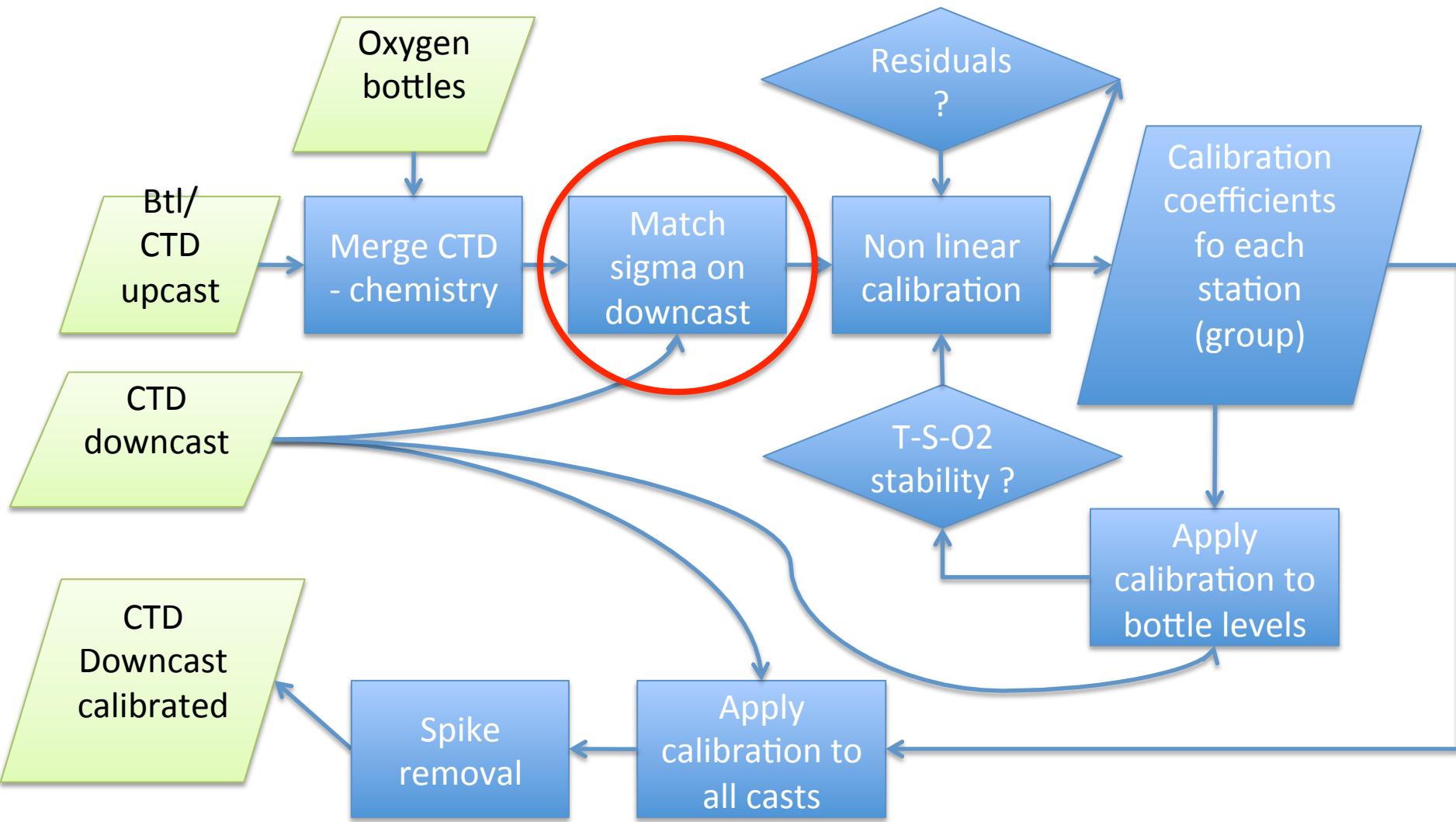
Procédure de calibration CTD-02



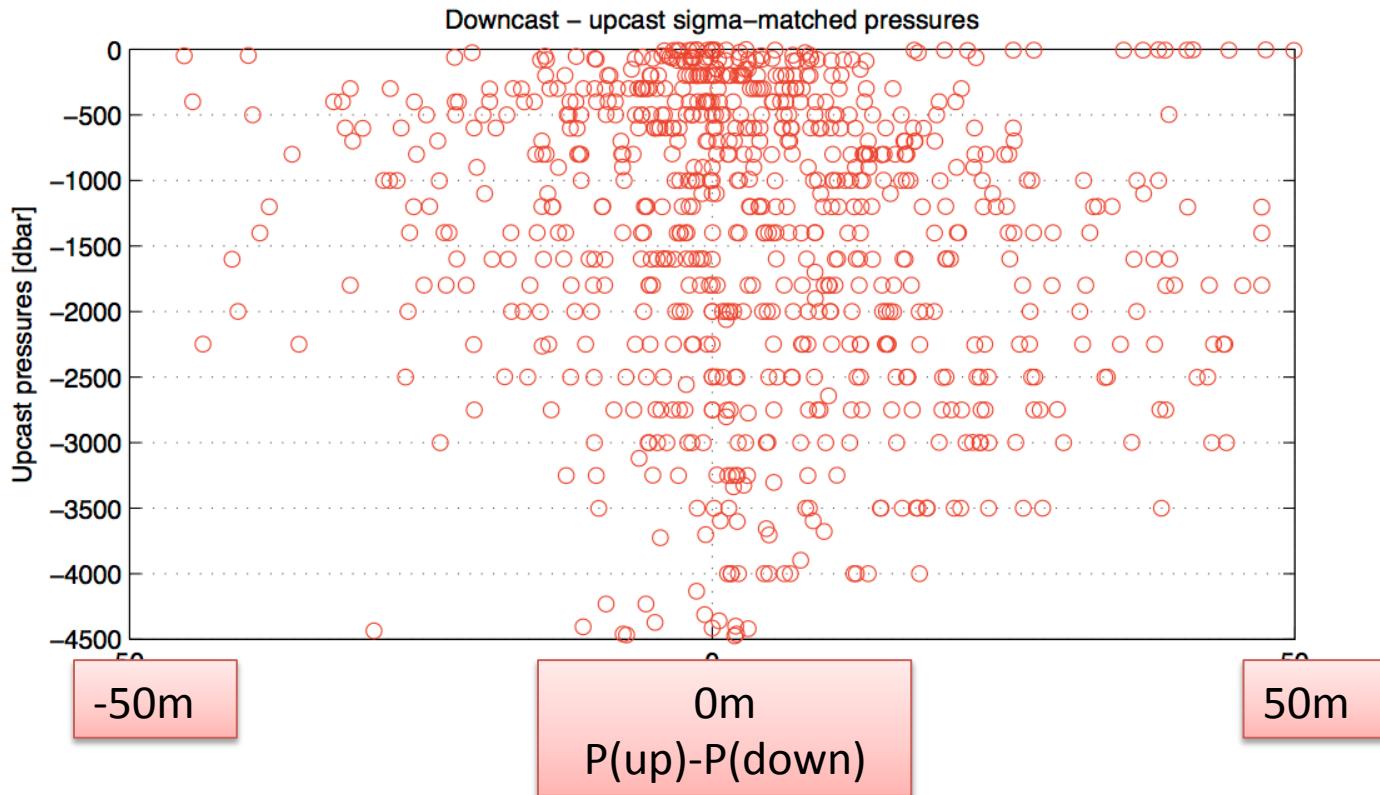
Procédure de calibration CTD-O2 (détail)



