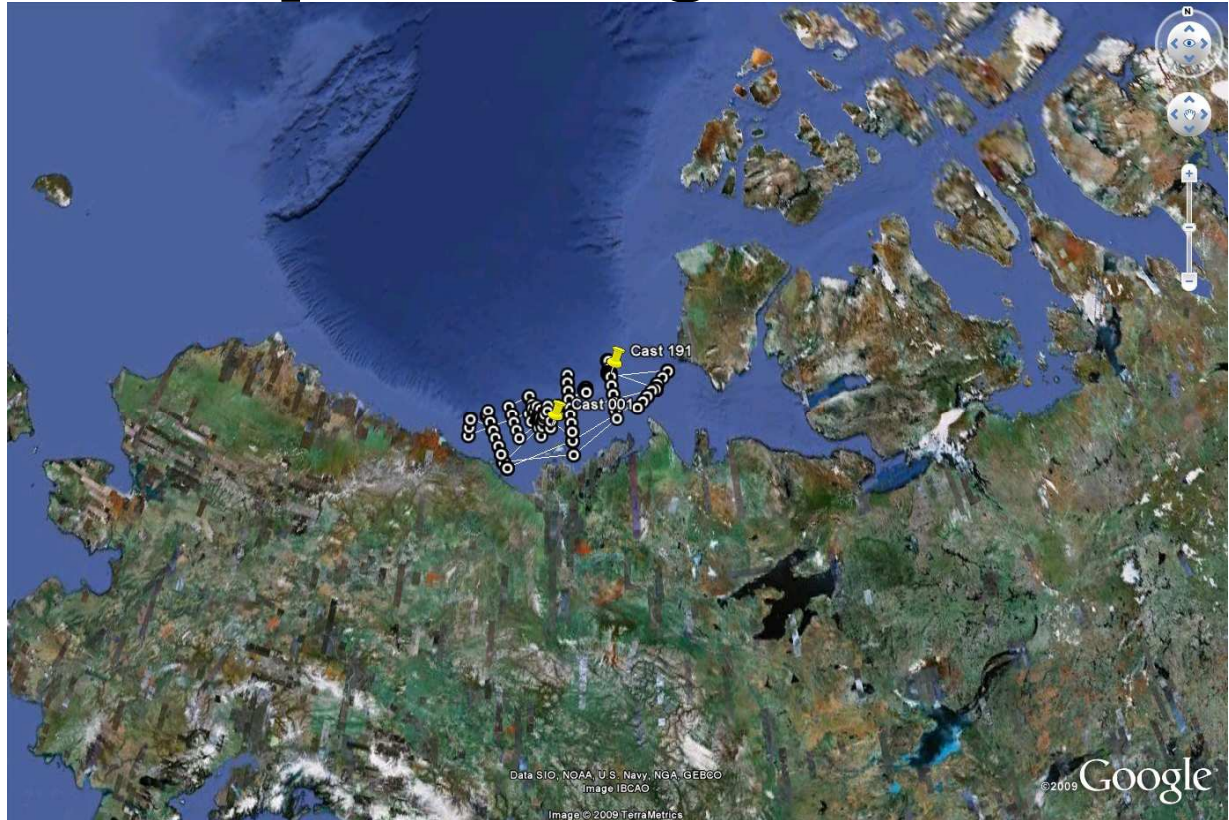


IOL/Malina 0902 CTD processing notes



Pascal Guillot

Pascal_Guillot@uqar.qc.ca

Yves Gratton

Yves_Gratton@inrs-ete.quebec.ca

Québec
Océan

Le groupe interinstitutionnel de
recherches océanographiques du Québec

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IOL/Malina 0902 (leg 2) CTD Processing Notes

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Foreword.

[Québec-Océan](#) has developed a procedure to process, to perform a quality control and to store into a database oceanographic data collected from a Sea-Bird CTD. This procedure should ensure both the quality and the durability of such data.

The data processing is performed through the “Sea-Bird SBE Data Processing program”. The quality control is based on the UNESCO’s algorithms and is performed through matlab toolbox developed by the Maurice-Lamontagne Institute (Fisheries and Ocean Canada).

1. DATA PREPARATION.

All the seabird filenames have been renamed by deleting the first letter “R” in order to be consistent with the Québec-Océan convention.

1.1. Check the configuration files.

The configuration files for the cast 001 to 004 are missing. They have been created from cast 006 configuration file.

For all the casts, the SBE43 oxygen date calibration “17-Apr-09p” has been replaced by “17-Apr-09”.

For all the casts, the fluorometer Seapoint date calibration “mai 2009” has been replaced by “01-May-09”.

The configuration for the sensor BackScat has been updated.

There are 191 casts recorded by a Sea-Bird 911*plus* CTD.

There are 12 sensors (see table 1).

There are 3 instrumental configuration for the 191 casts (see table 2).

The variables “user defined”, “User Polynomial” and “User Polynomial 2” defined into the configuration files are related to the BackScat and nitrate sensor.

The SBE 43 oxygen sensor used the new Sea-bird equation to compute the dissolved oxygen concentrations.

Table 1. List of the sensors installed on the 911*plus* CTD system during the 0902 cruise.

Sensor	Type	Unit	Serial number	Web link	Casts
pressure	Paroscientific Digiquartz®	db	0730	http://www.paroscientific.com/overview.htm#depth	191
temperature	SBE 3plus	ITS-90 deg C	4204	http://seabird.com/products/spec_sheets/3pdata.htm	191
conductivity	SBE 4	mS/cm	2696	http://seabird.com/products/spec_sheets/4data.htm	191
oxygen	SBE 43	ml/l	0240	http://seabird.com/products/spec_sheets/43data.htm	191
pH	SBE 18	SI (1-14)	0714	http://seabird.com/products/spec_sheets/27data.htm	45
fluorescence	Seapoint	µg/l	2900	http://www.seapoint.com/scf.htm	83
PAR/Irradiance	QCP-2300 Biosherical	µEinsteins/m ² ·sec	4664	http://www.biospherical.com/BSI%20WWW/Products/Listing.htm	191
SPAR/Surface Irradiance	QCR-2200 Biosherical	µEinsteins/m ² ·sec	20147	http://www.biospherical.com/BSI%20WWW/Products/Listing.htm	191
Transmissometer	WetLabs C-Star	%	CST- 671dr	http://wetlabs.com/products/cstar/cstar.htm	191
Nitrate / salinity	MBARI- ISUS Satlantic	µMolar / PSU	132	http://www.satlantic.com/details.asp?ID=11&CategoryID=2&SubCategoryID=0	191/191
Altimeter	Benthos	m	1061	http://www.benthos.com/	191
CDOM fluorometer	Dr. Haardt Back Scat I	mg/m ³	12030	http://www.dr-haardt.de/BackScat.html	145

Table 2. Modification of the Sea-Bird CTD configuration during the cruise 0902.

Cast number	Cast list	Version
45 cast(s)	0902001 0902002 0902003 0902004 0902005 0902006 0902007 0902008 0902009 0902010 0902011 0902012 0902013 0902014 0902015 0902016 0902017 0902018 0902019 0902020 0902021 0902022 0902023 0902024 0902025 0902026 0902027 0902028 0902029 0902030 0902031 0902032 0902033 0902034 0902035 0902036 0902037 0902038 0902039 0902040 0902041 0902042 0902043 0902044 0902045	V1
Difference	The pH sensor sn 0714 has been removed. The CDOM fluorometer Dr. Haardt Back Scat sn 12030 has been connected.	
57 cast(s)	0902046 0902047 0902048 0902049 0902050 0902051 0902052 0902053 0902054 0902055 0902056 0902057 0902058 0902059 0902060 0902061 0902062 0902063 0902064 0902065 0902066 0902067 0902068 0902069 0902070 0902071 0902072 0902073 0902074 0902075 0902076 0902077 0902078 0902079 0902080 0902081 0902082 0902083 0902084 0902085 0902086 0902087 0902088 0902089 0902090 0902091 0902092 0902093 0902094 0902095 0902096 0902097 0902098 0902099 0902100 0902101 0902104	V2
Difference	The coefficients for the Seapoint fluorometer sensor sn 2900 have been changed.	
89 cast(s)	0902102 0902103 0902105 0902106 0902107 0902108 0902109 0902110 0902111 0902112 0902113 0902114 0902115 0902116 0902117 0902118 0902119 0902120 0902121 0902122 0902123 0902124 0902125 0902126 0902127 0902128 0902129 0902130 0902131 0902132 0902133 0902134 0902135 0902136 0902137 0902138 0902139 0902140 0902141 0902142 0902143 0902144 0902145 0902146 0902147 0902148	V3

	0902149 0902150 0902151 0902152 0902153 0902154 0902155 0902156 0902157 0902158 0902159 0902160 0902161 0902162 0902163 0902164 0902165 0902166 0902167 0902168 0902169 0902170 0902171 0902172 0902173 0902174 0902175 0902176 0902177 0902178 0902179 0902180 0902181 0902182 0902183 0902184 0902185 0902186 0902187 0902188 0902189 0902190 0902191	
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1.2. Check the logbook and the rosette sheets.

Table 3. Modifications into the logbook and the rosette sheets.

Cast	File	Parameter	Original	New
001	Rosette sheet	Cable length		51
001	Rosette sheet	Wind		8 kt/180°
001	Rosette sheet	Start Lat.	74°	74° 28.8144
001	Rosette sheet	Start Lon.	135°	135° 6.6228
001	Rosette sheet	End Lat.		74° 28.8156
001	Rosette sheet	End Lon.		135° 6.7104
002	Rosette sheet	Cable length		51
003	Rosette sheet	Cable length		140
003	Rosette sheet	Bottom time		0:32
003	Rosette sheet	Bottom Lat.		70° 39.3588
003	Rosette sheet	Bottom Lon.		-135° 38.3244
004	Rosette sheet	Cable length		355
004	Rosette sheet	Bottom time		06:30
004	Rosette sheet	End time		06:33
004	Rosette sheet	Bottom Lat.		70° 44.1768
004	Rosette sheet	Bottom Lon.		-135° 33.6264
004	Rosette sheet	End Lat.		70° 44.1864
004	Rosette sheet	End Lon.		-135° 33.6168
005	Rosette sheet	Cable length		355
006	Rosette sheet	Bottom Lat.		70° 42.3336
006	Rosette sheet	Bottom Lon.		-135° 48.2700
007	Rosette sheet	Cable length		85
008	Rosette sheet	Cable length		286
008	Rosette sheet	Bottom time		06:26
008	Rosette sheet	End time		06:57
008	Rosette sheet	Bottom Lat.		70° 39.2964
008	Rosette sheet	Bottom Lon.		-135° 55.8312

008	Rosette sheet	End Lat.		70°39.3636
008	Rosette sheet	End Lon.		-135°55.7448
009	Rosette sheet	Cable length		720
010	Rosette sheet	Cable length		665
010	Rosette sheet	Bottom Lat.		70°45.7404
010	Rosette sheet	Bottom Lon.		-136°1.4112
011	Rosette sheet	Cable length		421
011	Rosette sheet	End Lat.	70°41.194	70°41.194
012	Rosette sheet	Bottom time		21:49
012	Rosette sheet	End time		21:52
012	Rosette sheet	Bottom Lat.		70°48.8892
012	Rosette sheet	Bottom Lon.		134°33.0240
012	Rosette sheet	End Lat.		70°48.8820
012	Rosette sheet	End Lon.		134°33.0384
013	Rosette sheet	Cable length		75
013	Rosette sheet	Bottom Lat.		70°53.8020
013	Rosette sheet	Bottom Lon.		-134°16.0644
014	Rosette sheet	Cable length		62
014	Rosette sheet	Bottom time		07:43
014	Rosette sheet	End time		07:58
014	Rosette sheet	Bottom Lat.		70°49.0980
014	Rosette sheet	Bottom Lon.		-134°30.6072
014	Rosette sheet	End Lat.		70°49.0896
014	Rosette sheet	End Lon.		-134°30.5904
015	Rosette sheet	Cable length		331
015	Rosette sheet	Bottom time		16:39
015	Rosette sheet	End time		17:22
015	Rosette sheet	Bottom Lat.		71°1.0308
015	Rosette sheet	Bottom Lon.		-134°37.9272
015	Rosette sheet	End Lat.		71°0.7440

015	Rosette sheet	End Lon.		-134°38.3316
016	Rosette sheet	Cable length		485
016	Rosette sheet	Bottom time		01:17
016	Rosette sheet	Bottom Lat.		70°52.5108
016	Rosette sheet	Bottom Lon.		-135°21.5700
017	Rosette sheet	Start Lon.	-015°51.822	- 135°51.822
018	Rosette sheet	Cable length		635
018	Rosette sheet	Bottom time		16:07
018	Rosette sheet	End time		17:04
018	Rosette sheet	Bottom Lat.		71°0.8184
018	Rosette sheet	Bottom Lon.		-135°21.1644
018	Rosette sheet	End Lat.		71°0.6900
018	Rosette sheet	End Lon.		-135°22.4844
019	Rosette sheet	Cable length		1000
019	Rosette sheet	Bottom time		14:28
019	Rosette sheet	End time		15:20
019	Rosette sheet	Bottom Lat.		70°47.5692
019	Rosette sheet	Bottom Lon.		-136°39.8052
019	Rosette sheet	End Lat.		70°47.4348
019	Rosette sheet	End Lon.		-136°40.5456
019	Rosette sheet	Start Lon.	-134°39.451	-13 6°39.451
020	Rosette sheet	Cable length		1000
020	Rosette sheet	Bottom time		09:09
020	Rosette sheet	End time		10:03
020	Rosette sheet	Bottom Lat.		70°56.1552
020	Rosette sheet	Bottom Lon.		-136°25.8492
020	Rosette sheet	End Lat.		70°56.1864
020	Rosette sheet	End Lon.		-136°26.4048
021	Rosette sheet	Cable length		1000
022	Rosette sheet	Cable length		570

022	Rosette sheet	Bottom time		02:59
022	Rosette sheet	Bottom Lat.		70°44.2524
022	Rosette sheet	Bottom Lon.		-135°55.2444
023	Rosette sheet	Cable length		60
023	Rosette sheet	Bottom time		03:58
023	Rosette sheet	Bottom Lat.		70°30.3780
023	Rosette sheet	Bottom Lon.		-135°40.3992
024	Rosette sheet	Cable length		50
024	Rosette sheet	Bottom time		14:15
024	Rosette sheet	End time		14:25
024	Rosette sheet	Bottom Lat.		70°38.4060
024	Rosette sheet	Bottom Lon.		-135°5.9796
024	Rosette sheet	End Lat.		70°38.4276
024	Rosette sheet	End Lon.		-135°6.0372
025	Rosette sheet	Start time		21:03
025	Rosette sheet	Bottom time		21:06
025	Rosette sheet	End time	21:03	21:18
025	Rosette sheet	Start Lat.	70°10.763	70°10. 8120
025	Rosette sheet	Start Lon.	-133°34.114	-133°3 3.8280
025	Rosette sheet	Bottom Lat.		70°10.8144
025	Rosette sheet	Bottom Lon.		-133°33.9468
026	Rosette sheet	Bottom time		23:09
026	Rosette sheet	Bottom Lat.		70°10.4556
026	Rosette sheet	Bottom Lon.		133°34.0800
027	Rosette sheet	Start Lat.	70°6.99	70° 10.6920
027	Rosette sheet	Start Lon.	133°30.649	133°3 4.7280
027	Rosette sheet	Bottom time		0:33
027	Rosette sheet	End time		0:39
027	Rosette sheet	Bottom Lat.		70°10.6824
027	Rosette sheet	Bottom Lon.		133°34.8048

027	Rosette sheet	End Lat.		70°10.6572
027	Rosette sheet	End Lon.		133°34.9056
028	Rosette sheet	Cable length		46
028	Rosette sheet	Bottom time		12:32
028	Rosette sheet	Bottom Lat.		69°29.2440
028	Rosette sheet	Bottom Lon.		137°56.5080
029	Rosette sheet	Bottom depth		51
029	Rosette sheet	Cable length		46
029	Rosette sheet	Bottom time		15:13
029	Rosette sheet	End time		15:24
029	Rosette sheet	Bottom Lat.		69°29.0100
029	Rosette sheet	Bottom Lon.		137°55.9968
029	Rosette sheet	End Lat.		69°28.9044
029	Rosette sheet	End Lon.		137°56.0448
030	Rosette sheet	Cable length		48
030	Rosette sheet	Bottom time		16:47
030	Rosette sheet	End time		16:57
030	Rosette sheet	Bottom Lat.		69°28.1460
030	Rosette sheet	Bottom Lon.		137°57.2400
030	Rosette sheet	End Lat.		69°28.0020
030	Rosette sheet	End Lon.		137°57.2820
031	Rosette sheet	Cable length		46
031	Rosette sheet	Bottom Lat.		69°29.1240
031	Rosette sheet	Bottom Lon.		137°56.3340
032	Rosette sheet	Cable length		115
032	Rosette sheet	Bottom time		16:49
032	Rosette sheet	End time		17:03
032	Rosette sheet	Bottom Lat.		69°36.4320
032	Rosette sheet	Bottom Lon.		138°12.3420
032	Rosette sheet	End Lat.		69°36.3480

032	Rosette sheet	End Lon.		138°11.9400
033	Rosette sheet	Cable length		115
033	Rosette sheet	Pa(mbar)		1023.9
033	Rosette sheet	Tair(°C)		9.8
033	Rosette sheet	Wind		4/029
033	Rosette sheet	Cloud cover		PC
033	Rosette sheet	Sea state		1
033	Rosette sheet	Bottom time		19:18
033	Rosette sheet	Bottom Lat.		69°36.3540
033	Rosette sheet	Bottom Lon.		138°13.3500
035	Rosette sheet	Cable length		115
035	Rosette sheet	Bottom time		21:03
035	Rosette sheet	Bottom Lat.		69°36.5220
035	Rosette sheet	Bottom Lon.		138°13.3080
036	Rosette sheet	Cable length		101
036	Rosette sheet	Bottom time		22:53
036	Rosette sheet	End Lat.		69°36.5538
036	Rosette sheet	End Lon.		138°14.3520
037	Rosette sheet	Cable length		10
037	Rosette sheet	Bottom time		20:30
037	Rosette sheet	End time		20:35
037	Rosette sheet	Bottom Lat.		69°50.8140
037	Rosette sheet	Bottom Lon.		133°29.5320
037	Rosette sheet	End Lat.		69°50.8080
037	Rosette sheet	End Lon.		133°29.6220
038a	Rosette sheet	Cable length		10
038a	Rosette sheet	Bottom time		22:48
038a	Rosette sheet	End time		22:52
038a	Rosette sheet	Bottom Lat.		69°50.9580
038a	Rosette sheet	Bottom Lon.		133°29.8740

