PANDORA

Par Alexandre Ganachaud — Dernière modification 16/01/2014 15:10

log for Pandora Calibration, A. Ganachaud

Notes regarding oxygen calibration, Pandora Cruise A. Ganachaud, 2013. Non-public.

Sensors

Calibration sheets: main primary: 1506 (pre calibration 5-may-2012; same with Tcor); main secondary: 0514 (pre calibration 28-oct-2011; post calibration 15-dec-2012; same with Tcor)

Primary and secondary sensors: " Généralement le circuit primaire est meilleur. Sur le secondaire il y a souvent du bruit en conductivité. Donc je prendrais systématiquement le primaire. cas particulier, **le cast 6801**, que Jacques a récupéré après inversion des circuits, à vérifier même si les capteurs sont maintenant dans le bon ordre. Et toujours les problèmes en surface pour 1301,1302, 3903,3904.

Station characteristics:

Parameters and remarks from cruise (J. Grelet)

Summary table, *** Primary circuit ***

Station	Gaps in the vertical	sigma-match > 50m (except MLD)	Upcast problem	Downcast problem	Spikes	Remarks
1-8	X					Unit deck setting problem
2	X			Data gap near 1705m? STEP at 1646m; maybe real		No filtered DVDT: 1705-1740m; 1765-1785; 1795-1905;
3	X					No filtered DVDT below 1885 bump at 1275m
4	X					No filtered DVDT below 1680
5	X					No filtered DVDT below 1835
6	X					No filtered DVDT below 1810

10				2500-2700m	No spike in calibrated o2
12	735m; in Smax that was almost constant				No incidence on bottle
13				SSS	(GE)
16				spike-looking	cast 1: structure in both sensors
21	1865m, constant salt 1665m, constant salt 735m, constant salt				? proche de Guadalcanal No incidence on bottles 2102-2111: flagged 3 below 1000m (jellyfish problem)
25				100-700m	S spike at 592m and some in 200-300m flag 3 salt 57-799m because bottles confirm values below flag 3 Temp all profiles because many glitches
28	1869m			3155-bottom	No incidence on bottles flagged to 3 below 3155m; also in S
31				1650, 1850	
3601	0m				Left pipe: removed data ? nothing in salinity
3904				0-25m	Left pipe: removed data
40		No sigma match 900m			Problem during upcast
42		No sigma-match for 1000, 700, 500	800-970m; Almost all casts then pump was changed		Problem during upcast; 400m is also off due to spurious sigma match Arrival in Solomon Strait Systematic for all casts (GE). Secondary better.
4201			834-1001m		Removed data
4202			813-941m		Removed data
4205			818-963m		Removed data
4207			791-1210m		Removed data
4209			798-1310m		Removed data
48	1336m; Salinity const				
53					Samples are in the gradients
54				2650 in raw o2	Nothing in calibrated o2 or salinity
6001					All profile flagged to 3 (deviation from samples and next casts) Removed bad data below
				3543-bot	
6002 (5506)	at 2542, 2750, 3000, 4000, 4250, 4500, 5001, 5250m			3525m	Constant density so limited match to 3500m; Bottles 14,15,17 are higher Removed data below 3525m Used circuit 2 for T/S bottle (upcast)
6003-6008					Removed data below 3525m

6009			9m	Removed surface data (pipe); Sali
6013 (1300)		715, 304, 191		Used circuit 2 for T/S bottle (upcast)
61			1650	dVdt problem 1705m; O2
			1750	Despiked @ 1699-1710m
				Goes below 3800m
				Despiked S: 1646-1653; 1726-1754; 1839-1842
62		at 70m		Mixed layer very homogeneous
63		at 55m		Mixed layer very homogeneous
66	X			Missing 234m and 235m
67			1250	Looks noisy below 1500m
			1500	Pump power supply problem fixed after 67
			Also in Sali	Unspiked: 1180-1248m;
				1492-1539m;
				1546-1565m;
				1670-1684m;
				1748-1769m;
				1823-1832m;
				1894-1960m;
				1965-2000m
				Unspiked salinity also
				Not temperatures
6801				Initially, CTD1/2 inversion and bad pump: re-done (6802). But CTD1/2 were put back in order in the dataset (email JG 19/11/21)
6802		at 76m		
72	X			Missing 103m and 104m
82	X	Many places		Unit deck setting problem. No filtered dvdt 1800-2000m

Unit deck setting: "le scan average dans le deck unit était réglé à 24, j'ai corrigé ensuite (mis à 1, cad tout les cycles)"
Conséquence: trous dans les données de quelques mètres

Bottle depths and leak detection (**all-stat-depth.xlsx**)