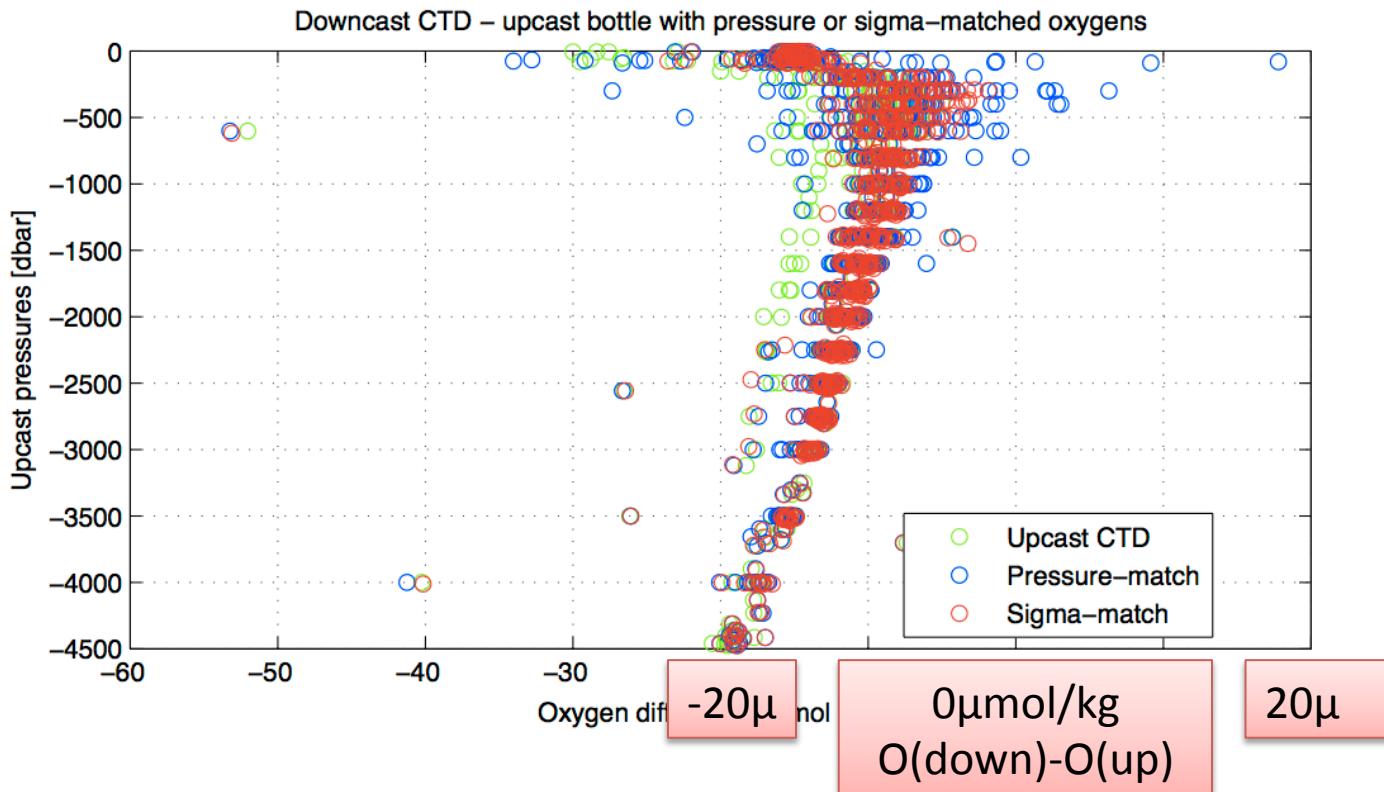
Procédure de calibration CTD-O2 (détail)