038a	Rosette sheet	End Lat.		69°51.0000
038a	Rosette sheet	End Lon.		133°29.9220
038b	Rosette sheet	Cable length		10
038b	Rosette sheet	Bottom time		22:48
038b	Rosette sheet	End time		22:52
038b	Rosette sheet	Bottom Lat.		69°50.9580
038b	Rosette sheet	Bottom Lon.		133°29.8740
038b	Rosette sheet	End Lat.		69°51.0000
038b	Rosette sheet	End Lon.		133°29.9220
039	Rosette sheet	Cable length		28
039	Rosette sheet	Bottom time		12:24
039	Rosette sheet	Bottom Lat.		70°40.302
039	Rosette sheet	Bottom Lon.		130°26.094
040	Rosette sheet	Bottom time		14:59
040	Rosette sheet	End time		15:08
040	Rosette sheet	Bottom Lat.		70°52.1580
040	Rosette sheet	Bottom Lon.		130°30.4920
040	Rosette sheet	End Lat.		70°52.1580
040	Rosette sheet	End Lon.		130°30.6960
041	Rosette sheet	Cable length		38
041	Rosette sheet	Bottom time		16:30
041	Rosette sheet	End time		16:40
041	Rosette sheet	Bottom Lat.		70°52.2840
041	Rosette sheet	Bottom Lon.		130°30.5400
041	Rosette sheet	End Lat.		70°52.3320
041	Rosette sheet	End Lon.		130°30.7560
042	Rosette sheet	Bottom time		18:16
042	Rosette sheet	End time		18:26
042	Rosette sheet	Bottom Lat.		70°52.8480
042	Rosette sheet	Bottom Lon.		130°31.7160

042	Rosette sheet	End Lat.		70°52.8900
042	Rosette sheet	End Lon.		130°31.7340
043	Rosette sheet	Bottom time		19:53
043	Rosette sheet	End time		19:59
043	Rosette sheet	Start Lat.	70°4.411	71°4.411
043	Rosette sheet	Bottom Lat.		71°4.4280
043	Rosette sheet	Bottom Lon.		130°32.8560
043	Rosette sheet	End Lat.		71°4.4460
043	Rosette sheet	End Lon.		130°32.8560
044	Rosette sheet	Cable length		50
044	Rosette sheet	Bottom time		22:08
044	Rosette sheet	Bottom Lat.		71°15.9900
044	Rosette sheet	Bottom Lon.		130°36.4920
045	Rosette sheet	Cable length		50
045	Rosette sheet	Bottom time		0:03
045	Rosette sheet	End Lat.		71°16.0080
045	Rosette sheet	End Lon.		130°36.9480
046	Rosette sheet	Bottom time		04:26
046	Rosette sheet	End time		04:34
046	Rosette sheet	Bottom Lat.		71°28.3800
046	Rosette sheet	Bottom Lon.		130°42.0180
046	Rosette sheet	End Lat.		71°28.4340
046	Rosette sheet	End Lon.		130°42.2280
047	Rosette sheet	Bottom Lat.	70°40.415	71°40.415
047	Rosette sheet	End Lat.	70°40.454	71°40.454
048	Rosette sheet	Sea state		3
049	Rosette sheet	UTC Date	09/08/	09/08/05
049	Rosette sheet	Cable length		880
050	Rosette sheet	Cable length		400
050	Rosette sheet	Bottom time		14:19

050	Rosette sheet	End time		14:26
050	Rosette sheet	Bottom Lat.		72°2.8500
050	Rosette sheet	Bottom Lon.		130°49.8300
050	Rosette sheet	End Lat.		72°3.0120
050	Rosette sheet	End Lon.		130°50.4540
051	Rosette sheet	Cable length		200
051	Rosette sheet	Bottom time		15:55
051	Rosette sheet	End time		16:14
051	Rosette sheet	Bottom Lat.		72°3.3180
051	Rosette sheet	Bottom Lon.		130°53.1000
051	Rosette sheet	End Lat.		72°3.4380
051	Rosette sheet	End Lon.		130°53.6460
052	Rosette sheet	Cable length		225
052	Rosette sheet	Bottom time		17:41
052	Rosette sheet	End time		18:01
052	Rosette sheet	Bottom Lat.		72°2.9700
052	Rosette sheet	Bottom Lon.		130°57.264
052	Rosette sheet	End Lat.		72°3.0240
052	Rosette sheet	End Lon.		130°57.9780
053	Rosette sheet	Bottom time		22:25
053	Rosette sheet	Bottom Lat.		71°40.3260
053	Rosette sheet	Bottom Lon.		130°43.7700
055	Rosette sheet	Cable length		390
056	Rosette sheet	Cable length		300
056	Rosette sheet	Sea state		4
057	Rosette sheet	Cable length		250
057	Rosette sheet	Bottom time		15:34
057	Rosette sheet	End time		15:56
057	Rosette sheet	End Lat.		71°41.7720
057	Rosette sheet	End Lon.		126°28.6620

058	Rosette sheet	Bottom time		18:16
058	Rosette sheet	End time		18:38
058	Rosette sheet	Bottom Lat.		71°41.7780
058	Rosette sheet	Bottom Lon.		126°28.6860
058	Rosette sheet	End Lat.		71°41.6760
058	Rosette sheet	End Lon.		126°28.7760
059	Rosette sheet	Cable length		410
060	Rosette sheet	Cable length		250
061	Rosette sheet	Cable length		250
061	Rosette sheet	Bottom time		03:33
061	Rosette sheet	End time		03:54
061	Rosette sheet	Bottom Lat.		71°25.3500
061	Rosette sheet	Bottom Lon.		127°21.2100
061	Rosette sheet	End Lat.		71°25.1340
061	Rosette sheet	End Lon.		127°20.8680
062	Rosette sheet	Bottom time		09:14
062	Rosette sheet	End time		09:23
062	Rosette sheet	Bottom Lat.		71°17.0820
062	Rosette sheet	Start Lon.	126°47.418	126°47.418
062	Rosette sheet	Bottom Lon.		127°47.4900
062	Rosette sheet	End Lat.		71°17.0580
062	Rosette sheet	End Lon.		127°47.5200
063	Rosette sheet	Cable length		60
064	Rosette sheet	Cable length		40
064	Rosette sheet	Bottom time		12:44
064	Rosette sheet	Bottom Lat.		71°3.0120
064	Rosette sheet	Bottom Lon.		128°29.8260
065	Rosette sheet	Cable length		30
065	Rosette sheet	Pa(mbar)		1015.82
065	Rosette sheet	Tair(°C)		0.7

065	Rosette sheet	Wind		4/244
065	Rosette sheet	Cloud cover		0
065	Rosette sheet	Sea state		2
065	Rosette sheet	Bottom time		14:38
065	Rosette sheet	Bottom Lat.		70°54.7860
065	Rosette sheet	Bottom Lon.		128°55.1580
066	Rosette sheet	Cable length		30
066	Rosette sheet	Bottom time		16:09
066	Rosette sheet	End time		16:18
066	Rosette sheet	Bottom Lat.		70°54.9060
066	Rosette sheet	Bottom Lon.		128°55.4820
066	Rosette sheet	End Lat.		70°54.8700
066	Rosette sheet	End Lon.		128°55.5600
067	Rosette sheet	Cable length		30
067	Rosette sheet	Bottom time		17:40
067	Rosette sheet	End time		17:49
067	Rosette sheet	Bottom Lat.		70°55.0500
067	Rosette sheet	Bottom Lon.		128°55.2060
067	Rosette sheet	End Lat.		70°55.0860
067	Rosette sheet	End Lon.		128°55.3320
068	Rosette sheet	Cable length		62
068	Rosette sheet	Bottom Lat.		71°9.7320
068	Rosette sheet	Bottom Lon.		128°9.4380
069	Rosette sheet	Cable length		60
069	Rosette sheet	Bottom time		01:11
069	Rosette sheet	Bottom Lat.		71°9.6000
069	Rosette sheet	Bottom Lon.		128°9.5640
069	Rosette sheet	End Lat.		71°9.1860
069	Rosette sheet	End Lon.		128°9.5700
070	Rosette sheet	Cable length		40

070	Rosette sheet	Bottom time		11:42
070	Rosette sheet	Bottom Lat.		70°10.6440
070	Rosette sheet	Bottom Lon.		133°33.5820
071	Rosette sheet	Bottom time		13:15
071	Rosette sheet	End time		13:25
071	Rosette sheet	Bottom Lat.		70°23.7960
071	Rosette sheet	Bottom Lon.		133°36.5340
071	Rosette sheet	End Lat.		70°23.8140
071	Rosette sheet	End Lon.		133°36.4800
072	Rosette sheet	Cable length		56
072	Rosette sheet	Bottom time		14:51
072	Rosette sheet	End time		15:02
072	Rosette sheet	Bottom Lat.		70°23.7600
072	Rosette sheet	Bottom Lon.		133°35.9460
072	Rosette sheet	End Lat.		70°23.7300
072	Rosette sheet	End Lon.		133°35.9160
073	Rosette sheet	Cable length		55
073	Rosette sheet	Bottom time		16:10
073	Rosette sheet	End time		16:21
073	Rosette sheet	Bottom Lat.		70°23.5440
073	Rosette sheet	Bottom Lon.		133°35.7000
073	Rosette sheet	End Lat.		70°23.5260
073	Rosette sheet	End Lon.		133°35.6760
074	Rosette sheet	Cable length		65
074	Rosette sheet	Bottom time		19:17
074	Rosette sheet	End time		19:20
074	Rosette sheet	Bottom Lat.		70°35.9100
074	Rosette sheet	Bottom Lon.		133°39.0120
074	Rosette sheet	End Lat.		70°35.8980
074	Rosette sheet	End Lon.		133°39.0600

075	Rosette sheet	Cable length		70
075	Rosette sheet	Bottom time		21:34
075	Rosette sheet	Bottom Lat.		70°48.0480
075	Rosette sheet	Bottom Lon.		133°43.9740
076	Rosette sheet	Cable length		70
076	Rosette sheet	Bottom time		23:41
076	Rosette sheet	Bottom Lat.		70°48.1500
076	Rosette sheet	Bottom Lon.		133°44.0040
076	Rosette sheet	End Lat.	70°	70° 48.1920
076	Rosette sheet	End Lon.	133°	133° 44.0520
077	Rosette sheet	UTC Date	09/08/	09/08/09
077	Rosette sheet	Cable length		85
077	Rosette sheet	Bottom time		04:23
077	Rosette sheet	End time		04:29
077	Rosette sheet	Bottom Lat.		70°58.2840
077	Rosette sheet	Bottom Lon.		133°44.0580
077	Rosette sheet	End Lat.		70°58.2840
077	Rosette sheet	End Lon.		133°44.0400
078	Rosette sheet	Cable length		570
078	Rosette sheet	Bottom time		06:34
078	Rosette sheet	Bottom Lat.		71°10.4040
078	Rosette sheet	Bottom Lon.		133°50.3100
078	Rosette sheet	End Lat.	71°	71° 10.4280
078	Rosette sheet	End Lon.	133°	133° 50.5920
079	Rosette sheet	Bottom time		08:25
079	Rosette sheet	Bottom Lat.		71°22.4040
079	Rosette sheet	Bottom Lon.		133°54.1500
080	Rosette sheet	UTC Date	09/08/	09/08/09
081	Rosette sheet	Bottom depth		1614
081	Rosette sheet	End Lon.	123°56.504	1 33°56.504

082	Rosette sheet	Bottom time		15:06
082	Rosette sheet	End time		15:24
082	Rosette sheet	Bottom Lat.		71°34.2780
082	Rosette sheet	Bottom Lon.		133°57.2100
082	Rosette sheet	End Lat.		71°34.1700
082	Rosette sheet	End Lon.		133°57.5700
083	Rosette sheet	Bottom time		17:10
083	Rosette sheet	End time		17:37
083	Rosette sheet	Bottom Lat.		71°33.7260
083	Rosette sheet	Bottom Lon.		133°57.4500
083	Rosette sheet	End Lat.		71°33.5280
083	Rosette sheet	End Lon.		133°57.6960
084	Rosette sheet	Bottom time		19:10
084	Rosette sheet	End time		19:31
084	Rosette sheet	Bottom Lat.		71°33.7800
084	Rosette sheet	Bottom Lon.		133°57.4560
084	Rosette sheet	End Lat.		71°33.5460
084	Rosette sheet	End Lon.		133°57.5460
085	Rosette sheet	Bottom time		21:47
085	Rosette sheet	End time		22:03
085	Rosette sheet	Bottom Lat.		71°22.1460
085	Rosette sheet	Bottom Lon.		133°53.3220
085	Rosette sheet	End Lat.		71°22.0500
085	Rosette sheet	End Lon.		133°53.0880
086	Rosette sheet	End Lat.		71°10.1400
086	Rosette sheet	End Lon.		133°49.7820
087	Rosette sheet	Cable length		300
088	Rosette sheet	Bottom time		16:50
088	Rosette sheet	End time		16:57
088	Rosette sheet	Bottom Lat.		69°36.2940

088	Rosette sheet	Bottom Lon.		138°13.8300
088	Rosette sheet	End Lat.		69°36.2700
088	Rosette sheet	End Lon.		138°13.6440
089	Rosette sheet	Bottom time		19:32
089	Rosette sheet	End time		19:48
089	Rosette sheet	Bottom Lat.		69°47.8740
089	Rosette sheet	Bottom Lon.		138°26.4420
089	Rosette sheet	End Lat.		69°47.9100
089	Rosette sheet	End Lon.		138°26.5620
089	Rosette sheet	Start Lat.	68°47.845	6 9°47.845
090	Rosette sheet	Bottom time		21:11
090	Rosette sheet	End time		21:30
090	Rosette sheet	Bottom Lat.		69°48.0300
090	Rosette sheet	Bottom Lon.		138°26.0280
090	Rosette sheet	End Lat.		69°48.0780
090	Rosette sheet	End Lon.		138°25.7520
091	Rosette sheet	Cable length		165
091	Rosette sheet	Bottom time		23:06
091	Rosette sheet	Bottom Lat.		69°48.0300
091	Rosette sheet	Bottom Lon.		138°26.0280
091	Rosette sheet	Sea state		2
092	Rosette sheet	Cable length		260
092	Rosette sheet	End time		01:42
092	Rosette sheet	Bottom time	01:41	01:15
092	Rosette sheet	Start Lat.	69°59.087	69°59.08 1
092	Rosette sheet	Start Lon.	138°29.088	138° 39.088
092	Rosette sheet	Bottom Lat.		69°58.9500
092	Rosette sheet	Bottom Lon.		138°38.3820
093	Rosette sheet	Bottom time		03:21
093	Rosette sheet	End time		03:40

093	Rosette sheet	Bottom Lat.		69°58.0500
093	Rosette sheet	Bottom Lon.		138°38.0400
093	Rosette sheet	End Lat.		69°57.7920
093	Rosette sheet	End Lon.		138°37.7040
094	Rosette sheet	Bottom time		05:48
094	Rosette sheet	End time		06:15
094	Rosette sheet	Bottom Lat.		70°9.9420
094	Rosette sheet	Bottom Lon.		138°54.7440
094	Rosette sheet	End Lat.		70°9.8280
094	Rosette sheet	End Lon.		138°55.5060
095	Rosette sheet	Bottom time		07:46
095	Rosette sheet	Bottom Lat.	70°	70° 20.4060
095	Rosette sheet	Bottom Lon.	139°	139° 8.8740
096	Rosette sheet	Cable length		836
096	Rosette sheet	Pa(mbar)		1018.72
096	Rosette sheet	Tair(°C)		0.8
096	Rosette sheet	Wind		6/313
096	Rosette sheet	Cloud cover		0
096	Rosette sheet	Sea state		3
096	Rosette sheet	Begin time		9:11
096	Rosette sheet	Bottom time		09:28
096	Rosette sheet	End time		09:43
096	Rosette sheet	Start Lat.		70°32.012
096	Rosette sheet	Stat Lon.		139°22.7760
096	Rosette sheet	Bottom Lat.		70°32.148
096	Rosette sheet	Bottom Lon.		139°22.944
096	Rosette sheet	End Lat.		70°32.3100
096	Rosette sheet	End Lon.		139°23.1720
097	Rosette sheet	Cable length		1708
097	Rosette sheet	Bottom time		11:40

097	Rosette sheet	Bottom Lat.		70°42.2700
097	Rosette sheet	Bottom Lon.		139°36.5820
097	Rosette sheet	End Lat.		70°42.3060
097	Rosette sheet	End Lon.		139°36.5400
098	Rosette sheet	Cable length		1805
098	Rosette sheet	Wind		4/004
098	Rosette sheet	Bottom time		14:58
098	Rosette sheet	End time		16:11
098	Rosette sheet	End Lat.		70°47.1120
098	Rosette sheet	End Lon.		139°35.6640
099	Rosette sheet	Bottom time		18:58
099	Rosette sheet	End time		19:19
099	Rosette sheet	Bottom Lat.		70°40.7700
099	Rosette sheet	Bottom Lon.		139°37.5660
099	Rosette sheet	End Lat.		70°40.6740
099	Rosette sheet	End Lon.		139°38.1180
100	Rosette sheet	Wind		8/350
100	Rosette sheet	End time		21:32
100	Rosette sheet	End Lat.		70°40.0500
100	Rosette sheet	End Lon.		139°39.9480
101	Rosette sheet	Cable length		300
102	Rosette sheet	Cable length		300
103	Rosette sheet	Cable length		300
103	Rosette sheet	Bottom time		03:03
103	Rosette sheet	Bottom Lat.		70°20.3160
103	Rosette sheet	Bottom Lon.		139°8.1240
105	Rosette sheet	Cable length		571
105	Rosette sheet	End time		14:11
105	Rosette sheet	End Lat.		70°33.282
105	Rosette sheet	End Lon.		140°47.934

106	Rosette sheet	Bottom time		15:33
106	Rosette sheet	End time		15:53
106	Rosette sheet	Bottom Lat.		70°33.2220
106	Rosette sheet	Bottom Lon.		140°47.7840
106	Rosette sheet	End Lat.		70°33.1500
106	Rosette sheet	End Lon.		140°47.7660
107	Rosette sheet	Bottom time		17:03
107	Rosette sheet	End time		17:26
107	Rosette sheet	Bottom Lat.		70°32.7360
107	Rosette sheet	Bottom Lon.		140°47.6100
107	Rosette sheet	End Lat.		70°32.5860
107	Rosette sheet	End Lon.		140°47.6820
108	Rosette sheet	Wind		5/050
108	Rosette sheet	Bottom time		19:24
108	Rosette sheet	End time		19:48
108	Rosette sheet	Bottom Lat.		70°32.2920
108	Rosette sheet	Bottom Lon.		140°47.2560
108	Rosette sheet	End Lat.		70°32.1300
108	Rosette sheet	End Lon.		140°47.6640
109	Rosette sheet	Cable length		215
110	Rosette sheet	Cable length		45
110	Rosette sheet	Sea State		1
110	Rosette sheet	Bottom time		02:01
110	Rosette sheet	Bottom Lat.		70°9.2700
110	Rosette sheet	Bottom Lon.		140°48.3900
111	Rosette sheet	UTC DATE		09/08/13
111	Rosette sheet	Cable length		45
111	Rosette sheet	Bottom time		03:41
111	Rosette sheet	End time		03:51
111	Rosette sheet	Bottom Lat.		70°9.2640