Residuals before interpolation:

1. With upcasts: depth deviation; oxygen deviation
2. Without upcasts: depth deviation; oxygen deviation

Calibration

Experiment	Option	Residuals (STD)	Remark
1: all stats 1-82	regular LS	0.03 (1.64) (fig)	See linear structure with station after 12
2: all stats 1-82	linear stat	0.02 (1.13) (fig)	Much better but remaining struct stat 1-10; removed more outliers
3: stats 12-82	linear stat	0.02 (1.05) (fig)	Very nice fit. Deviation at stat 60 below 4000m
4: stats 1-10	linear stat	-0.095 (1.011) (fig)	Ok but bias looks large
5: stats 1-10	regular LS	0.003 (1.17) (fig)	Much better without slope
6: only deep reaching (>3000m) stats	regular LS	0.02 (1.20) (fig)	Still 3.5 umol/kg at 5500m/ stat 60 Not sufficient. G. Johnson recommends using fit 3; then fit on station 60, only one coefficient (poor): experience 9
7: try wswitch to 1 (weight on deep measurements)	linear ws=1	0.06 (1.25) (fig)	Keeps many more outliers but still residual slope with depth
8: try wswitch to 3 (L4 norm)	linear ws=3	0.08 (1.165) (fig)	Keeps many more outliers but still residual slope with depthSupposed to better fit low and high values
9: Station 60 only; fit all coefs except Pcor			

10: stats 1-10; wswitch to 1; slope=0	regular ws=1		Better than exp 5 but still large at station 3
11: stats 1-10; wswitch=1; slope=1	linear ws=1	-0.009 (1.179) (fig) (bydepth)	** DOES NOT CONVERGE ** linear station dependent bias and weight on deep measurements give a good residual
12: stats 12-82; remove calibration below 3510m	linear ws=0	0.023 (1.03) (fig) (bydepth)	suffix_3510m. Very nice fit
13: stats12-82; based on exp 3 but using in situ oxygen solubility	linear ws=0	0.023 (1.056) (fig)	little difference with experience 3 (see in situ T-S-O2)
14: stats 12-82; same as exp 12 but ws=1 because saw about 1umol/kg deep bias	linear ws=1	0.03 (1.08) (rms 1.08) (fig) (bydepth)	At depths, difference with Exp 12 is very small.
FROM HERE WITH NEW SOFTWARE			
15: stats 1-10	iswitch=2 ws=0	0.01 (1.007) (fig) (bydepth)	Theta-S-O2 comparison

*** FINAL CHOICE FOR CALIBRATION ***

Experiments 12 & 15

Bias analysis

- T-S-O2 for experiments 11 and 12 (fig) (but since 11 does not converge…)
- T-S-O2 for experiments 15 and 12 (fig)

Secondary circuit

Used oxygen from secondary sensor

T/S from primary

Summary table

Spikes spotted: stations 2,6,9,10,14,15,16,17,18,21,22,23,29,31,32,40,59,60,61,62,63,7201

Station	Gaps in the vertical	sigma-match > 50m (except MLD)	Upcast problem	Downcast problem	Spike	Remarks
All stations						**Many spikes in general**
4209						**remove, 1271-1301m**
All casts 42						**Noise on small scales; all flagged to 3**
6002-6301						**All oxygen wrong/noisy**

Residuals before interpolation:

1. With upcasts: depth deviation; oxygen deviation: similar to primary circuit (linear slope 12-82)

Calibration, secondary O2 sensor

Experiment	Option	Residuals (STD)	Remark
1: all stats 1-82	regular LS	0.05 (1.96) (fig)	Same linear structure with station after 12; but also in stations 1-10
11: stats 1-10; wswitch=1; slope=1	linear ws=1	0.02 (1.3)(1.3)(fig) (bydepth)	Good residual; vertical structure is unbiased: need to check if it converged
New scripts (March 2014) from now on			
12: stats 12-82; remove calibration below 3510m	linear ws=0	0.001 (1.23) (fig) (bydepth)	Optimal as for circuit 1

*** FINAL CHOICE FOR CALIBRATION ***

Experiment 12. Did not re-calibrate stats 1-10.

Choice between Primary and Secondary

- Use secondary O2 only for profiles 4201 4202 4204 4205 4207 4208 4209 6001. **WATCH OUT** for calibration purpose we used TS from primary, but we use T and S from secondary: (they remain flagged at 3)
- Comparison primary/secondary for 6001 (compare_primary_secondary_station60.m)
- All profiles with only those from secondary: Theta-O2 for all; isolating secondary

More info

- CCHDO (WOCE/WHP) format: see here

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Réalisation: **Octavo**