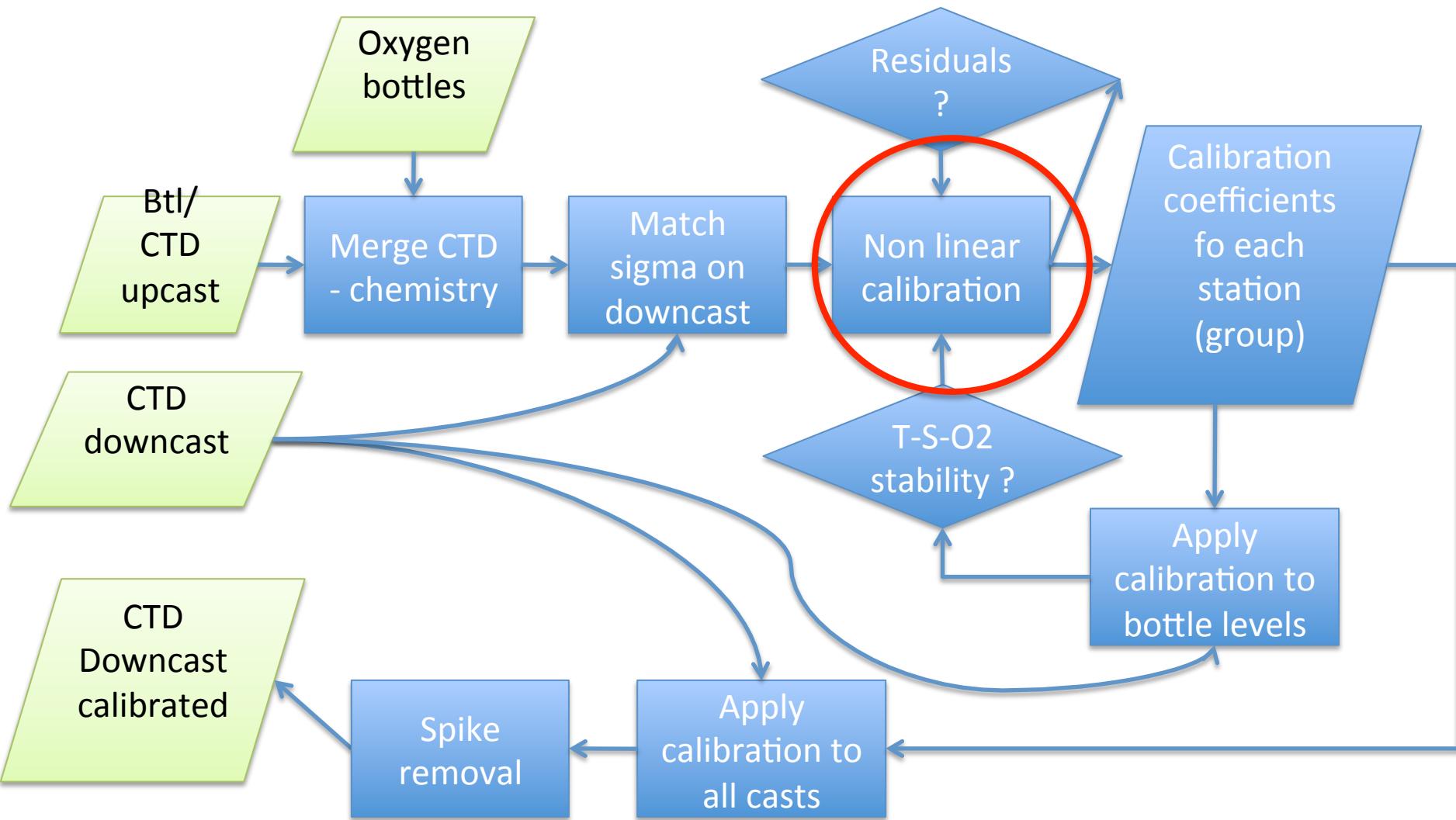
1-Ajustement en densité



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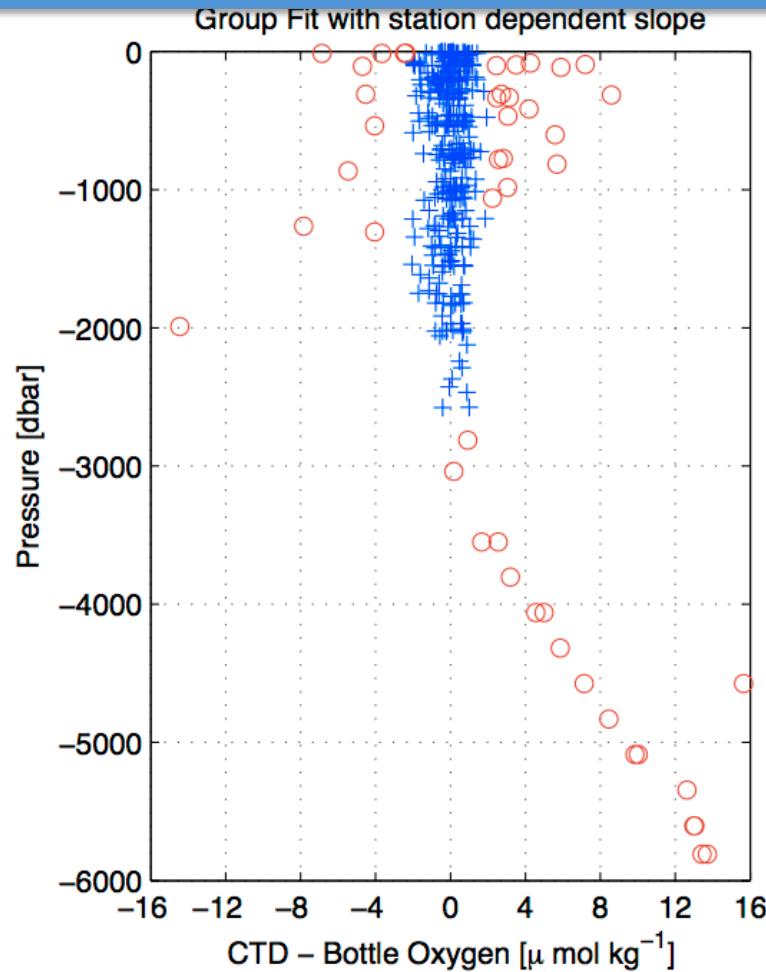
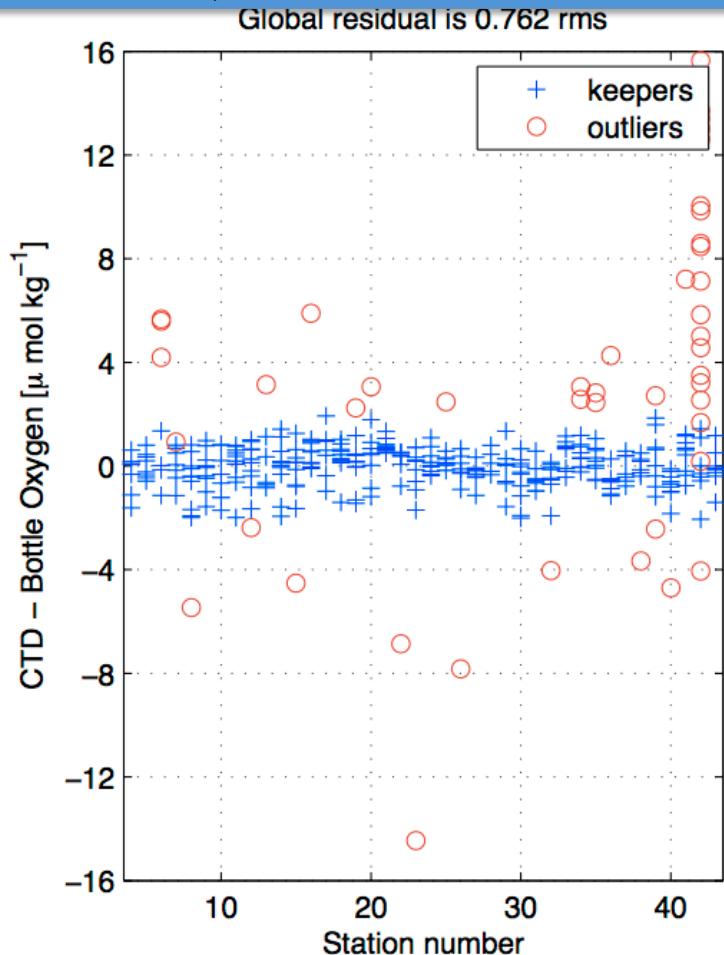
Procédure de calibration CTD-O2 (détail)