111	Rosette sheet	Bottom Lon.		140°47.9520
111	Rosette sheet	End Lat.		70°9.3420
111	Rosette sheet	End Lon.		140°47.8560
112	Rosette sheet	Cable length		460
112	Rosette sheet	Bottom time		16:35
112	Rosette sheet	Bottom Lat.		71°19.8060
112	Rosette sheet	Bottom Lon.		132°33.7860
113	Rosette sheet	Cable length		500
113	Rosette sheet	Bottom Depth	500	502
113	Rosette sheet	Bottom time		18:29
113	Rosette sheet	End time		18:43
113	Rosette sheet	Bottom Lat.		71°20.5440
113	Rosette sheet	Bottom Lon.		132°35.5740
113	Rosette sheet	End Lat.		71°20.6340
113	Rosette sheet	End Lon.		132°35.5800
114	Rosette sheet	Cable length		500
114	Rosette sheet	Bottom time		20:37
114	Rosette sheet	End time		20:51
114	Rosette sheet	Bottom Lat.		71°21.0000
114	Rosette sheet	Bottom Lon.		132°36.3900
114	Rosette sheet	End Lat.		71°21.0240
114	Rosette sheet	End Lon.		132°36.3660
115	Rosette sheet	Cable length		500
116	Rosette sheet	Cable length		500
117	Rosette sheet	Cast Number		117
117	Rosette sheet	Bottom time		02:29
117	Rosette sheet	End time		02:44
117	Rosette sheet	Bottom Lat.		71°21.3000
117	Rosette sheet	Bottom Lon.		132°37.0800
117	Rosette sheet	End Lat.		71°21.3180

117	Rosette sheet	End Lon.		132°37.1760
118	Rosette sheet	Bottom time		04:30
118	Rosette sheet	End time		04:44
118	Rosette sheet	Bottom Lat.		71°21.1740
118	Rosette sheet	Bottom Lon.		132°36.6720
118	Rosette sheet	End Lat.		71°21.2280
118	Rosette sheet	End Lon.		132°36.7380
119	Rosette sheet	Bottom depth		536
119	Rosette sheet	Cable length		500
119	Rosette sheet	Pa(mbar)		1006.76
119	Rosette sheet	Tair(°C)		2
119	Rosette sheet	Wind		6/172
119	Rosette sheet	Cloud	MC	C
119	Rosette sheet	Sea state		1
119	Rosette sheet	Begin time		6:21
119	Rosette sheet	Bottom time		6:31
119	Rosette sheet	End time		6:48
119	Rosette sheet	Start Lat.		71°21.624
119	Rosette sheet	Start Lon.		132°36.641
119	Rosette sheet	Bottom Lat.		71°21.6240
119	Rosette sheet	Bottom Lon.		132°36.9360
119	Rosette sheet	End Lat.		71°21.6420
119	Rosette sheet	End Lon.		132°37.1400
120	Rosette sheet	Cable length		500
120	Rosette sheet	Bottom time		08:27
120	Rosette sheet	End time		08:43
120	Rosette sheet	Bottom Lat.		71°21.7980
120	Rosette sheet	Bottom Lon.		132°36.4920
120	Rosette sheet	End Lat.		71°21.7980
120	Rosette sheet	End Lon.		132°36.4680

121	Rosette sheet	Cable length		500
122	Rosette sheet	Cable length		500
123	Rosette sheet	Cable length		500
123	Rosette sheet	Bottom time		14:34
123	Rosette sheet	End time		14:50
123	Rosette sheet	Bottom Lat.		71°22.1160
123	Rosette sheet	Bottom Lon.		132°41.3880
123	Rosette sheet	End Lat.		71°22.1580
123	Rosette sheet	End Lon.		132°41.3760
124	Rosette sheet	Pa(mbar)		999.93
124	Rosette sheet	Tair(°C)		3.4
124	Rosette sheet	Wind		19/129
124	Rosette sheet	Cloud	MC	0
124	Rosette sheet	Sea state		5
124	Rosette sheet	Bottom time		16:34
124	Rosette sheet	End time		17:00
124	Rosette sheet	Bottom Lat.		71°22.9920
124	Rosette sheet	Bottom Lon.		132°43.5180
124	Rosette sheet	End Lat.		71°23.2500
124	Rosette sheet	End Lon.		132°43.7760
125	Rosette sheet	Cable length		500
125	Rosette sheet	Bottom depth	170	602
125	Rosette sheet	Bottom time		18:28
125	Rosette sheet	End time		18:50
125	Rosette sheet	Bottom Lat.		71°23.6100
125	Rosette sheet	Bottom Lon.		132°39.9060
125	Rosette sheet	End Lat.		71°23.7060
125	Rosette sheet	End Lon.		132°40.0980
126	Rosette sheet	Cable length		500
126	Rosette sheet	Bottom time		20:27

126	Rosette sheet	End time		20:49
126	Rosette sheet	Bottom Lat.		71°24.6180
126	Rosette sheet	Bottom Lon.		132°38.2260
126	Rosette sheet	End Lat.		71°24.7080
126	Rosette sheet	End Lon.		132°38.0220
127	Rosette sheet	Cable length		500
128	Rosette sheet	Cable length		600
129	Rosette sheet	Cable length		595
130	Rosette sheet	Cable length		648
131	Rosette sheet	Cable length		50
131	Rosette sheet	Bottom time		10:46
131	Rosette sheet	End time		10:48
131	Rosette sheet	Bottom Lat.		70°12.3300
131	Rosette sheet	Bottom Lon.		137°15.3000
131	Rosette sheet	End Lat.		70°12.3360
131	Rosette sheet	End Lon.		137°15.2760
132	Rosette sheet	Cable length		395
133	Rosette sheet	Cable length		1076
133	LogBook	Fond	1076	1077
133	LogBook	Prof Cast	1077	1076
133	Rosette sheet	Bottom depth	1076	1077
133	Rosette sheet	Bottom time		14:26
133	Rosette sheet	End time		14:46
133	Rosette sheet	Bottom Lat.		70°34.2840
133	Rosette sheet	Bottom Lon.		137°42.3840
133	Rosette sheet	End Lat.		70°34.2720
133	Rosette sheet	End Lon.		137°42.1980
134	Rosette sheet	Bottom time		17:51
134	Rosette sheet	End time		18:34
134	Rosette sheet	Bottom Lat.		70°45.0420

134	Rosette sheet	Bottom Lon.		137°53.4780
134	Rosette sheet	End Lat.		70°45.0180
134	Rosette sheet	End Lon.		137°53.3280
135	Rosette sheet	Bottom time		20:20
135	Rosette sheet	End time		20:45
135	Rosette sheet	Bottom Lat.		70°45.3060
135	Rosette sheet	Bottom Lon.		137°52.9740
135	Rosette sheet	End Lat.		70°45.3360
135	Rosette sheet	End Lon.		137°52.7280
136	Rosette sheet	Bottom time		22:21
136	Rosette sheet	Bottom Lat.		70°45.3540
136	Rosette sheet	Bottom Lon.		137°52.0320
136	Rosette sheet	End Lat.	70°43.338	70°4 5.338
137	Rosette sheet	Bottom time		05:02
137	Rosette sheet	End time		05:42
137	Rosette sheet	Bottom Lat.		70°56.5440
137	Rosette sheet	Bottom Lon.		138°9.4500
137	Rosette sheet	End Lat.		70°56.7240
137	Rosette sheet	End Lon.		138°10.0500
138	Rosette sheet	Bottom time		15:24
138	Rosette sheet	End time		15:58
138	Rosette sheet	Bottom Lat.		71°13.0020
138	Rosette sheet	Bottom Lon.		136°43.3620
138	Rosette sheet	End Lat.		71°12.9180
138	Rosette sheet	End Lon.		136°44.2200
139	Rosette sheet	Wind		17/333
139	Rosette sheet	Bottom time		17:40
139	Rosette sheet	End time		18:02
139	Rosette sheet	Bottom Lat.		71°12.0180
139	Rosette sheet	Bottom Lon.		136°44.2620

139	Rosette sheet	End Lat.		71°11.7960
139	Rosette sheet	End Lon.		136°44.2980
140	Rosette sheet	Bottom time		19:42
140	Rosette sheet	End time		20:03
140	Rosette sheet	Bottom Lat.		71°10.9200
140	Rosette sheet	Bottom Lon.		136°45.0240
140	Rosette sheet	End Lat.		71°10.7640
140	Rosette sheet	End Lon.		136°45.0840
142	Rosette sheet	Cable length		834
142	Rosette sheet	Bottom time		02:46
142	Rosette sheet	End time		03:01
142	Rosette sheet	Bottom Lat.		70°51.2940
142	Rosette sheet	Bottom Lon.		136°13.8960
142	Rosette sheet	End Lat.		70°51.2160
142	Rosette sheet	End Lon.		136°13.5600
143	Rosette sheet	Wind		12
143	Rosette sheet	Bottom time		06:09
143	Rosette sheet	End time		06:13
143	Rosette sheet	Bottom Lat.		70°28.3140
143	Rosette sheet	Bottom Lon.		135°54.7920
143	Rosette sheet	End Lat.		70°28.2900
143	Rosette sheet	End Lon.		135°54.7560
144	Rosette sheet	Begin time		07:29
144	Rosette sheet	Bottom time		07:32
144	Rosette sheet	End time		07:35
144	Rosette sheet	Start Lat.		70°16.692
144	Rosette sheet	Start Lon.		135°45.097
144	Rosette sheet	Bottom Lat.		70°16.7100
144	Rosette sheet	Bottom Lon.		135°45.1080
144	Rosette sheet	End Lat.		70°16.7100

144	Rosette sheet	End Lon.		135°45.1260
145	Rosette sheet	Bottom time		13:59
145	Rosette sheet	End time		14:21
145	Rosette sheet	Bottom Lat.		70°40.6860
145	Rosette sheet	Bottom Lon.		136°2.8560
145	Rosette sheet	End Lat.		70°40.6740
145	Rosette sheet	End Lon.		136°2.2260
146	Rosette sheet	Cable length		300
146	Rosette sheet	Bottom time		15:47
146	Rosette sheet	End time		15:51
146	Rosette sheet	Bottom Lat.		70°41.0280
146	Rosette sheet	Bottom Lon.		135°59.1420
146	Rosette sheet	End Lat.		70°41.0280
146	Rosette sheet	End Lon.		135°59.0040
147	Rosette sheet	Cable length		300
147	Rosette sheet	Bottom time		16:29
147	Rosette sheet	End time		16:47
147	Rosette sheet	Bottom Lat.		70°40.9920
147	Rosette sheet	Bottom Lon.		135°57.4440
147	Rosette sheet	End Lat.		70°40.9500
147	Rosette sheet	End Lon.		135°56.7720
148	Rosette sheet	Bottom time		18:31
148	Rosette sheet	End time		18:57
148	Rosette sheet	Bottom Lat.		70°40.8660
148	Rosette sheet	Bottom Lon.		135°52.9560
148	Rosette sheet	End Lat.		70°40.8360
148	Rosette sheet	End Lon.		135°52.3200
149	Rosette sheet	Sea state		4
149	Rosette sheet	Bottom time		18:51
149	Rosette sheet	End time		19:11

149	Rosette sheet	Bottom Lat.		71°18.6660
149	Rosette sheet	Bottom Lon.		127°28.3080
149	Rosette sheet	End Lat.		71°18.7860
149	Rosette sheet	End Lon.		127°27.2130
150	Rosette sheet	Cable length		222
150	Rosette sheet	Bottom time		20:32
150	Rosette sheet	End time		20:51
150	Rosette sheet	Bottom Lat.		71°18.8100
150	Rosette sheet	Bottom Lon.		127°29.1540
150	Rosette sheet	End Lat.		71°18.9660
150	Rosette sheet	End Lon.		127°28.9320
151	Rosette sheet	Cable length		221
151	Rosette sheet	Bottom Lat.		71°18.6120
151	Rosette sheet	Bottom Lon.		127°28.8180
152	Rosette sheet	Cable length		220
152	Rosette sheet	End Lat.	71°16.164	71°18.1680
153	Rosette sheet	Cable length		223
153	Rosette sheet	Bottom time		02:39
153	Rosette sheet	Bottom Lat.		71°18.5940
153	Rosette sheet	Bottom Lon.		127°29.5920
154	Rosette sheet	Cable length		227
155	Rosette sheet	Cable length		220
155	Rosette sheet	Bottom time		06:18
155	Rosette sheet	End time		06:47
155	Rosette sheet	Start Lat.		71°18.709
155	Rosette sheet	Start Lon.		127°29.804
155	Rosette sheet	Bottom Lat.	71°18.709	71°18.7200
155	Rosette sheet	Bottom Lon.	127°27.804	127°29.8260
155	Rosette sheet	End Lat.		71°18.7500
155	Rosette sheet	End Lon.		127°29.9100

156	Rosette sheet	Cable length		221
156	Rosette sheet	Bottom time		08:28
156	Rosette sheet	End time		08:37
156	Rosette sheet	Bottom Lat.		71°18.5760
156	Rosette sheet	Bottom Lon.		127°29.4780
156	Rosette sheet	End Lat.		71°18.5700
156	Rosette sheet	End Lon.		127°29.4060
157	Rosette sheet	Cable length		228
157	Rosette sheet	Bottom time		10:28
157	Rosette sheet	End time		10:46
157	Rosette sheet	Bottom Lat.		71°18.5880
157	Rosette sheet	Bottom Lon.		127°29.2320
157	Rosette sheet	End Lat.		71°18.5100
157	Rosette sheet	End Lon.		127°28.6740
158	Rosette sheet	Cable length		222
158	Rosette sheet	Bottom time		12:58
158	Rosette sheet	End time		13:14
158	Rosette sheet	Bottom Lat.		71°18.3480
158	Rosette sheet	Bottom Lon.		127°29.3340
158	Rosette sheet	End Lat.		71°18.1980
158	Rosette sheet	End Lon.		127°29.2740
159	Rosette sheet	Cable length		220
159	Rosette sheet	Bottom time		14:32
159	Rosette sheet	End time		14:50
159	Rosette sheet	Bottom Lat.		71°18.3360
159	Rosette sheet	Bottom Lon.		127°29.8380
159	Rosette sheet	End Lat.		71°18.1980
159	Rosette sheet	End Lon.		127°30.0900
160	Rosette sheet	Cable length		215
160	Rosette sheet	Bottom time		16:29

160	Rosette sheet	End time		16:48
160	Rosette sheet	Bottom Lat.		71°18.6120
160	Rosette sheet	Bottom Lon.		127°30.5640
160	Rosette sheet	End Lat.		71°18.7320
160	Rosette sheet	End Lon.		127°31.3200
161	Rosette sheet	Cable length		222
161	Rosette sheet	Bottom time		18:31
161	Rosette sheet	End time		18:47
161	Rosette sheet	Bottom Lat.		71°18.6840
161	Rosette sheet	Bottom Lon.		127°29.7540
161	Rosette sheet	End Lat.		71°18.7200
161	Rosette sheet	End Lon.		127°29.9340
162	Rosette sheet	Bottom depth	225	227
162	Rosette sheet	Cable length		225
162	Rosette sheet	Bottom time		20:41
162	Rosette sheet	End time		21:00
162	Rosette sheet	Bottom Lat.		71°18.8100
162	Rosette sheet	Bottom Lon.		127°29.6280
162	Rosette sheet	End Lat.		71°19.0080
162	Rosette sheet	End Lon.		127°29.4300
163	Rosette sheet	Cable length		225
163	Rosette sheet	Bottom time		22:57
163	Rosette sheet	End time		23:14
163	Rosette sheet	Bottom Lat.		71°18.4980
163	Rosette sheet	Bottom Lon.		127°29.7420
163	Rosette sheet	End Lat.		71°18.4740
163	Rosette sheet	End Lon.		127°29.2200
164	Rosette sheet	Cable length		520
164	Rosette sheet	Bottom time		08:46
164	Rosette sheet	Start Lon.	130°45.973	130°4 9.973

164	Rosette sheet	Bottom Lat.		71°45.8700
164	Rosette sheet	Bottom Lon.		130°49.8840
165	Rosette sheet	Cable length		522
165	Rosette sheet	Bottom Lat.		71°45.6720
165	Rosette sheet	Bottom Lon.		130°45.5880
166	Rosette sheet	Cable length		520
166	Rosette sheet	Bottom time		12:29
166	Rosette sheet	Bottom Lat.		71°45.8100
166	Rosette sheet	Bottom Lon.		130°48.4920
168	Rosette sheet	Cable length		520
168	Rosette sheet	Bottom time		16:34
168	Rosette sheet	End time		16:58
168	Rosette sheet	Bottom Lat.		71°45.7200
168	Rosette sheet	Bottom Lon.		130°50.2920
168	Rosette sheet	End Lat.		71°45.7680
168	Rosette sheet	End Lon.		130°51.0780
169	Rosette sheet	Cable length		530
169	Rosette sheet	Bottom Lat.		71°46.1220
169	Rosette sheet	Bottom Lon.		130°54.1620
169	Rosette sheet	End Lat.		71°46.1400
169	Rosette sheet	End Lon.		130°54.6780
170	Rosette sheet	Cable length		677
170	Rosette sheet	Bottom time		20:37
170	Rosette sheet	End time		21:02
170	Rosette sheet	Bottom Lat.		71°46.0740
170	Rosette sheet	Bottom Lon.		130°56.4660
170	Rosette sheet	End Lat.		71°46.0860
170	Rosette sheet	End Lon.		130°56.0700
171	Rosette sheet	Cable length		634
171	Rosette sheet	Bottom time		22:42