2-Détermination coefficients

$$O_2 = O_{sat} \times e^{\frac{T_{cor} \times T}{273.15+T}} \times e^{\frac{P_{cor} \times P}{273.15+T}} \times \dots$$

$$\textbf{Soc} * \left(O_x V + \textbf{V}_{\text{offset}} + \tau_{20} \times e^{(D1 \times P + D2 \times T)} \times \frac{dV}{dt} \right)$$



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$$O_2 = O_{sat} \times e^{\frac{T_{cor} \times T}{P_{cor} \times P}} \times e^{\frac{273.15 + T}{273.15 + T}} \times \dots$$

$$\text{Soc} * \left(O_x V + V_{\text{offset}} + \tau_{20} \times e^{(D1 \times P + D2 \times T)} \times \frac{dV}{dt} \right)$$

Global residual is 0.762 rms

Group Fit with station dependent slope

16

0

Optimisation des résidus:

- Dépendance linéaire du no de station
- Pondération par la profondeur
- Optimisation séquentielle: eg Soc pour tout puis les autres par station (?)
- Variation de la norme utilisée
- Groupements de stations

10

20

30

40

Station number

-16

-12

-8

-4

0

4

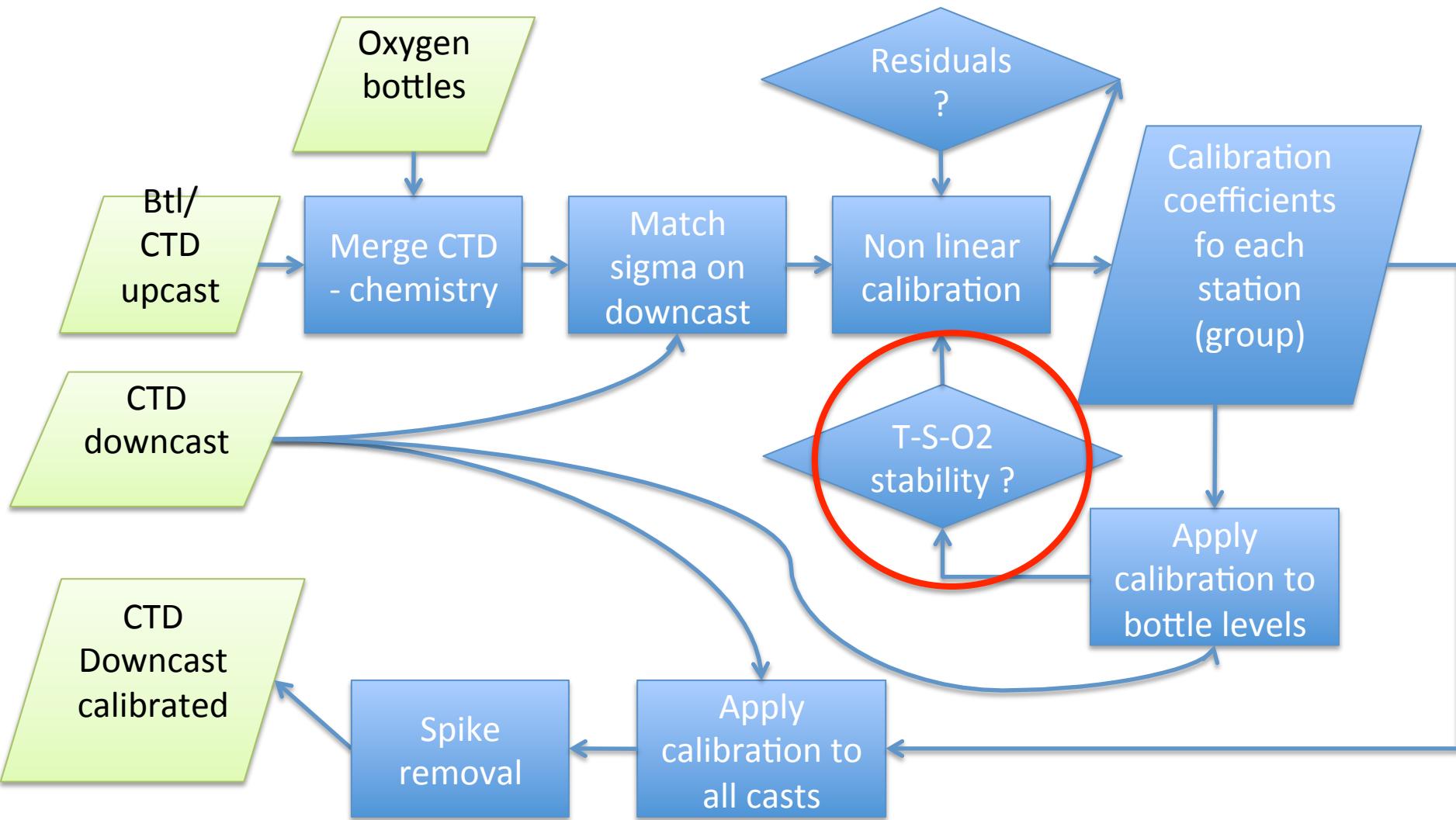
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12

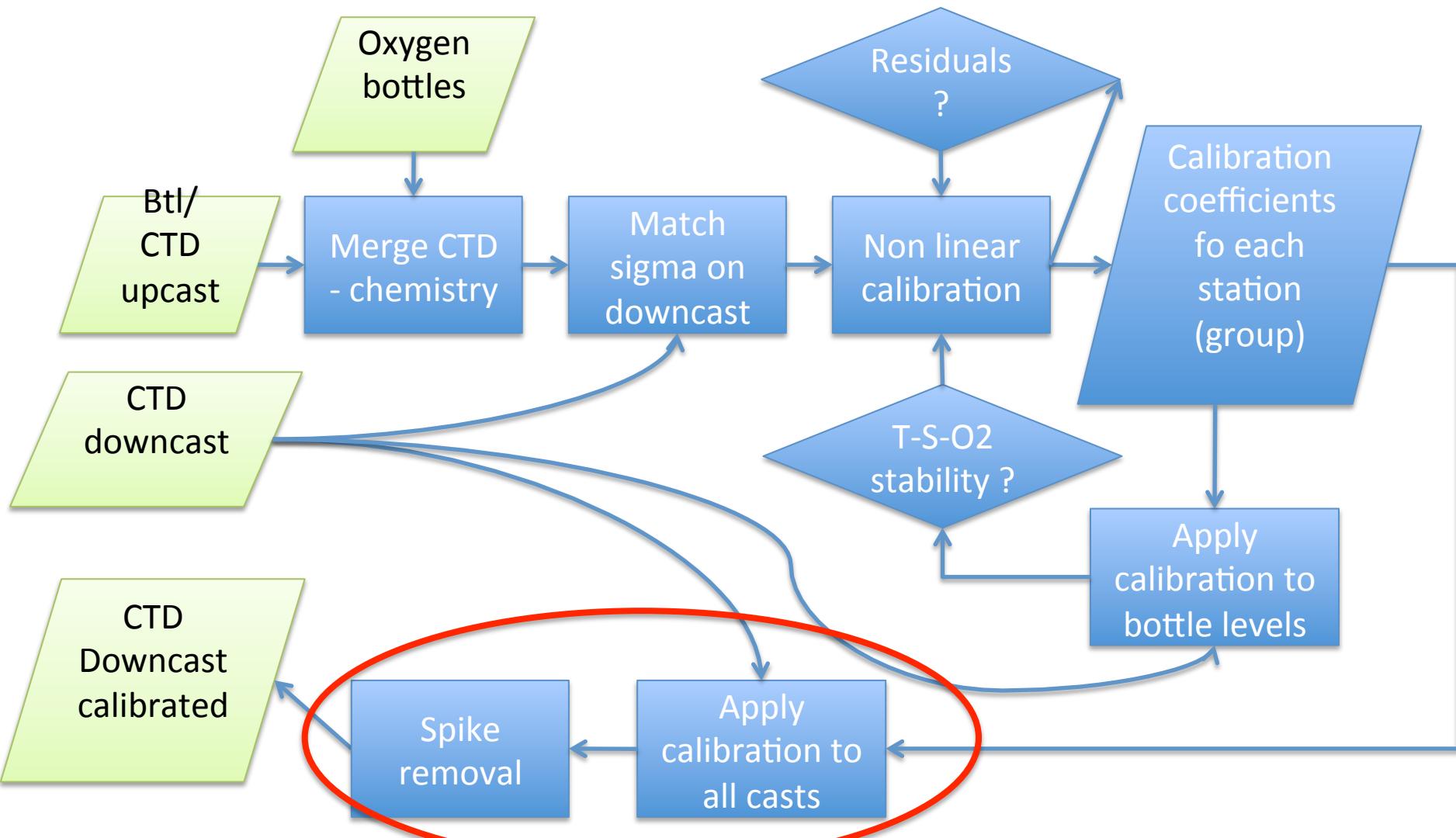
16

CTD - Bottle Oxygen [$\mu \text{ mol kg}^{-1}$]