171	Rosette sheet	Bottom Lat.		71°46.6440
171	Rosette sheet	Bottom Lon.		130°51.4380
172	Rosette sheet	Cable length		635
172	Rosette sheet	End time		0:54
172	Rosette sheet	End Lat.		71°46.8660
172	Rosette sheet	End Lon.		130°51.4320
173	Rosette sheet	Cable length		620
173	Rosette sheet	Start Lon.	130°20.236	130° 50.236
173	Rosette sheet	Bottom Lat.		71°46.4040
173	Rosette sheet	Bottom Lon.		130°50.5080
174	Rosette sheet	Bottom depth	660	670
174	Rosette sheet	Cable length		660
174	Rosette sheet	Bottom time		04:40
174	Rosette sheet	End time		05:00
174	Rosette sheet	Bottom Lat.		71°46.1100
174	Rosette sheet	Bottom Lon.		130°54.3780
175	Rosette sheet	Cable length		388
175	Rosette sheet	Bottom time		06:33
175	Rosette sheet	End time		06:57
175	Rosette sheet	Bottom Lat.		71°46.1820
175	Rosette sheet	Bottom Lon.		130°56.9520
175	Rosette sheet	End Lat.		71°46.2120
175	Rosette sheet	End Lon.		130°57.2640
176	Rosette sheet	Cable length		680
176	Rosette sheet	Bottom time		08:28
176	Rosette sheet	End time		08:53
176	Rosette sheet	Bottom Lat.		71°46.4580
176	Rosette sheet	Bottom Lon.		130°56.4360
176	Rosette sheet	End Lat.		71°46.4580
176	Rosette sheet	End Lon.		130°56.4300

177	Rosette sheet	Cable length		625
178	Rosette sheet	Cloud cover		-99
178	Rosette sheet	Sea state		-99
178	Rosette sheet	End time		12:42
178	Rosette sheet	Bottom Lat.		71°46.1040
178	Rosette sheet	Bottom Lon.		130°50.9520
178	Rosette sheet	End Lat.		71°46.0980
178	Rosette sheet	End Lon.		130°50.8440
179	Rosette sheet	Cable length		629
179	Rosette sheet	Bottom time		14:27
179	Rosette sheet	End time		14:47
179	Rosette sheet	Bottom Lat.		71°45.8280
179	Rosette sheet	Bottom Lon.		130°51.2760
179	Rosette sheet	End Lat.		71°45.7920
179	Rosette sheet	End Lon.		130°51.4380
180	Rosette sheet	Cable length		654
180	Rosette sheet	Bottom time		16:34
180	Rosette sheet	End time		17:01
180	Rosette sheet	Start Lat.		71°45.607
180	Rosette sheet	Start Lon.		130°53.802
180	Rosette sheet	Bottom Lat.	71°45.607	71°45. 5280
180	Rosette sheet	Bottom Lon.	130°53.802	130°53. 7720
180	Rosette sheet	End Lat.		71°45.4260
180	Rosette sheet	End Lon.		130°53.9400
181	Rosette sheet	Cable length		643
181	Rosette sheet	Bottom time		18:41
181	Rosette sheet	End time		19:04
181	Rosette sheet	Bottom Lat.		71°45.1860
181	Rosette sheet	Bottom Lon.		130°54.0780
181	Rosette sheet	End Lat.		71°45.1620

181	Rosette sheet	End Lon.		130°54.2640
182	Rosette sheet	Cable length		647
182	Rosette sheet	Bottom time		20:35
182	Rosette sheet	End time		20:56
182	Rosette sheet	Bottom Lat.		71°45.2580
182	Rosette sheet	Bottom Lon.		130°54.6600
182	Rosette sheet	End Lat.		71°45.1740
182	Rosette sheet	End Lon.		130°54.5820
183	Rosette sheet	Cable length		500
183	Rosette sheet	Bottom Lat.		71°44.9880
183	Rosette sheet	Bottom Lon.		130°54.2820
184	Rosette sheet	Cable length		500
186	Rosette sheet	Bottom Lat.		71°43.6440
186	Rosette sheet	Bottom Lon.		130°50.9100
186	Rosette sheet	End Lat.		71°43.6500
186	Rosette sheet	End Lon.		130°51.0240
187	Rosette sheet	Bottom time		06:45
187	Rosette sheet	End time		07:04
187	Rosette sheet	Bottom Lat.		71°43.8600
187	Rosette sheet	Bottom Lon.		130°52.1880
187	Rosette sheet	End Lat.		71°43.8420
187	Rosette sheet	End Lon.		130°51.9540
188	Rosette sheet	Begin time		08:21
188	Rosette sheet	Bottom time		08:35
188	Rosette sheet	End time		08:53
188	Rosette sheet	Start Lat.		71°43.932
188	Rosette sheet	Start Lon.		130°52.273
188	Rosette sheet	Bottom Lat.		71°43.9080
188	Rosette sheet	Bottom Lon.		130°52.0740
188	Rosette sheet	End Lat.		71°43.8600

188	Rosette sheet	End Lon.		130°52.0320
189	Rosette sheet	Bottom time		10:55
189	Rosette sheet	End time		11:16
189	Rosette sheet	Bottom Lat.		71°44.1660
189	Rosette sheet	Bottom Lon.		130°44.9820
189	Rosette sheet	End Lat.		71°44.1780
189	Rosette sheet	End Lon.		130°44.9880
191	Rosette sheet	Cable length		300

1.3. Check the bottle data summary files (extension .bti).

Cast 010: the bottle number 1 has been fired twice (position 1 and 25). The second one seems to be a test and has been removed from the .bl and .bti files

1.4. Compare meta data from logbook, rosette sheets and converted file header.

Actually, this step is partly performed after the data processing (Sea-Bird Data conversion module). For the meta data, little differences (for instance start time difference less than 5 minutes) are not took into account (see Table 5).

Moreover, some metadata are different between 2 sets of data but it is difficult to confirm the good value (see table 4).

So the final odf files have been updated with the time extracted from the log book.

Table 4. Metadata values impossible to confirm.

Cast	Parameter	File 1	Value 1	File 2	Value 2
086	Bottom	Rosette sheet	590	LogBook	562
108	Bottom	Rosette	644	Logbook	566

		sheet			
117	Bottom	Rosette sheet	520	Logbook	529
191	Bottom	Rosette sheet	543	Logbook	593

Table 5. Comparisons and modifications into the logbook, the rosette sheets and the converted files.

Cast	File	Parameter	Original	New
001	Rosette sheet	STATION	1	1 (B)
001	Rosette sheet	UTC DATE	08/07/18	09/07/18
001	LogBook	Lat.	70°28.617	70° 28.8144
001	LogBook	Lon.	135°6.674	135° 6.6228
002	Rosette sheet	STATION	1	1 (B)
002	Rosette sheet	UTC DATE	08/07/18	09/07/18
003	Rosette sheet	UTC DATE	08/07/19	09/07/19
003	LogBook	Date	18/07/09	19/07/09
003	LogBook	Lat.	70°38.354	70°3 9.354
004	Rosette sheet	UTC DATE	08/07/19	09/07/19
004	Rosette sheet	Cable length	355	101
004	LogBook	Prof. Cast (m)	355	101
005	Rosette sheet	UTC DATE	08/07/19	09/07/19
006	Rosette sheet	UTC DATE	08/07/19	09/07/19
006	LogBook	Heure UTC	13:07	12:54
006	Rosette sheet	Begin time	13:04	12:54
006	Rosette sheet	Bottom time	13:16	13:06
006	Rosette sheet	End time	14:12	14:02
006	LogBook	Fond	404	400
006	Rosette sheet	Cable length	395	392
006	LogBook	Prof. Cast (m)	395	392
007	Rosette sheet	UTC DATE	08/07/20	09/07/20

008	Rosette sheet	UTC DATE	08/07/20	09/07/20
008	Rosette sheet	Bottom depth	293	294
009	Rosette sheet	UTC DATE	08/07/20	09/07/20
009	Rosette sheet	Cable length	720	715
009	LogBook	Prof. Cast (m)	720	715
010	LogBook	Prof. cast	673	665
010	LogBook	Heure UTC	02:50	02:34
010	LogBook	Bottom depth	700	688
011	Rosette sheet	UTC DATE	08/07/21	09/07/21
011	Rosette sheet	Begin time	12:39	12:46
011	Rosette sheet	Bottom time	12:59	13:06
011	Rosette sheet	End time	13:39	13:46
011	Rosette sheet	Cable length	421	416
011	LogBook	Heure UTC	12:39	12:46
011	LogBook	Prof. Cast (m)	421	416
013	Rosette sheet	UTC DATE	09/07/21	09/07/22
013	Rosette sheet	STATION	22 (B)	23 (B)
013	LogBook	Long. (W)	-134°16.018	-134°16.0 48
014	Rosette sheet	STATION	23 (B)	22 (B)
014	Rosette sheet	UTC DATE	08/07/22	09/07/22
014	LogBook	Prof. Cast	62.8	62
014	LogBook	Lon. (W)	135°51.799	135°51. 822
016	Rosette sheet	Cable length	485	480
016	LogBook	Prof. cast (m)	485	480
017	Rosette sheet	Cable length	775	767
017	LogBook	Prof. cast (m)	775	767
018	LogBook	Heure UTC	15:41	15:54
018	Rosette sheet	TIME Begin	15:47	15:54
018	Rosette sheet	Cable length	635	642
018	LogBook	Prof. cast (m)	635	642

019	Rosette sheet	STATION	14 (B)	16 (B)
019	Rosette sheet	UTC DATE	08/07/24	09/07/24
019	LogBook	Lon. (W)	134°39.451	13 6°39.451
019	LogBook	Heure UTC	14:09	14:15
019	Rosette sheet	Begin time	14:09	14:15
019	Rosette sheet	Bottom time	14:28	14:34
019	Rosette sheet	End time	15:20	15:26
019	Rosette sheet	Cable length	1000	991
019	LogBook	Prof. cast (m)	1000	991
020	LogBook	Heure UTC	08:51	06:57
020	Rosette sheet	Start time	08:51	06:57
020	Rosette sheet	Bottom time	09:09	07:15
020	Rosette sheet	End time	10:03	08:09
020	Rosette sheet	Cable length	1000	988
020	LogBook	Prof. cast (m)	1000	988
021	Rosette sheet	START LON.	-136°7.75	-136°7.7 05
021	Rosette sheet	Cable length	1000	988
021	LogBook	Prof. cast (m)	1000	988
022	Rosette sheet	Cable length	570	564
022	LogBook	Prof. cast (m)	570	564
023	Rosette sheet	UTC DATE	08/07/27	09/07/27
024	Rosette sheet	TIME Begin	14:08	14:11
025	Logbook	Bottom depth	40	58
025	Logbook	Lat. (N)	70°10.763	70°10. 812
025	Logbook	Lon. (W)	-133°34.114	-133°3 3.828
025	Logbook	Heure UTC	21:03	21:08
025	Rosette sheet	Begin time	21:03	21:08
025	Rosette sheet	Bottom time	21:06	21:11
025	Rosette sheet	End time	21:18	21:23
027	Logbook	Lat. (N)	70°6.990	70° 10.692

027	Logbook	Lon. (W)	133°30.649	133°3 4.728
027	Rosette sheet	UTC Date	09/07/31	09/08/02
030	Logbook	Heure UTC	16:44	16:50
030	Rosette sheet	Begin time	16:44	16:50
030	Rosette sheet	Bottom time	16:47	16:53
030	Rosette sheet	End time	16:57	17:03
033	Rosette sheet	Station	390	680
035	Logbook	Heure UTC	20:54	20:59
035	Logbook	Long. (W)	138°13.709	138°13. 198
044	Rosette sheet	UTC Data	09/08/03	09/08/04
047	Rosette sheet	Start Lat.	71°40.36	71°40.36 7
048	Logbook	Prof cast	692	684
048	Rosette sheet	Cable length	692	684
049	Rosette sheet	Start Lon.	130°53.5020	130°53.5 320
049	Logbook	Prof cast	880	871
049	Rosette sheet	Cable length	880	871
051	Logbook	Heure UTC	15:43	15:48
051	Rosette sheet	Begin time	15:43	15:48
051	Rosette sheet	Bottom time	15:55	16:00
051	Rosette sheet	End time	16:14	16:19
054	Rosette sheet	Cable length	200	395
054	Logbook	Prof. cast	400	395
055	Rosette sheet	Cable length	390	386
055	Logbook	Prof. cast	390	386
055	Logbook	Heure UTC	11:08	11:09
063	Rosette sheet	Start Lon.	128°9.667	128°9.6 42
064	Rosette sheet	Start Lon.	128°29.216	128°29. 816
066	Logbook	Heure UTC	16:07	16:12
066	Rosette sheet	Begin time	16:07	16:12
066	Rosette sheet	Bottom time	16:09	16:14

066	Rosette sheet	End time	16:18	16:23
068	Rosette sheet	Start Lat.	71°9.722	71°9.7 37
069	Rosette sheet	Time Begin	01:08	01:09
073	Logbook	Lat. (N)	70°23.073	70°23. 558
073	Logbook	Long. (W)	133°35.558	133°35. 716
073	Logbook	Heure UTC	16:07	16:12
073	Rosette sheet	Begin time	16:07	16:12
073	Rosette sheet	Bottom time	16:10	16:15
073	Rosette sheet	End time	16:21	16:26
075	Logbook	Heure UTC	21:28	21:58
075	Rosette sheet	Begin Time	21:29	21:58
075	Rosette sheet	Bottom Time	21:34	22:03
075	Logbook	Lat. (N)	70°48.055	70°48.0 300
076	Logbook	Lat. (N)	70°48.194	70°48. 136
076	Rosette sheet	Start Lon.	133°43.36	133°43. 940
077	Logbook	Heure UTC	04:18	04:24
077	Rosette sheet	Begin time	04:18	04:24
077	Rosette sheet	Bottom time	04:23	04:29
077	Rosette sheet	End time	04:29	04:35
078	Logbook	Prof. Cast (m)	570	564
078	Rosette sheet	Cable length	570	564
080	Logbook	Prof. Cast (m)	1000	989
080	Rosette sheet	Cable length	1000	989
081	Logbook	Prof. Cast (m)	1000	988
081	Rosette sheet	Cable length	1000	988
083	Logbook	Lat. (N)	71°34.225	71°34. 325
086	Rosette sheet	Start Lat.	71°10	71°10. 3080
086	Rosette sheet	Start Lon.	133°49	133°49. 5000
086	Logbook	Lat. (N)	71°10.296	71°10. 3080
086	Logbook	Lon.(W)	133°49.570	133°49. 5000

087	Rosette sheet	Bottom depth	55	553
089	Logbook	Lat. (N)	68°47.845	69°47.845
089	Logbook	Fond (m)	564	654
095	Logbook	Prof. Cast (m)	564	558
095	Rosette sheet	Cable length	564	558
096	Logbook	Prof. Cast (m)	836	826
096	Rosette sheet	Cable length	836	826
097	Logbook	Prof. Cast (m)	1708	1684
097	Rosette sheet	Cable length	1708	1684
098	Logbook	Prof. Cast (m)	1805	1780
098	Rosette sheet	Cable length	1805	1780
100	Rosette sheet	UTC Date	09/07/31	09/08/11
102	Rosette sheet	Begin Time	0:48	0:53
105	Logbook	Heure UTC	13:44	13:49
105	Logbook	Long. (W)	140°47.899	140°47.8 61
105	Logbook	Prof. Cast (m)	571	565
105	Rosette sheet	Cable length	571	565
109	Logbook	Lat. (N)	70°50.938	70°20. 928
112	Logbook	Long. (W)	132°34.796	132°3 3.796
113	Logbook	Lat. (N)	71°20.438	71°20.4 98
114	Rosette sheet	UTC Date	14/08/09	09/08/14
118	Logbook	Prof. Cast (m)	500	495
118	Rosette sheet	Cable length	500	495
121	Logbook	Prof. Cast (m)	500	494
121	Rosette sheet	Cable length	500	494
124	Rosette sheet	Start Lon.	132°43.684	132°43. 484
126	Logbook	Prof. Cast (m)	500	495
126	Rosette sheet	Cable length	500	495
128	Logbook	Prof. Cast (m)	600	594
128	Rosette sheet	Cable length	600	594

132	Rosette sheet	Start Lon.	137°28.754	137°28.6080
129	Logbook	Prof. Cast (m)	595	590
130	Logbook	Prof. Cast (m)	648	641
130	Rosette sheet	Cable length	648	641
129	Rosette sheet	Cable length	595	590
132	Logbook	Long. (W)	137°28.414	137°28.6080
133	Rosette sheet	Station	350	550
133	Rosette sheet	Cable length	1076	1064
133	Logbook	Prof. cast	1077	1064
134	Logbook	Prof. Cast (m)	1532	1512
134	Rosette sheet	Cable length	1532	1512
137	Rosette sheet	Start Lat.	70°56.619	70°56. 419
138	Logbook	Prof. cast	1357	1339
141	Rosette sheet	Start Lon.	136°27.676	136°27.67 0
141	Rosette sheet	Cable length	1000	990
141	Logbook	Prof. cast	1000	990
142	Rosette sheet	Cable length	834	824
142	Logbook	Prof. cast	834	824
143	Logbook	Prof. cast	44	55
144	Rosette sheet	Cable length	55	50
146	Rosette sheet	Start Lon.	135°59.22	135°59. 306
146	Rosette sheet	Cable length	300	58
146	Logbook	Prof. cast	300	58
147	Logbook	Heure UTC	16:15	16:16
148	Logbook	Heure UTC	18:26	18:16
154	Rosette sheet	UTC Date	09/08/20	09/08/21
154	Logbook	Long. (W)	127°29.626	127°29. 479
155	Logbook	Long. (W)	127°27.804	127°2 9.804
161	Rosette sheet	Station	145	135
164	Logbook	Prof. Cast (m)	520	514

164	Rosette sheet	Cable length	520	514
165	Logbook	Long. (W)	130°45.625	130°45. 787
166	Logbook	Lat. (N)	71°45.000	71°45. 772
166	Logbook	Prof. Cast (m)	520	526
166	Rosette sheet	Cable length	520	526
170	Logbook	Prof. Cast (M)	684.8	677
171	Logbook	Prof. Cast (m)	634	627
171	Rosette sheet	Cable length	634	627
172	Logbook	Prof. Cast (m)	635	628
172	Rosette sheet	Cable length	634.5	628
173	Logbook	Prof. Cast (m)	620	613
173	Rosette sheet	Cable length	620	613
174	Logbook	Long. (W)	130°45.983	130° 53.692
174	Logbook	Prof. Cast (m)	660	654
174	Rosette sheet	Cable length	660	654
175	Logbook	Long. (W)	130°56.808	130°56.80 3
175	Logbook	Prof. Cast (m)	388	680
175	Rosette sheet	Cable length	387.7	680
176	LogBook	Prof. Cast (m)	687.6	680
177	Logbook	Prof. Cast (m)	625	618
177	Rosette sheet	Cable length	625	618
178	Logbook	Prof. Cast (m)	625	618
178	Rosette sheet	Cable length	625	618
179	Logbook	Lat. (N)	71°46.856	71°4 5.856
179	Logbook	Prof. Cast (m)	629	621
179	Rosette sheet	Cable length	629	621
180	Logbook	Prof. Cast (m)	654	647
180	Rosette sheet	Cable length	654	647
181	Logbook	Bottom depth	650	643
181	Logbook	Start Lon.	135°58.063	135°5 3.472

182	Rosette sheet	Start Lat.	71°45.296	71°45.29 0
183	Logbook	Heure UTC	21:15	22:21
184	Logbook	Long. (W)	130°54.433	130°54.4 10
185	Rosette sheet	Start Lon.	130°50.616	130°50. 424
185	Logbook	Prof. Cast (m)	500	495
185	Rosette sheet	Cable length	500	495
186	Rosette sheet	Begin Time	04:34	04:43
186	Rosette sheet	End Time		05:01
187	Logbook	Prof. Cast (m)	500	495
187	Rosette sheet	Cable length	500	495
188	Logbook	Prof. Cast (m)	510	505
188	Rosette sheet	Cable length	510	505
189	Rosette sheet	Start Lat.	71°44.155	71°44.1 95
189	Logbook	Prof. Cast (m)	520	514
189	Rosette sheet	Cable length	520	514
190	Logbook	Long. (W)	130°49.970	130°49. 770

1.5. Compute new calibration coefficients for SBE 43 oxygen sensor.

The SBE43 oxygen sensor used the new Sea-bird algorithm derived from the original Owens-Millard equation.