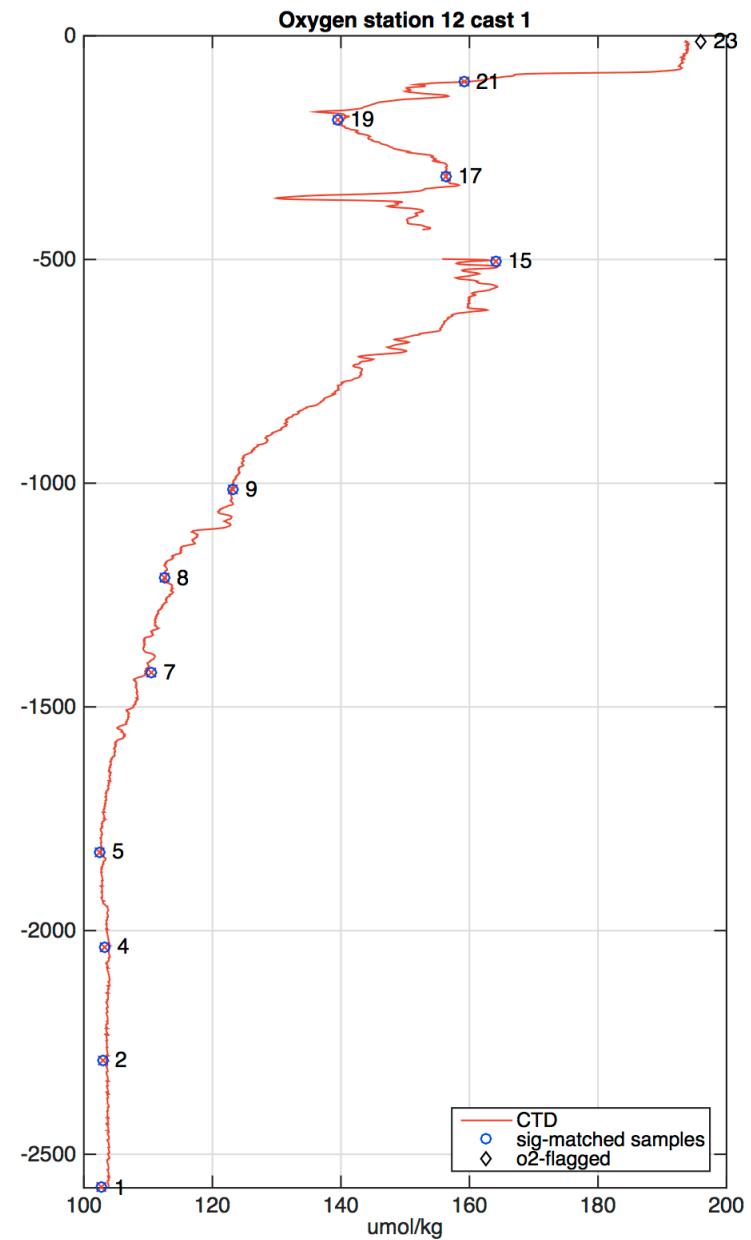
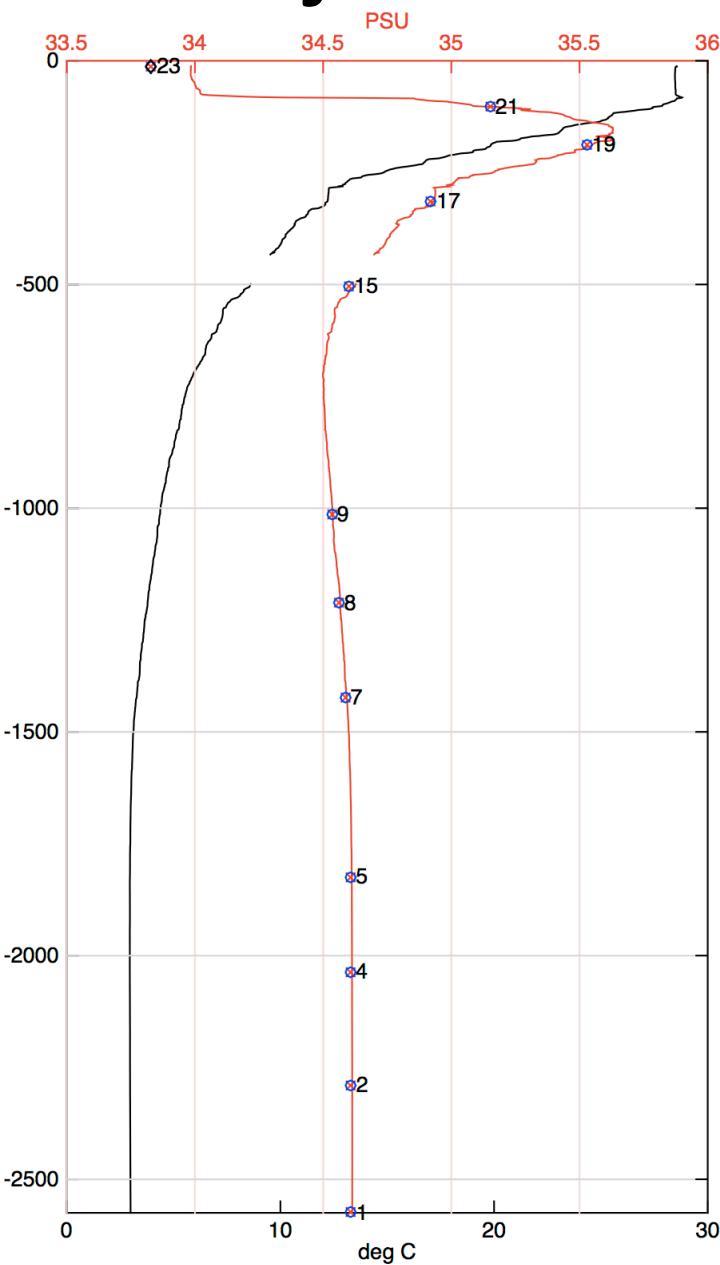
Procédure de calibration CTD-O2 (détail)



Procédure de calibration CTD-O2 (détail)



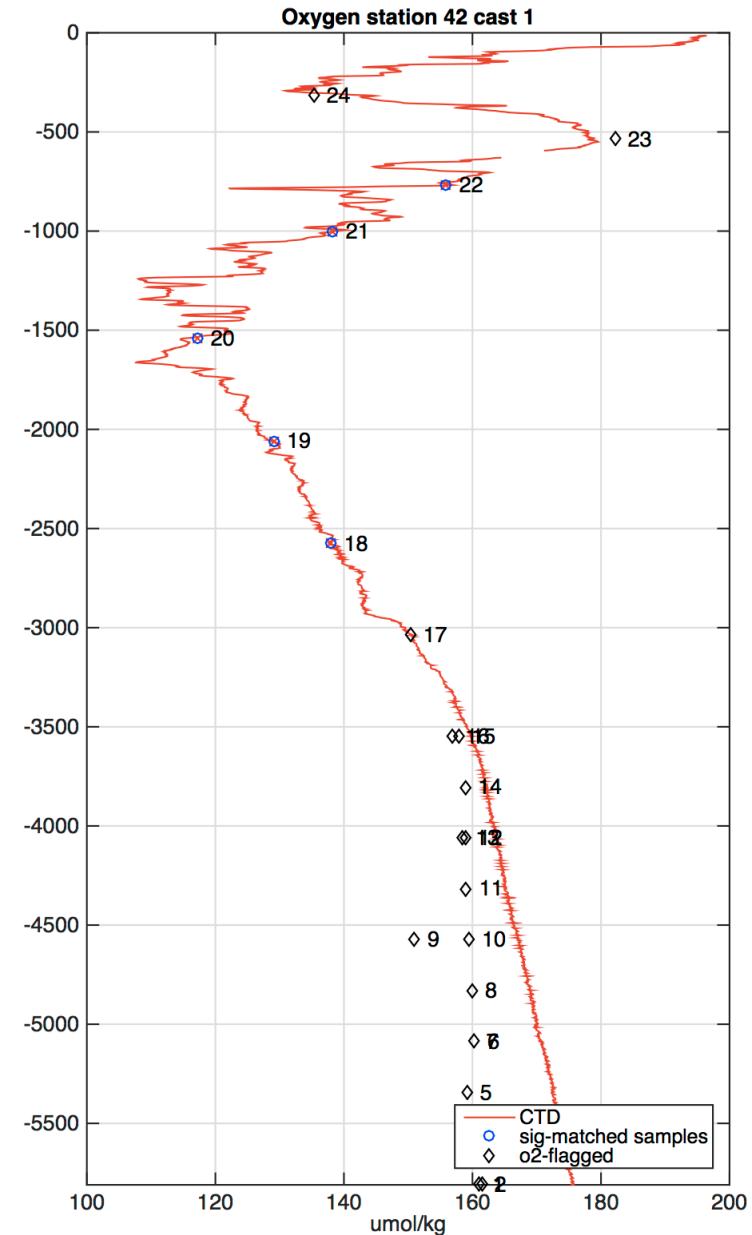
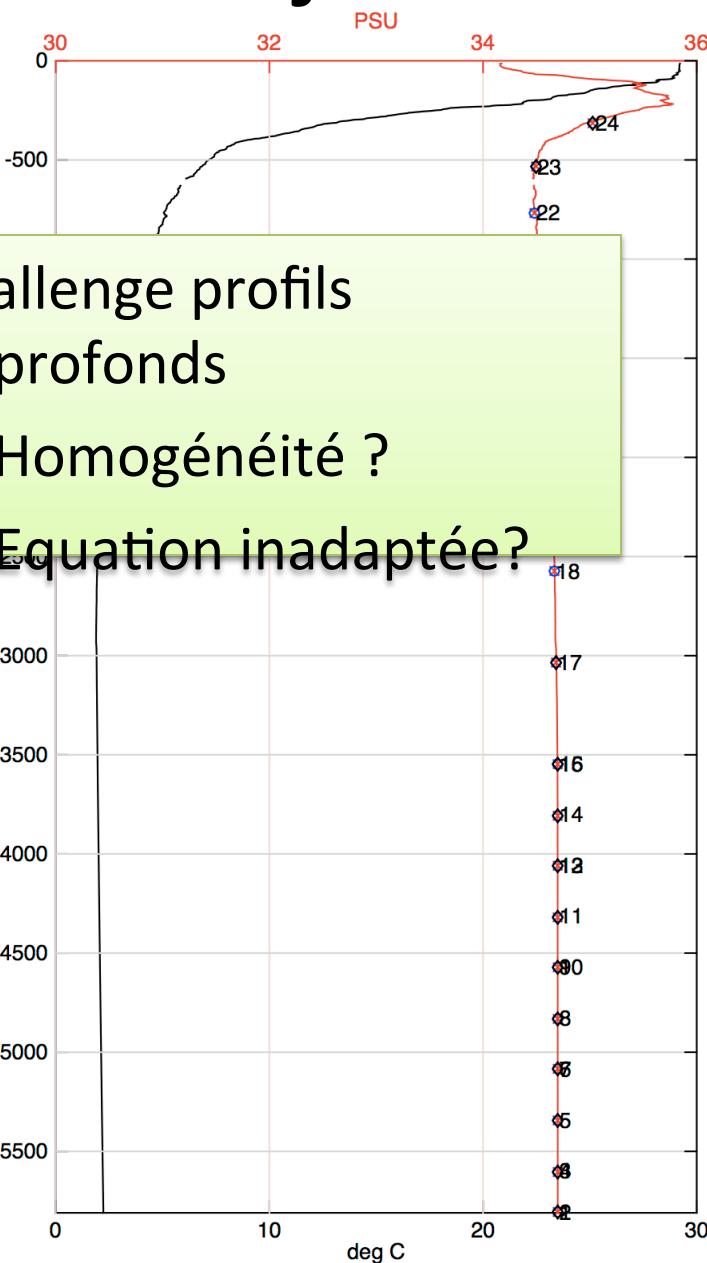
Ajustement/nettoyage