The Sea-Bird recommendations were used to compute much accurate calibrations thanks to Winkler titrations (see table 6). See the report “Tests to configure SBE43 data for the cruise IOL-Malina 0902.pdf” to have the complete description of the analysis.

Table 6. Calibration coefficients for the 0240 SBE43 sensor.

	Original	Winkler derived
Soc	0.3619	0.37946
Voffset	-0.4886	-0.4886

1.6. Compute the time alignment correction for dissolved oxygen data.

The oxygen data must be corrected in time relative to the pressure because of the long time constant of the sensor and because of the water time transit through the pipe.

The data analysis shows that a correction of **5** seconds gives the best results. See the report “Tests to configure SBE43 data for the cruise IOL-Malina 0902.pdf” to have the complete description of the analysis.

1.7. Compute new calibration coefficients for the ISUS nitrate sensor.

Similarly to the oxygen sensor, field titrations are used to compute accurate coefficients. See the report “Étalonnage du capteur de nitrate durant la mission IOL-Malina 0902” (in French only) to have the complete description of the analysis.

Although there was a unique nitrate sensor, the analysis shows that 2 sets of calibration are needed as following (see table 7).

Table 7. Calibration coefficients for the sn 132 nitrate sensor.

Casts	Coefficient	Original value	Optimized value
001 to 045	A_0	-8.2328	-15.5198
001 to 045	A_1	27.017	28.4067
046 to 191	A_0	-8.2328	-20.541
046 to 191	A_1	27.017	28.4311

1.8. Format bottle salinity data file for CTD comparison.

15 autosal measurements have been used for the comparison with the CTD data.

2. DATA PROCESSING.

2.1. The “Data Conversion” module: raw data conversion.

This step is used from the updated SBE Data Processing 7.19 software.

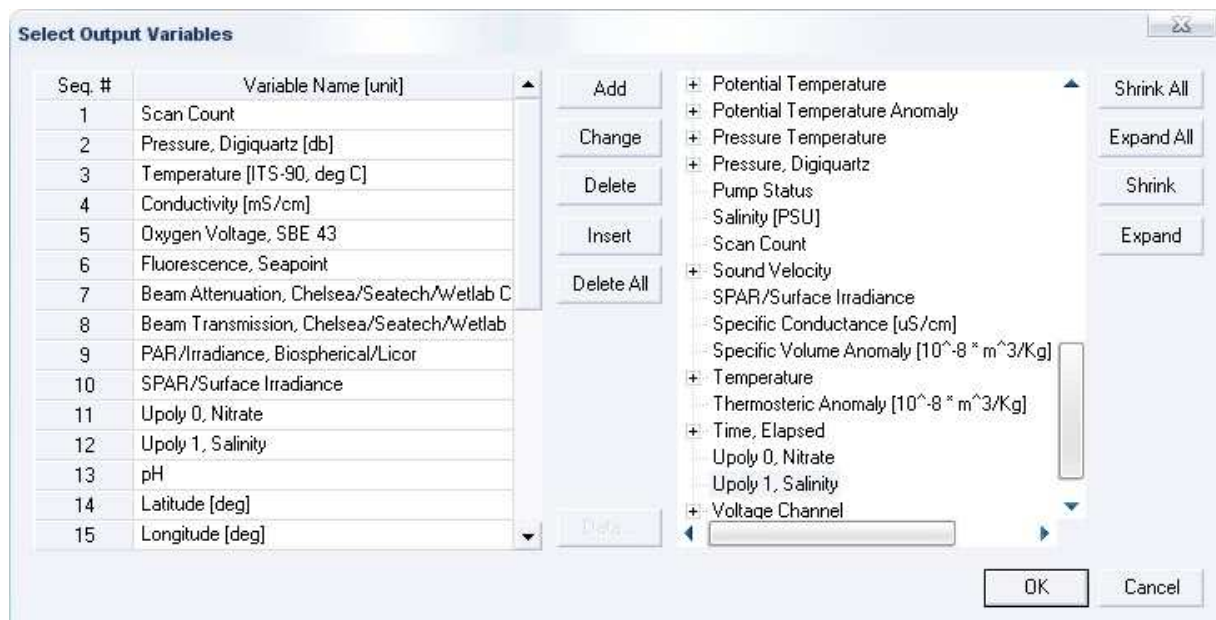


Figure 1. The “Data Conversion” module.

2.2. Data Extraction.

This step (performed through the Matlab software) is particularly useful to eliminate useless data such as those corresponding to sensor acclimatization period (“the surface soak”).

This step allows to detect miscellaneous problem:

- The cast 034 corresponds to the soaking period of the cast 035. So it has been removed from the cast list.
- The cast 037 is only 11 db depth.
- The cast 038 is only 11 db depth.
- The cast 104 is not a cast. So it has been removed from the cast list.
- The cast 186 stops at 300 db during the upcast.

Also, this step is useful to detect pressure spikes (see figure 2 for an example and table 8. The original values are replaced by the Sea-Bird “bad flag” value (-9.990e-29) into the

corresponding Sea-Bird converted files. Pressure spikes are usually associated by unreliable value of other parameters such as conductivity and temperature. The corresponding data into the derived ODF file is associated with a flag value equals to 5 (“the data was modified”).

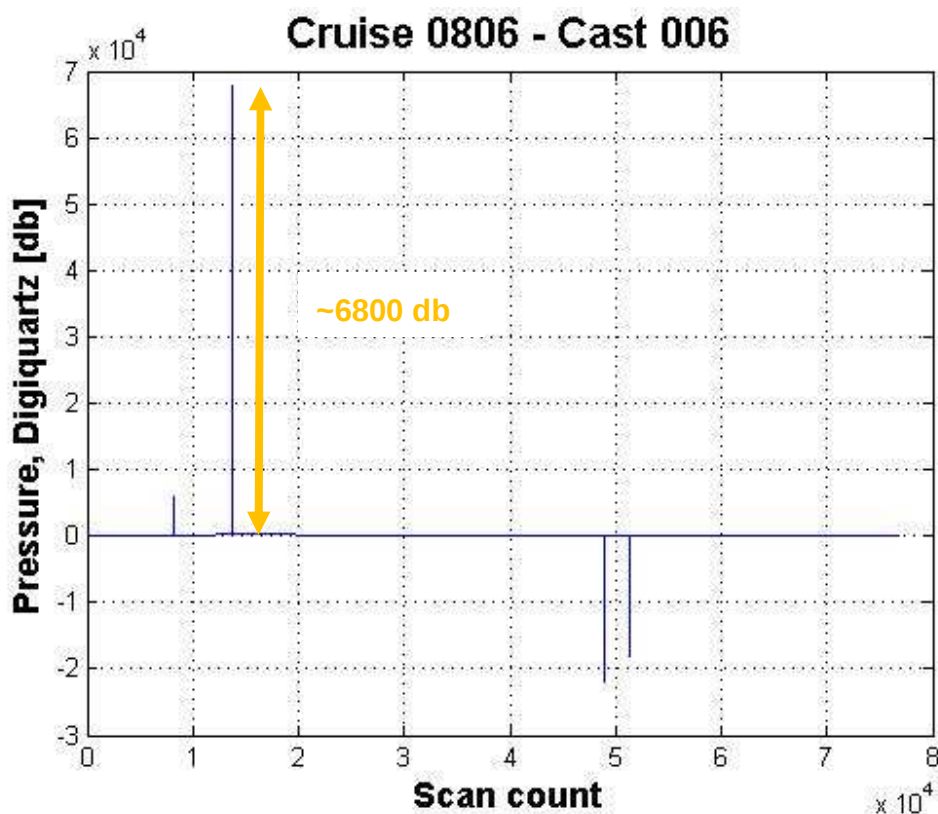


Figure 2. Example of evolution of the pressure for one cast.

Table 8. Spike detection during the data extraction.

Cast	Parameter	Scan count	Value	Remark
003	temperature	9684	-3.3963	Downcast
006	temperature	28900	-1.1764	Downcast
006	temperature	29076	-1.1825	Downcast
006	temperature	29768	3.6563	Downcast
006	temperature	29768	16.9692	Downcast
006	temperature	29769	-16.9165	Downcast

006	temperature	29770	99.0000	Downcast
...	...	...	...	...
006	temperature	29794	-4.7950	Downcast
006	temperature	30777	-5.2235	Downcast
009	temperature	11817	-24.9635	Downcast
009	temperature	11818	-61.0762	Downcast
009	temperature	11819	-10.9078	Downcast
009	temperature	12503	-29.5387	Downcast
...	...	...	...	...
009	temperature	12556	-1.2435	Downcast
009	temperature	14397	-11.7774	Downcast
009	temperature	14398	-6.9687	Downcast
009	temperature	14426	-11.0850	Downcast
009	temperature	14427	-21.3313	Downcast
009	temperature	17910	-27.3114	Downcast
009	temperature	17911	-31.4054	Downcast
010	temperature	13120	-9.6830	Downcast
010	temperature	13121	-45.0474	Downcast
010	temperature	13122	-0.4995	Downcast
010	temperature	14780	-14.7887	Downcast
010	temperature	14781	-17.5124	Downcast
010	temperature	16022	-28.1018	Downcast
010	temperature	16023	1.7982	Downcast
010	temperature	16510	-28.3096	Downcast
010	temperature	17724	-67.5573	Downcast
010	temperature	17725	-6.2078	Downcast
010	temperature	19198	-70.3961	Downcast
...	...	...	...	
010	temperature	19251	-0.6786	Downcast
017	temperature	11634	-14.3764	Downcast

017	temperature	11635	-0.3567	Downcast
017	temperature	12251	-38.7997	Downcast
017	temperature	12252	-12.0233	Downcast
017	temperature	12853	-9.0713	Downcast
017	temperature	12854	-10.2904	Downcast
017	temperature	12938	-85.1030	Downcast
017	temperature	12939	-98.9762	Downcast
017	temperature	12940	-6.2893	Downcast
017	temperature	13945	-18.1799	Downcast
...	...	...	...	...
017	temperature	13999	-0.2483	Downcast
017	temperature	15306	-3.6797	Downcast
...	...	...	...	...
017	temperature	15372	-0.2893	Downcast
017	temperature	16025	-6.6986	Downcast
...	...	...	...	...
017	temperature	16088	-0.4404	Downcast
018	temperature	14562	-15.7143	Downcast
018	temperature	14563	-0.7059	Downcast
019	temperature	13445	-5.0749	Downcast
019	temperature	13446	-37.5483	Downcast
019	temperature	15535	-34.7646	Downcast
...	...	...	...	...
019	temperature	15589	-0.0721	Downcast
020	temperature	11773	-9.6158	Downcast
020	temperature	11774	-14.7444	Downcast
020	temperature	16343	-25.8036	Downcast
020	temperature	16344	-35.0756	Downcast
021	temperature	15714	-13.5131	Downcast
...	...	...	...	...

021	temperature	15816	99.0000	Downcast
...	...	...	...	...
021	temperature	15866	99.0000	Downcast
...	...	...	...	...
021	temperature	15873	99.0000	Downcast
...	...	...	...	...
021	temperature	15876	99.0000	Downcast
...	...	...	...	...
021	temperature	15971	-0.0302	Downcast
021	temperature	17197	-82.9468	Downcast
...	...	...	...	...
021	temperature	17221	-28.9331	Downcast
...	...	...	...	...
021	temperature	17246	-7.3449	Downcast
...	...	...	...	...
021	temperature	17252	0.0195	Downcast
021	temperature	19483	-60.1922	Downcast
021	temperature	19508	90.0000	Downcast
...	...	...	...	...
021	temperature	19656	0.0230	Downcast

2.3. The “Wild Edit” module.

I have decided to put out this module from the SBE Data Processing sequence in order to keep unchanged at the most the original data. The outliers will be removed by the control quality sequence. Nevertheless, the previous step “Data Extraction” allows to detect the main pressure spikes which are often associated by temperature and conductivity spikes.

As far as the ctd 911*plus* is concerned, it is necessary to detect the temperature outliers and to cancel them because the temperature values are used into the module “Cell

Thermal Mass” (see figure 3 as an example). Moreover, major temperature spikes have an impact upon derived variables using temperature such as salinity and oxygen from SBE43 (see figure 4 as an example).

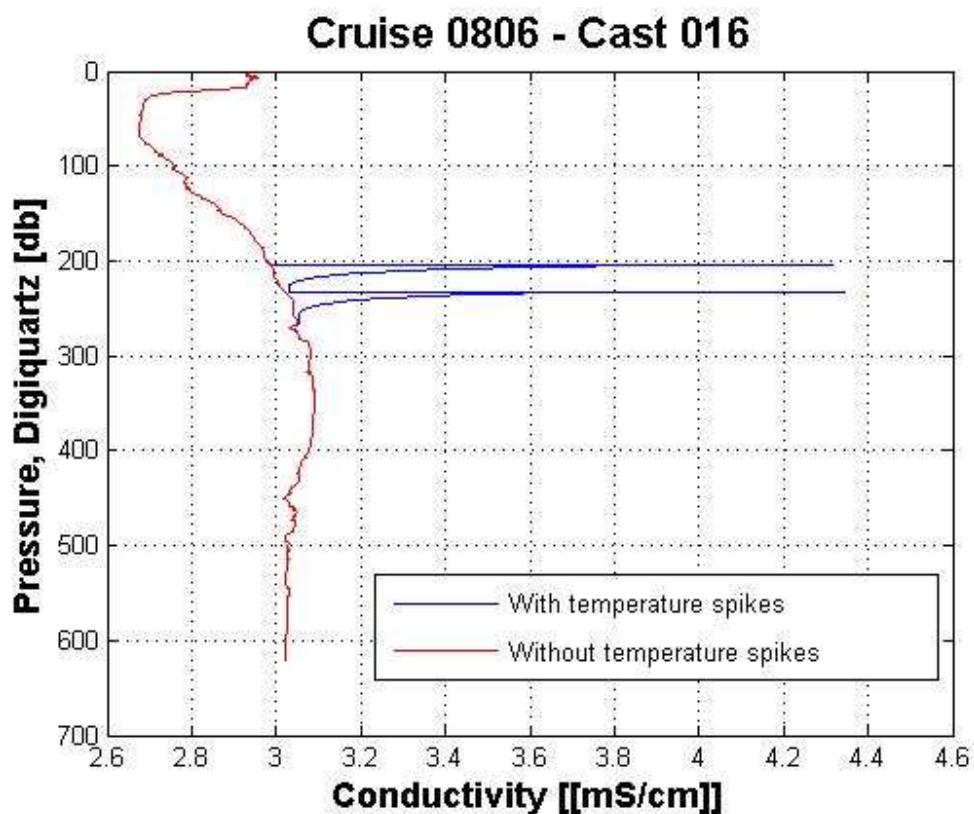


Figure 3. Example of the impact of temperature spikes upon the conductivity variable through the “Cell Thermal” module.

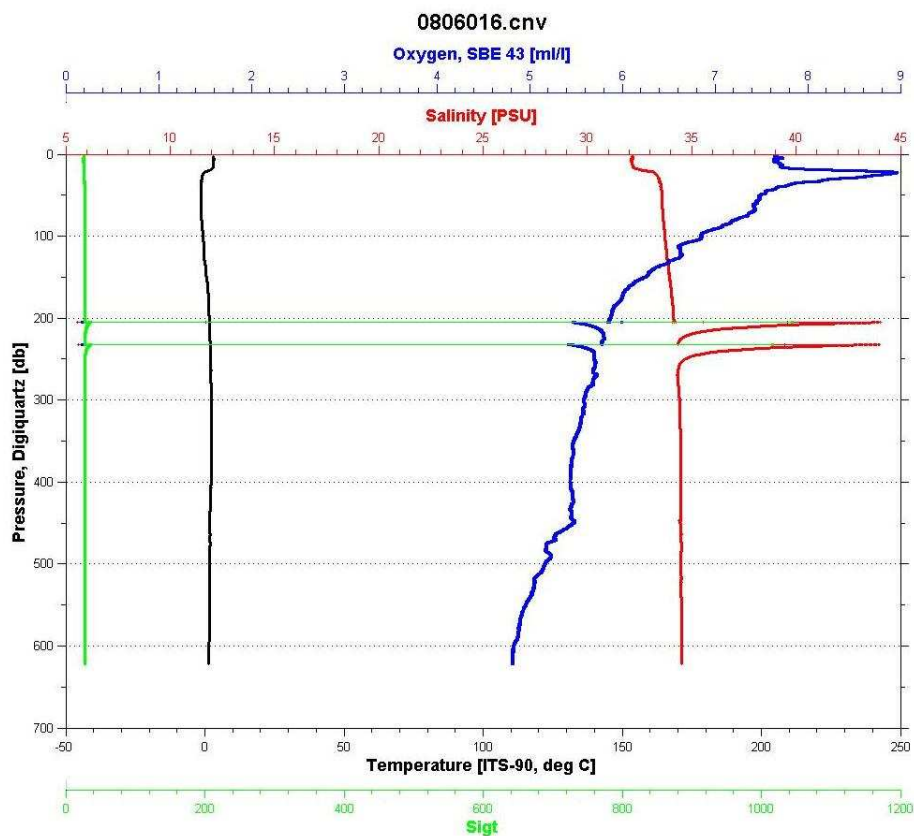


Figure 4. Example of the impact of temperature spikes upon the derived variables such as oxygen, salinity and density.

2.4. The “Filter” module.

This module allows to apply a low-pass filter in order to smooth high-frequency data. The new Sea-Bird’s documentation henceforth suggests applying this module only on the pressure data.

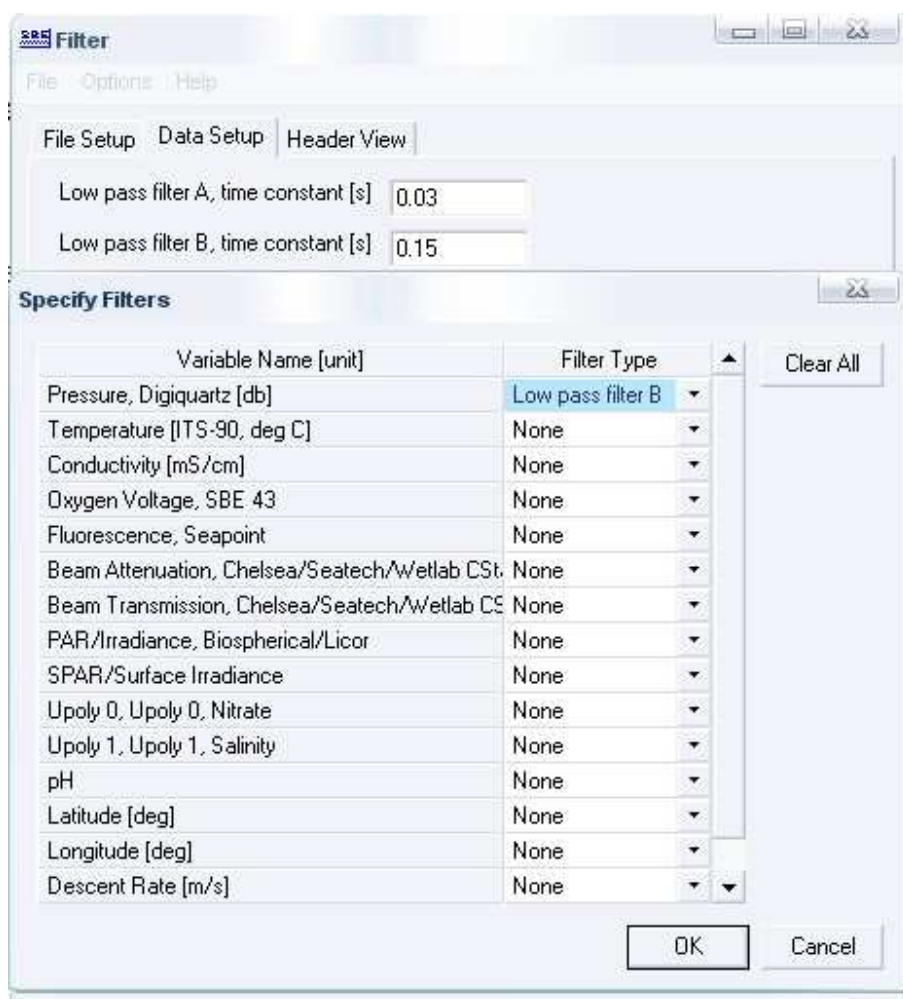


Figure 5. The “Filter” module

2.5. The “Align CTD” module.

The corrections (**5 seconds**) have been applied to align oxygen data relative to pressure. This correction allows to resolve the systematic time delay between oxygen and pressure data which is due to the long time constant of the sensor and to the time transit of the water through the pipe.

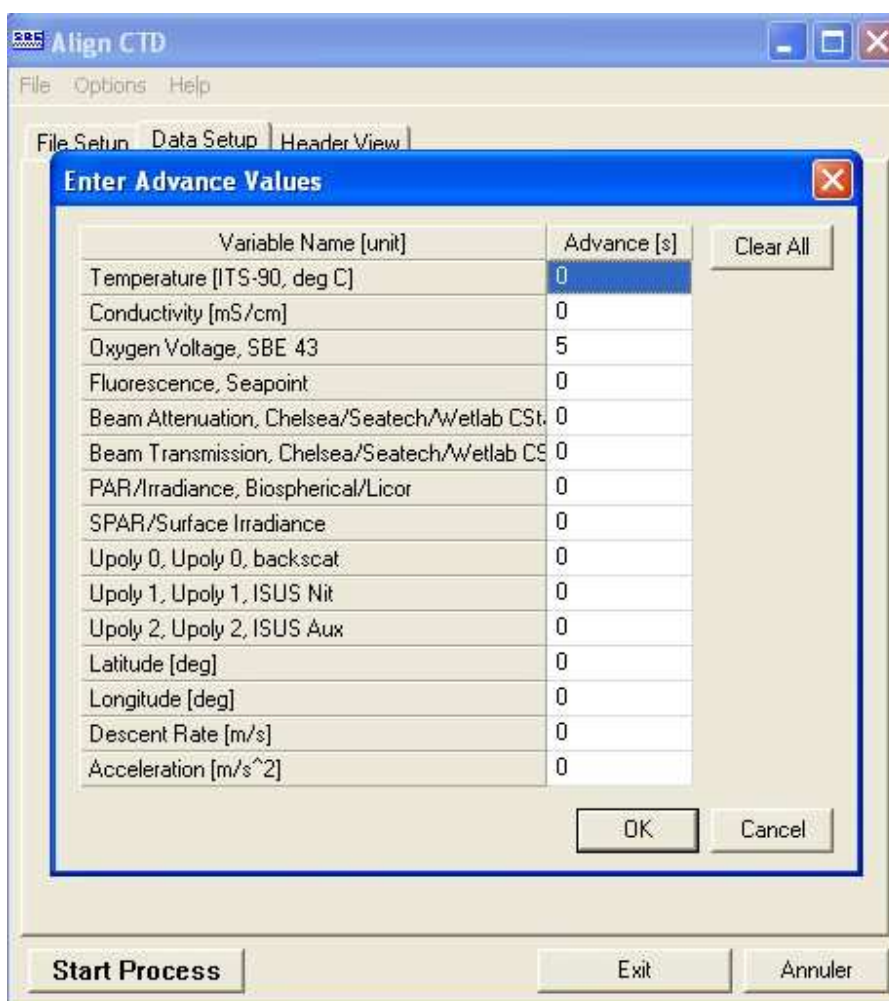


Figure 6. The Align Ctd module.

2.6. The “Cell Thermal Mass” module

This module concerns the conductivity parameter. It permits to remove conductivity cell thermal mass effects. It was set with the default value.

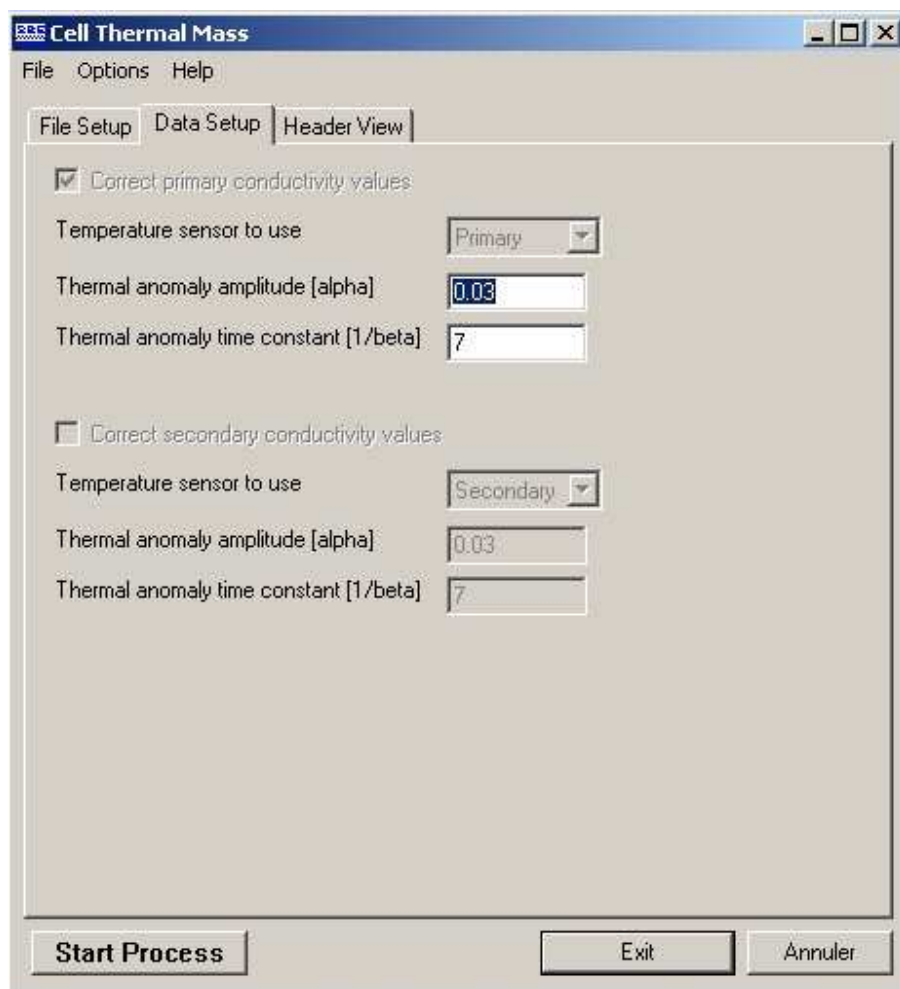


Figure 7. The “Cell Thermal Mass” module.

2.7. The “Loop Edit” module.

This module marks with the bad flag value records with pressure slowdowns or reversals.

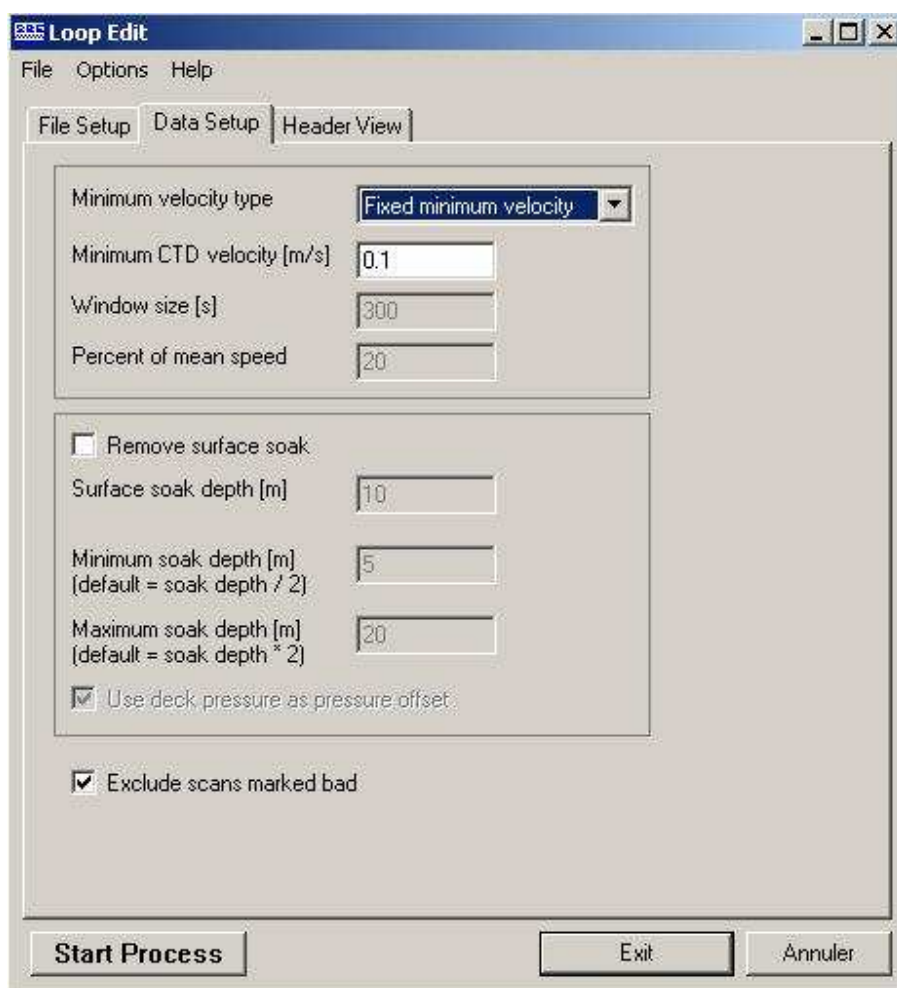


Figure 8. The “Loop Edit” module.

2.8. The “Derive” module.

This module allows to compute additional oceanographic parameters as shown in the next figure.

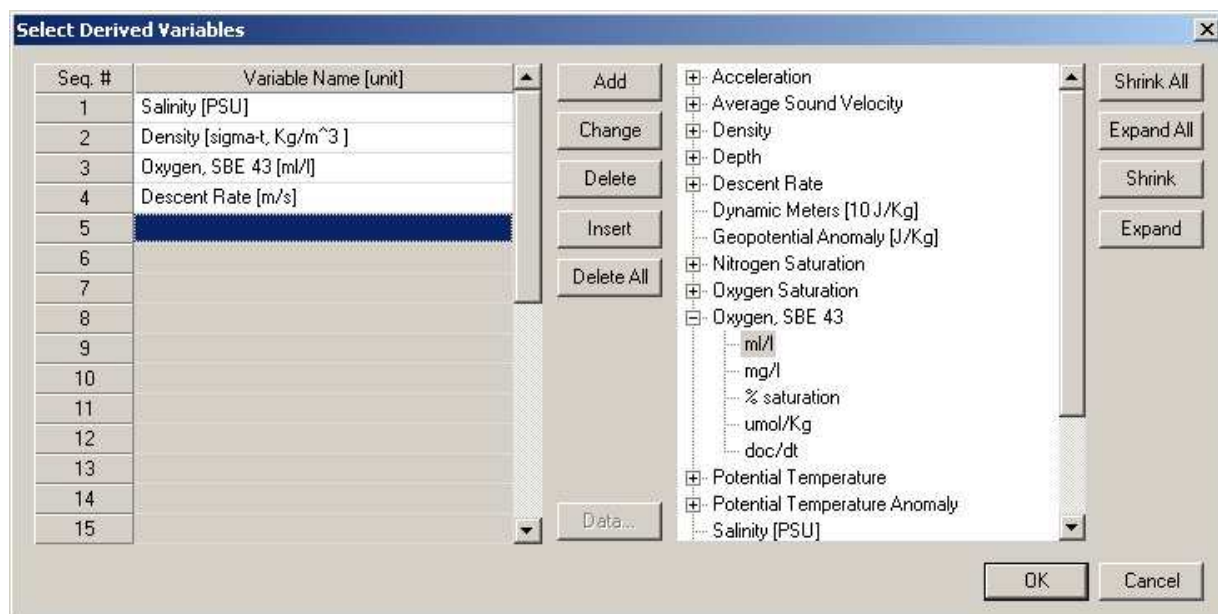


Figure 9. The “Derive” module.

2.9. The Median Filter module.

No median filter has been applied.

2.10. Detect 9plus pump problem

This step allows to detect that the pump works correctly that ensures that a best data quality for the sensors plumbed with the pump as conductivity and oxygen (see the corresponding Sea-Bird [application note](#)).

A simple matlab function has permitted to check that there is some pump problems for the following casts (see Table 9).

Table 9. Detect pump issue.

	Scan Count		Pressure [db]		
Cast	Start	End	Start	End	Direction
001	7170	8214	2.639	15.746	Downcast
004	8225	9738	2.915	56.460	Downcast

005	10539	11983	3.077	47.840	Downcast
006	15759	17236	4.054	41.812	Downcast
009	103007	103010	1.275	1.277	Upcast

2.11. The “Strip” module.

This module allows to extract columns. In this part, the following variables are cancelled: the “Pump Status” and the “Descent Rate”, both from the coming from the “Data Conversion” module. This “Descent Rate” variable is henceforth useless because there is a more accurate “Descent Rate” variable calculated from the “Derive” module.

3. THE DATA QUALITY CONTROL.

3.1. Miscellaneous remarks.

- All the casts have been recorded from the deck.
- The first data corresponding to the subsurface (about the first 15 db) might be characterized by large and chaotic variations or even by large density inversions (see figure 10). It is well known that salinity data are much influenced as temperature by low velocities and that the best quality data are collected from a 1 m/s rosette descent rate. For some casts in subsurface, it is quite difficult to detect if salinity and temperature variations are physically valid or if the data profile is caused by a combination of a low rosette velocity (CTD acceleration from 0 to 1 m/s) and the influence of the ship hull and movement (stabilization).

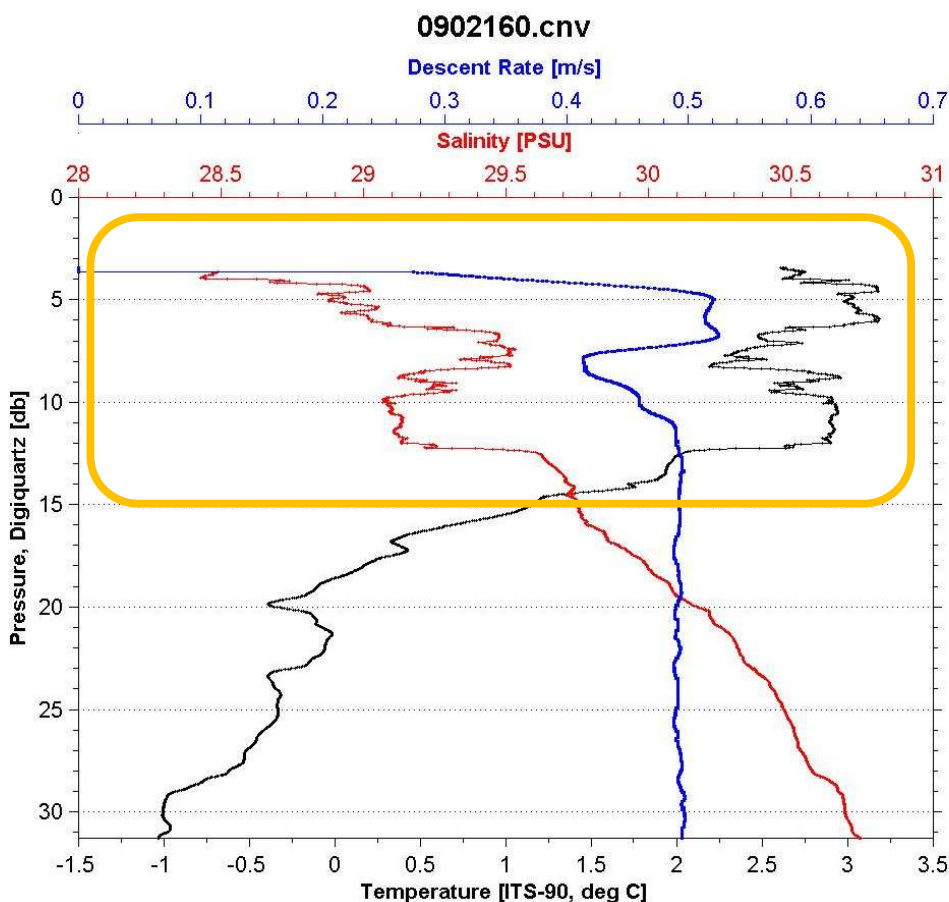


Figure 10. An example of irregular temperature and salinity variations at the surface.