Ajustement/nettoyage

Challenge profils profonds

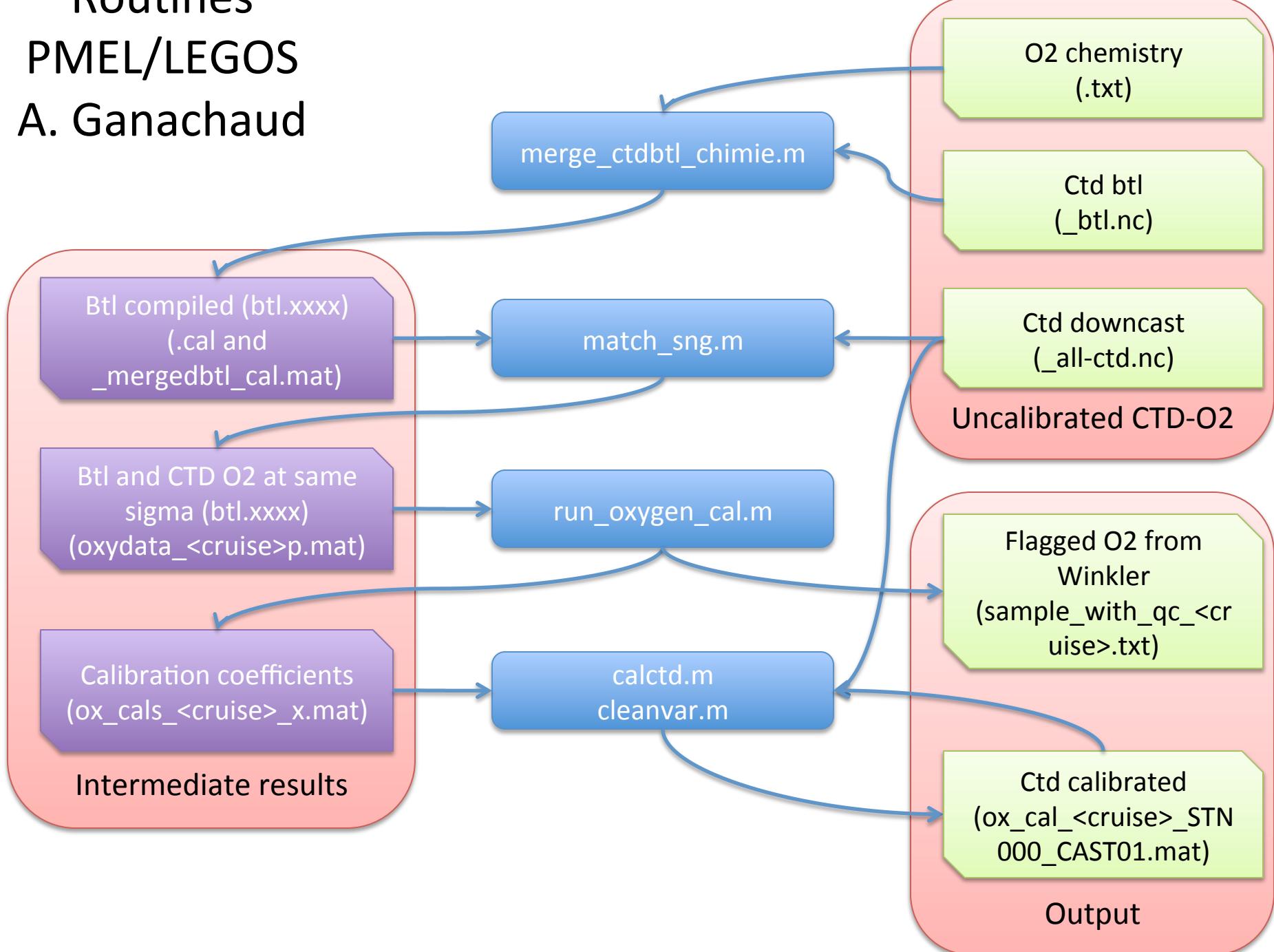
- Homogénéité ?
- Équation inadaptée?



Routines

PMEL/LEGOS

A. Ganachaud



Step 1: merge_ctdbtl_chimie.m

```
%FOR GIVEN STATION GROUP:  
% READ ROSETTE FILE (.BTL or _btl.nc)  
% READ OXYGEN EXCEL SHEET  
% FIND BOTTLE CLOSE TO ROSETTE1 BOTTLE and ASSOCIATE O2 (WARNING IF 2 CLOSE BOTTLES OR NO MATCH)  
%WRITE .CAL and _cal.mat bottle files with all stations for match_sgn
```

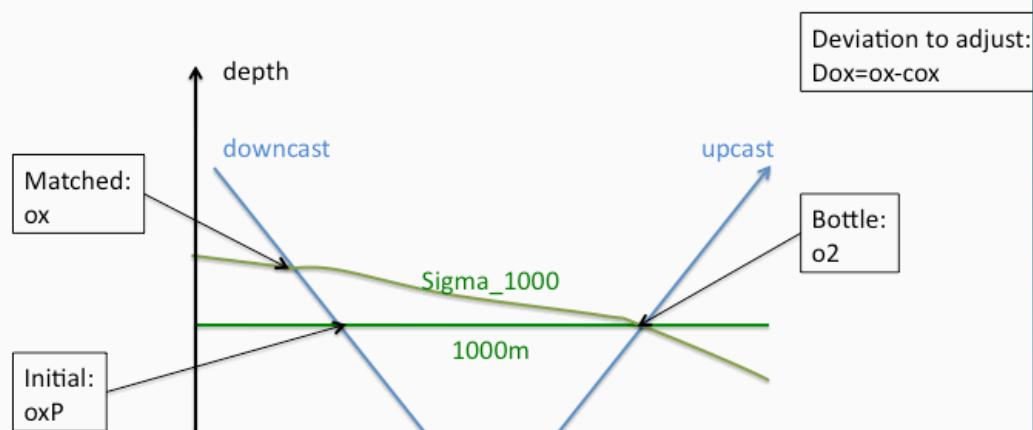
- **Input:**
 - This uses read_xls_o2.m to read xls file. For PANDORA, each xls contained group of 10 stations
 - Uses the .btl files with ctd rosette information (e.g., pandora_btl.nc)
- **Output:** "cal" file with all samples/rosette info: both ascii (.cal) and mat (_cal). Ascii has each column as follows:
 - btl.stat=p(:,1); %station
 - btl.cast=p(:,2); %cast
 - btl.btlid=p(:,3); %bottle id
 - btl.upres=p(:,4); %u = up ctd pressure
 - btl.utemp68=p(:,5); % up ctd temperature
 - btl.bsali=p(:,6); %salinity from samples
 - btl.usali=p(:,7); % up ctd salinity
 - btl.flask=p(:,8); %flacon id
 - btl.uoxv=p(:,9); %up ctd o2 voltage
 - btl.oxum=p(:,10); %up ctd o2 umol/kg
 - btl.wnklo2um=p(:,11); %oxygen from samples (umol/kg)

Website, log, software

- <http://www.legos.obs-mip.fr/ganachaud/restricted/oxygen-calibration/scripts>
- Accès: aginvited / swpac

Step 2: match_sgn.m

Oxygen calibration: density adjustment



Intercalibration between cruises ?