- For some casts, there may have some oxygen spikes coinciding with a sharp temperature gradient. Although these artefacts seem to be doubtful and may be produced by an inappropriate Sea-Bird algorithm, no data is flagged as doubtful (see annex B for more details).
- For several casts, there are noisy salinity and density data (see figures 11 and 12) coinciding with large temperature variations. It is quite difficult to determine if these salinity variations are oceanographically real or if they are a consequence of misalignment sensor problem pronounced by sharp temperature variations.

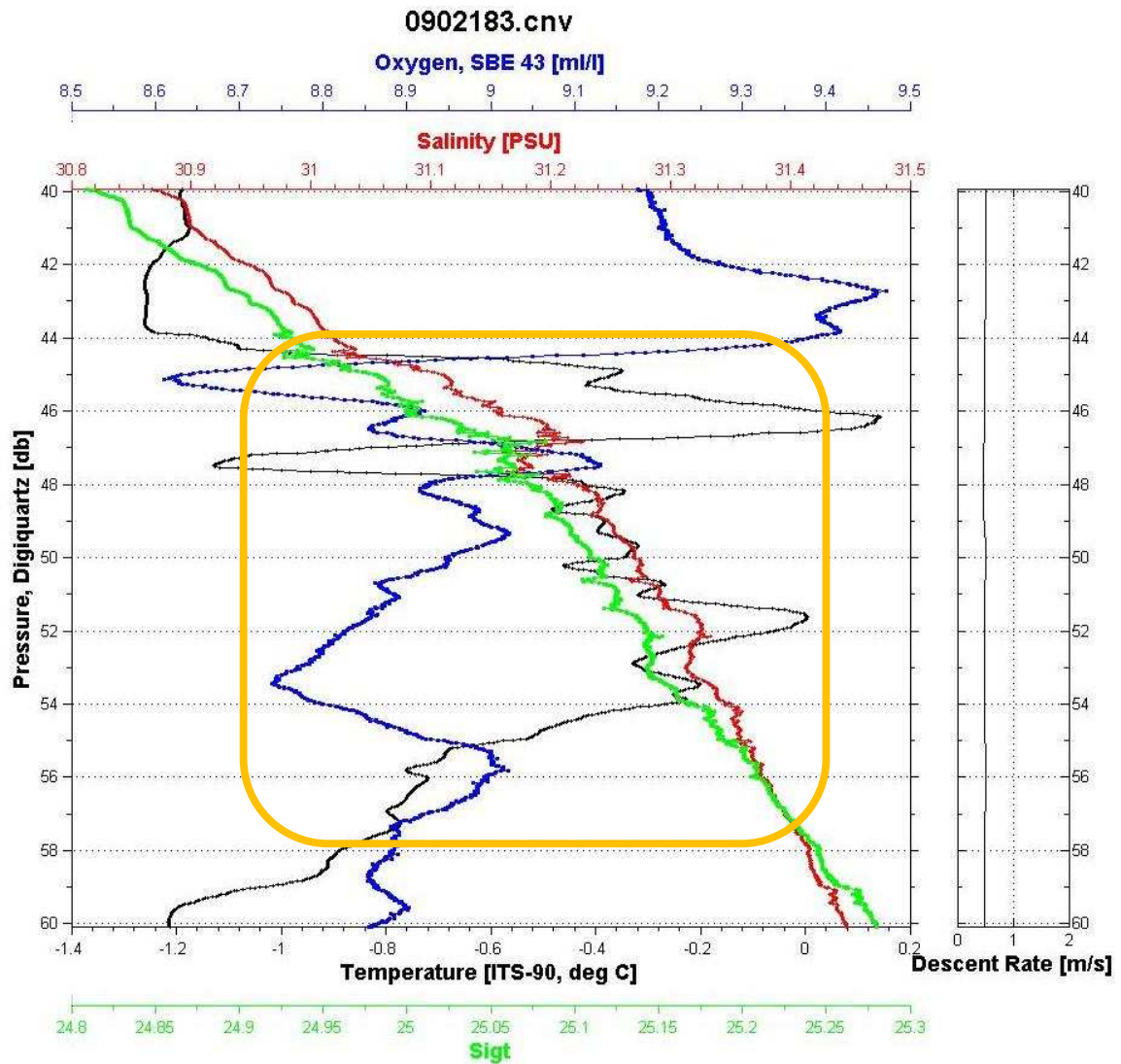


Figure 11. An example of noisy salinity and density data occurring during sharp temperature gradients.

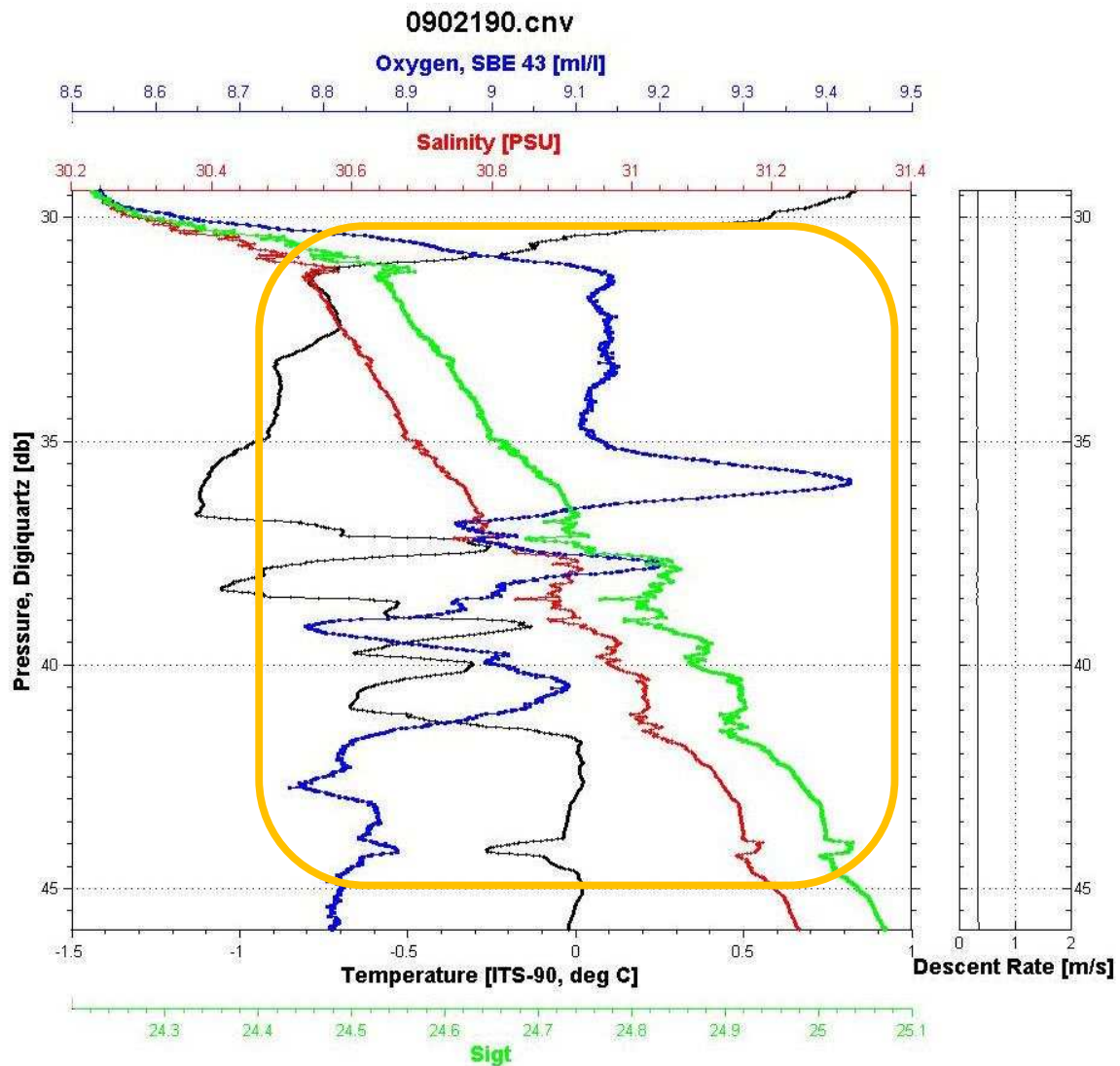


Figure 12. An example of noisy salinity and density data occurring during sharp temperature gradients.

- At the bottom, it is current to record noisy data and chaotic variations. These artefacts may often be linked with the rosette deceleration (see figure 13).

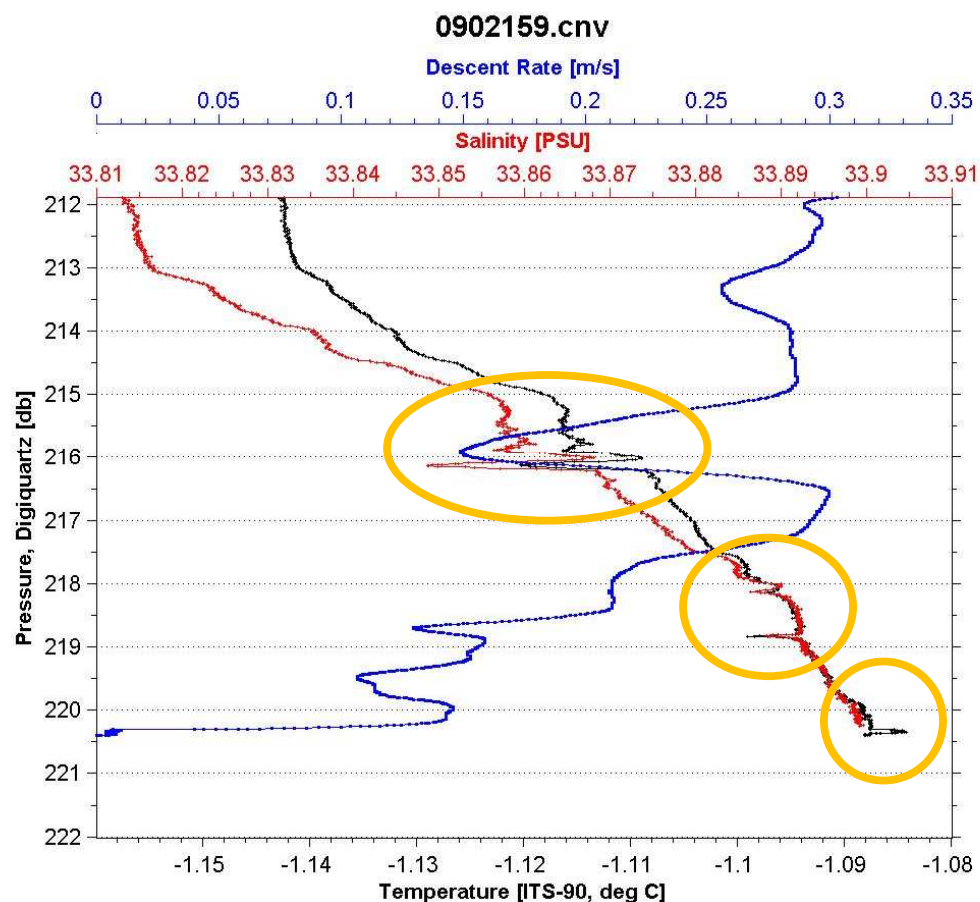


Figure 13. An example of doubtful data occurring during the rosette deceleration at the bottom.

- For most of the casts until the cast 162, the rosette descent rate is amazingly too low, about 0.5 m/s or less. Sea-Bird recommends to keep a descent rate close to 1 m/s to get the best data quality. Low velocities might lead to noisy and doubtful data.

3.2. A little reminder about the used quality flag.

- 0 → no quality control.
- 1 → the element appears to be correct.
- 2 → the element appears to be inconsistent with other elements (never used).
- 3 → the element appears to be doubtful.
- 4 → the element appears to be erroneous.
- 5 → the value was modified.

3.3. List of the carried out tests.

Test 1.1: GTSPP Platform Identification

Test 1.2: GTSPP Impossible Date/Time

Test 1.3: GTSPP Impossible Location

Test 1.4: GTSPP Position on Land

Test 1.4: GTSPP Position on Land

Test 1.5: GTSPP Impossible Speed

Test 1.6: GTSPP Impossible Sounding

Test 5.1: GTSPP Cruise Track Visual Inspection

Test 2.0: IML Minimum Descent Rate (2) (0.10m/s)

Test 2.1: GTSPP Global Impossible Parameter Values (4)

Test 2.3: GTSPP Increasing Depth (16)

Test 2.4: GTSPP Profile Envelope (Temperature and Salinity) (32)

Test 2.6: GTSPP Freezing Point (128)

Test 2.7: GTSPP Spike in Temperature and Salinity (one point) (256)

Test 2.8: GTSPP Top and Bottom Spike in Temperature and Salinity (512)

Test 2.9: GTSPP Gradient in Temperature and Salinity (1024)

Test 2.11: IML Spike in Pressure, Temperature and Salinity (one point or more) (4096)

Test 5.2: GTSPP Profile Visual Inspection

3.4. Cruise Track Visual Inspection.

The location map is based on the geographic coordinates recorded into the logbook.

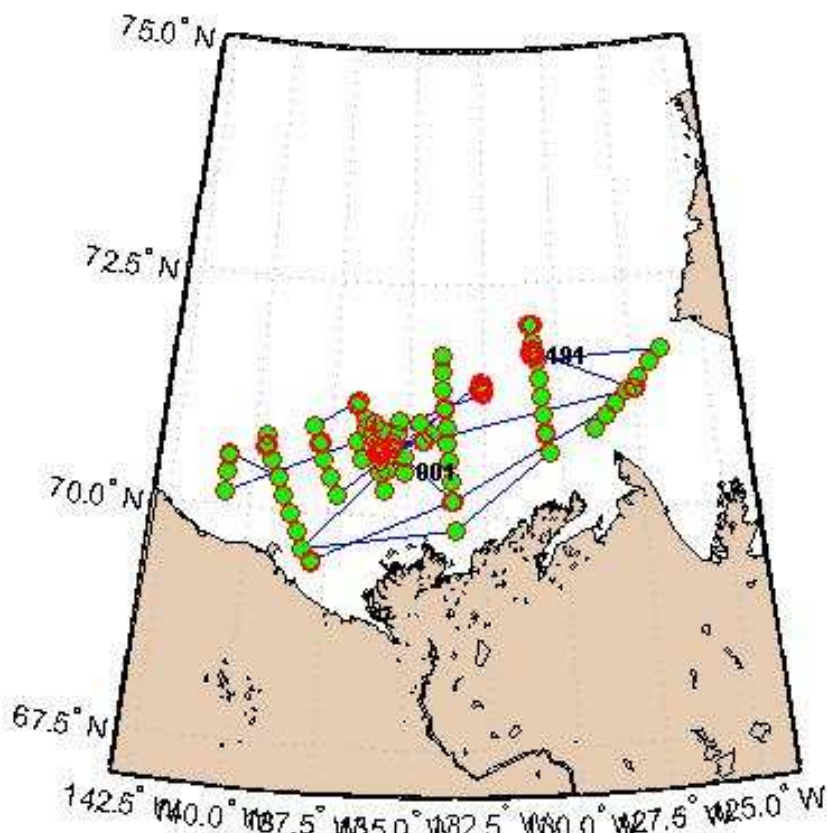


Figure 14. The 0902 location map.

- The casts **012** and **014** have a different station name although they have been recorded at the same location (1.5 km).
- The casts **028** and **029** have a different station name although they have been recorded at the same location (0.5 km).
- The casts **112** to **130** have been the same station name although they have been distant of 12 km.

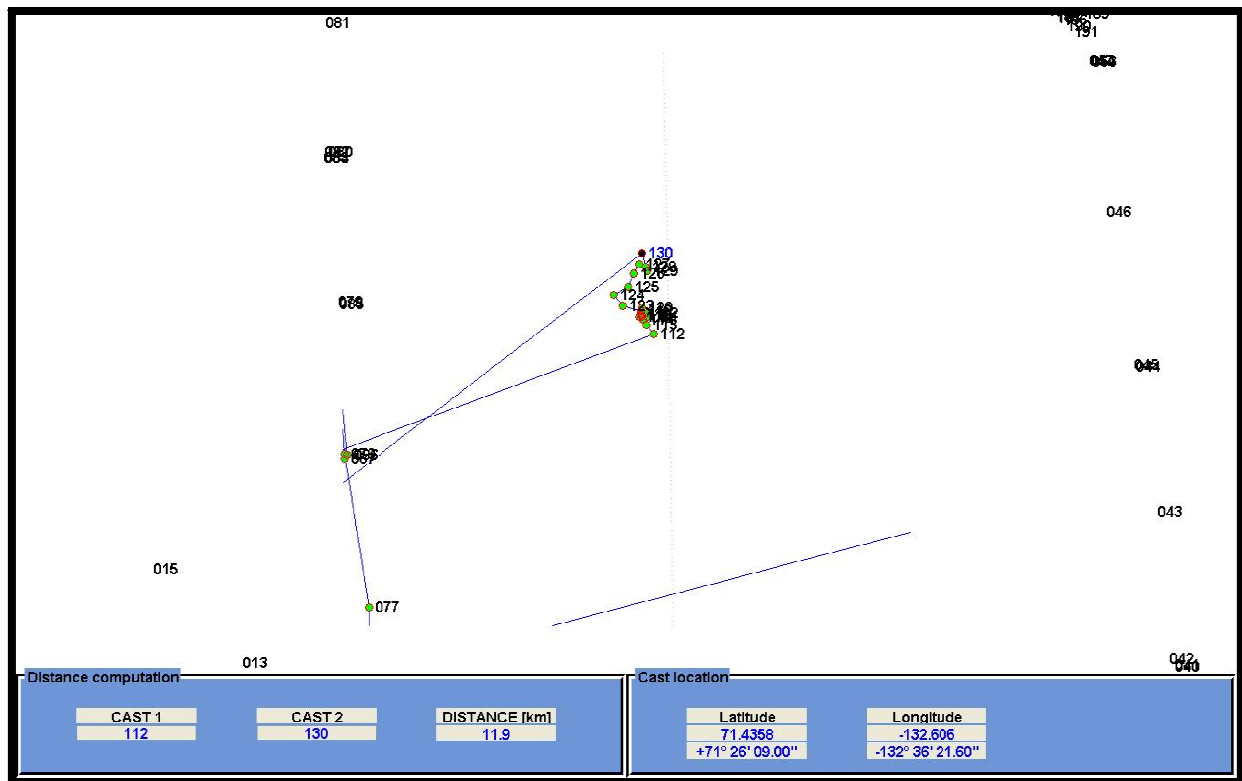


Figure 15. The geographical location of the casts 112 to 130.

- The casts 145 and 146 recorded at the same station (460) are 2.6 km away from each other.
- The casts 147 and 148 recorded at the same station (460) are 2.7 km away from each other.
- The casts 164 to 191 have the same station name but not exactly at the same location. The maximum distance is 8.3 km.

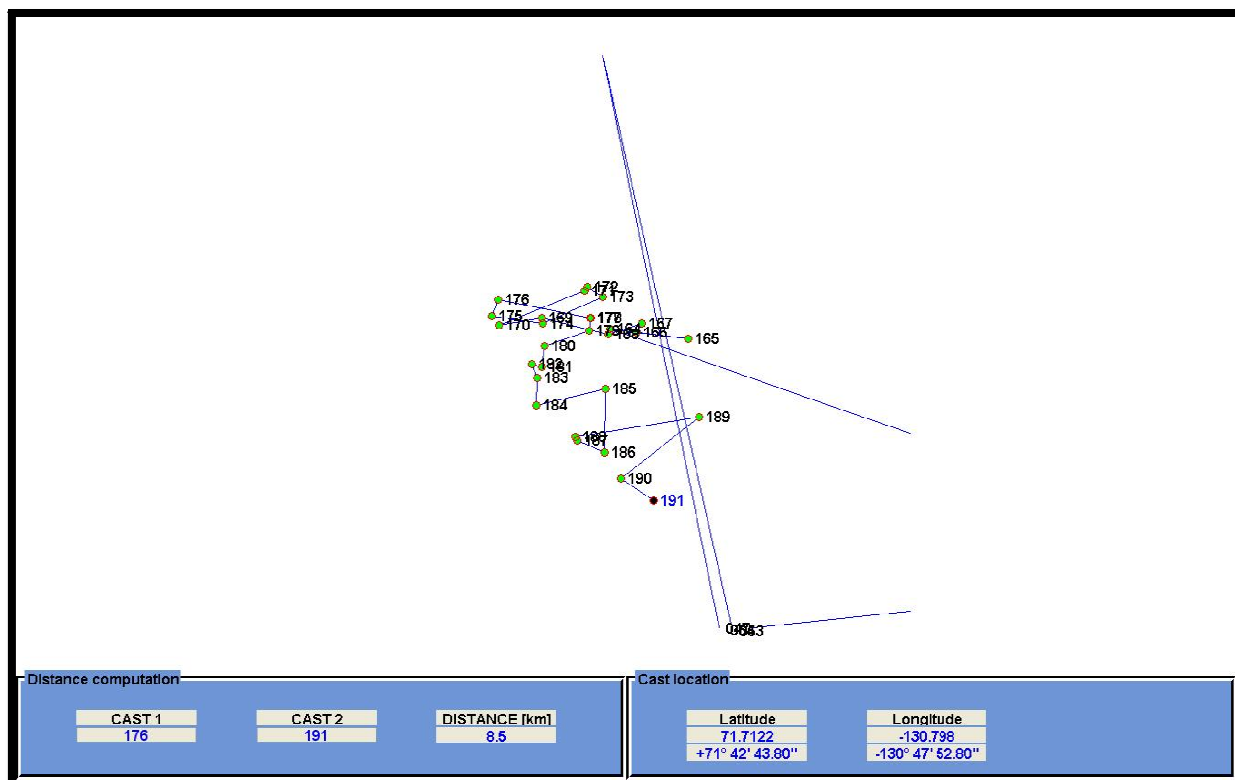


Figure 16. The geographical location of the casts 164 to 191.

3.5. Profile Visual Inspection.

*****The casts 001 and 002 have been recorded at the same station 1 (B). *****

001 → The pump does not work from the surface until 15 db. The descent rate is very low through the whole downcast (inferior to 0.45 m/s) that leads to noisy and doubtful data.

002 → The descent rate is very low through the whole downcast (inferior to 0.6 m/s) that leads to noisy and doubtful data.

003 → There are some problems with the temperature sensor (aberrant data).

The ascendant and descendant salinity and density profiles are different at the surface.

The ascendant and descendant oxygen profiles are different at the surface.

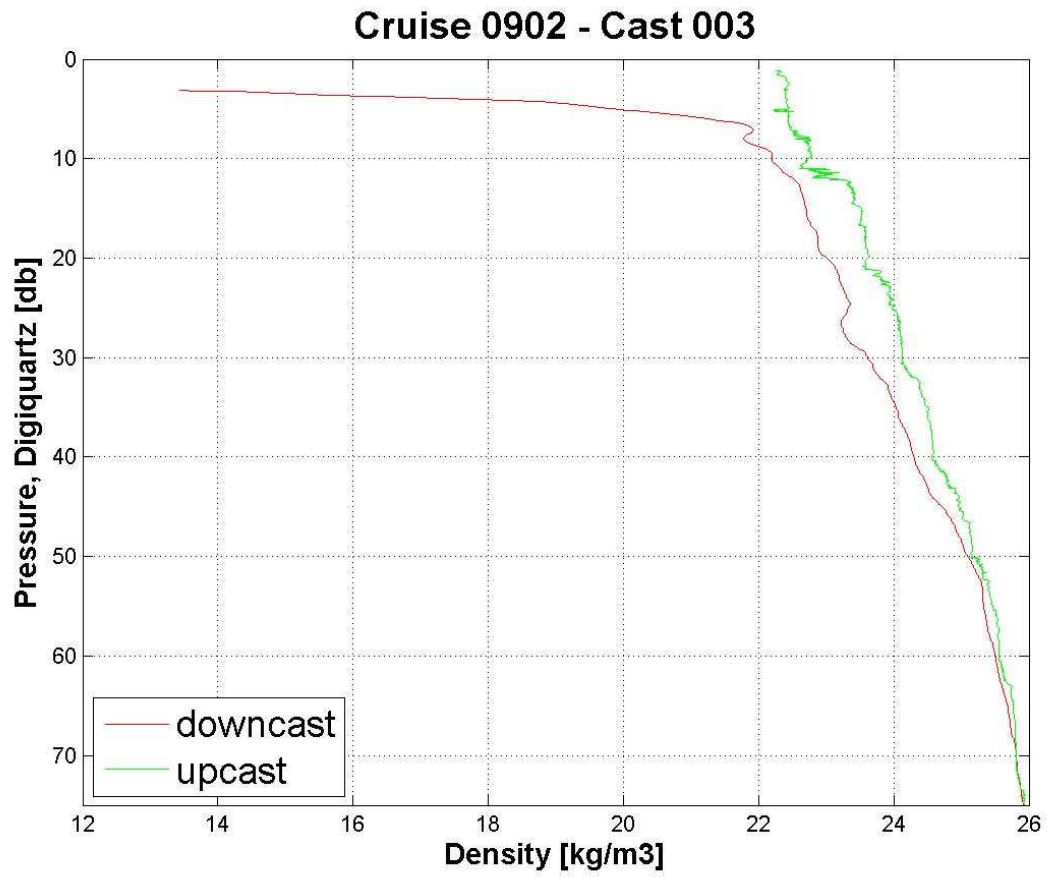


Figure 17. Evolution of the density profiles for the cast 003.

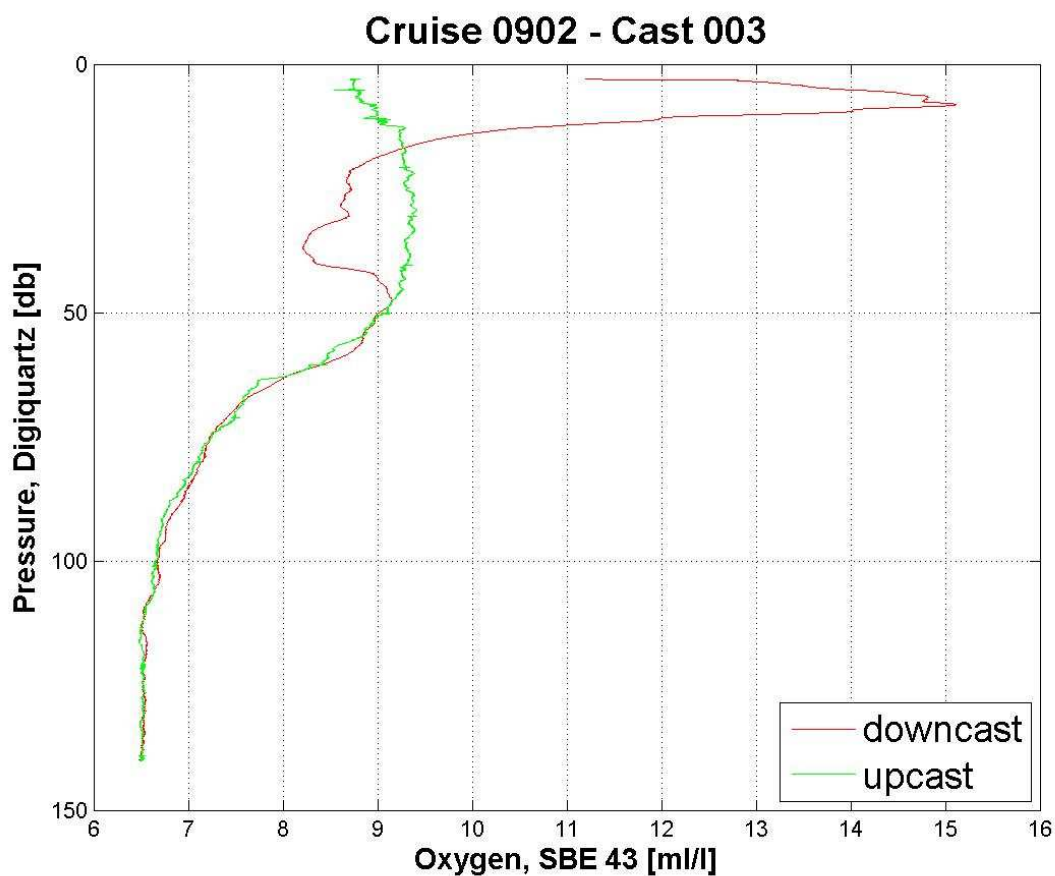


Figure 18. Evolution of the oxygen profiles for the cast 003.

*******The casts 004 and 005 have been recorded at the same station 11 (B). *******

004 → The pump does not work from the surface until 57 db.

005 → The pump does not work from the surface until 48 db.

006 → There are some problems with the temperature sensor (aberrant data). The pump does not work from the surface until 42 db. The profiles are quite spiky at the bottom.

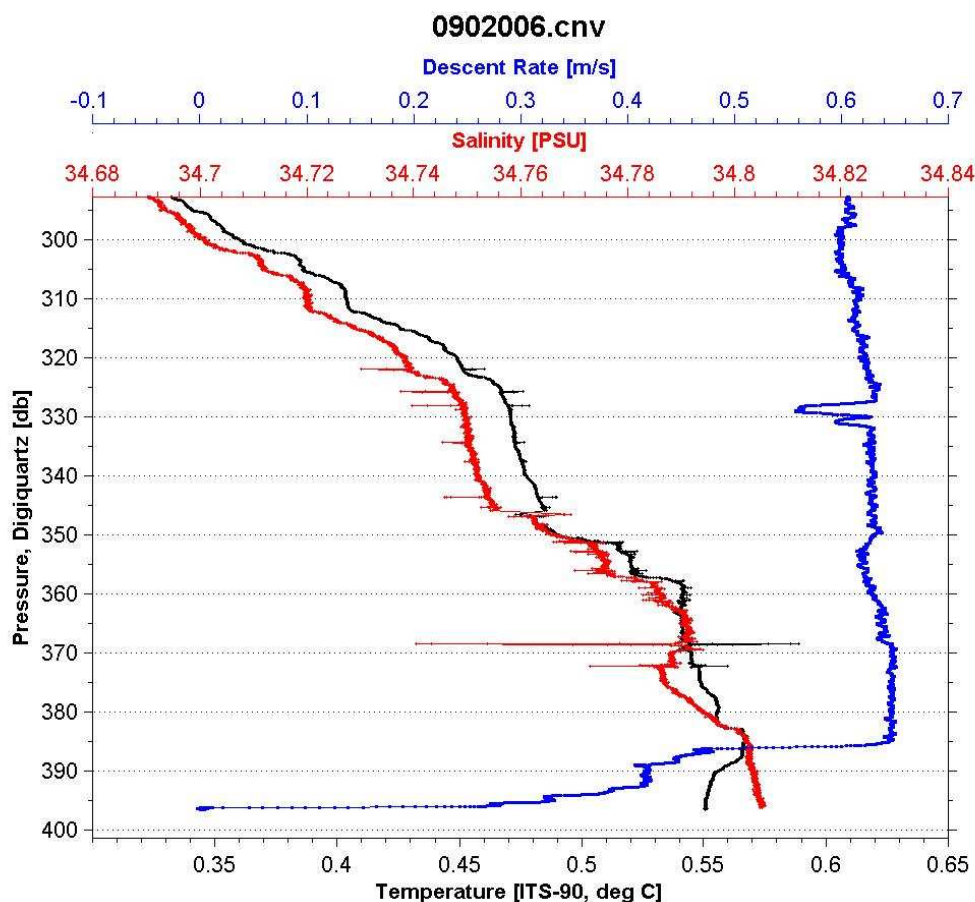


Figure 19. Evolution of the descendant temperature, salinity and descent rate for the cast 006.

007 → Noting to notice.

008 → Noting to notice.

009 → There are some problems with the temperature sensor (aberrant data).

010 → There are some problems with the temperature sensor (aberrant data). There is a density inversion at the surface.

011 → The average rosette descent rate is quite low (~0.6 m/s).

012 → Noting to notice. The average rosette descent rate is quite low (~0.6 m/s).

013 → There is a density inversion at the surface which may be detected on the ascendant profile. The rosette deceleration at the bottom leads to some doubtful data.

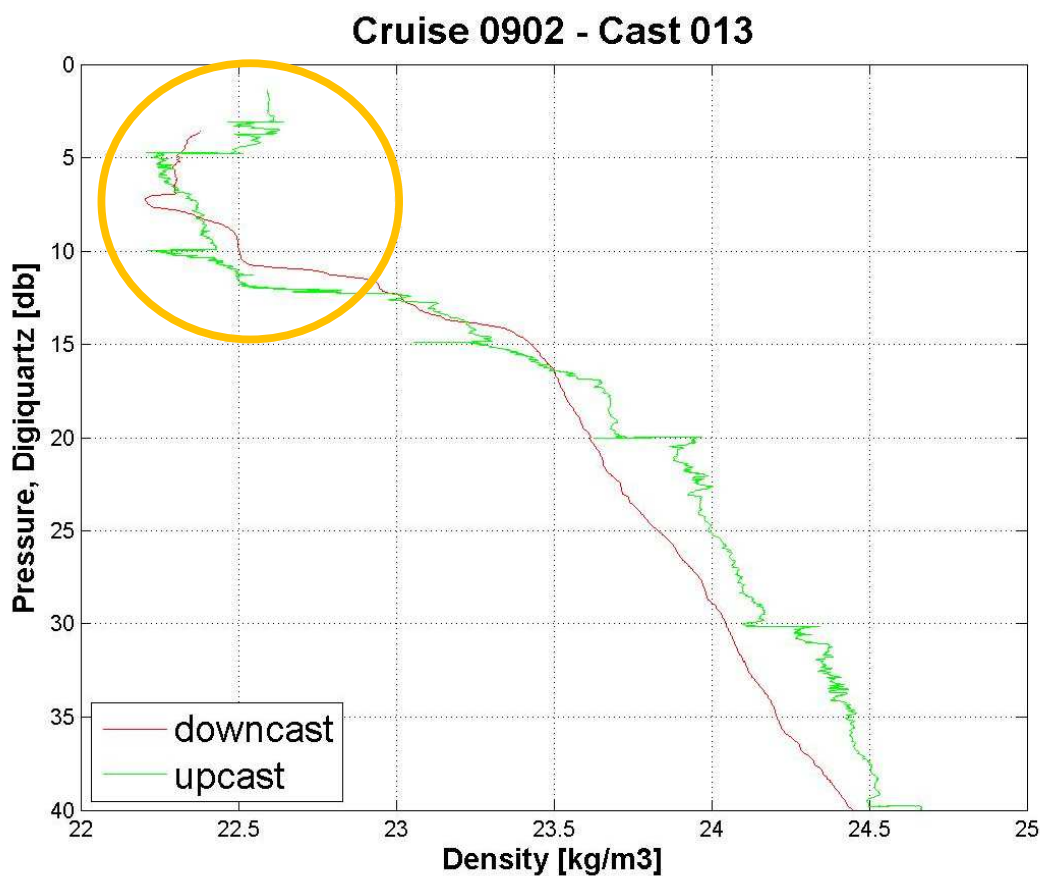


Figure 20. Evolution of the density profiles for the cast 013.

014 → Nothing to notice.

015 → Nothing to notice.

016 → Nothing to notice.

017 → There are some problems with the temperature sensor (aberrant data).

018 → There are some problems with the temperature sensor (aberrant data).

019 → There are some problems with the temperature sensor (aberrant data).

020 → There are some problems with the temperature sensor (aberrant data). The profile is step like between 240 and 290 db.

021 → There are some problems with the temperature sensor (aberrant data).

022 → Nothing to notice.

023 → The start of the profile is quite irregular.

024 → Nothing to notice.

*******The casts 025 to 027 and 070 have been recorded at the same station 390.**

025 → The irregular descent rate leads to some doubtful data.

026 → Nothing to notice.

027 → The rosette descent rate is quite low (about 0.6m/s).

028 → The rosette descent rate is quite low (about 0.6m/s).

*******The casts 029 to 031 have been recorded at the same station 690.**

029 → Nothing to notice.

030 → Nothing to notice.

031 → Nothing to notice.

*******The casts 032 to 036 and 088 have been recorded at the same station 680.**

032 → There is a high rosette deceleration at 99 db leading to doubtful data.

033 → Nothing to notice.

034 → Does not exist.

035 → Nothing to notice.

036 → Nothing to notice.

*******The casts 037 and 038 have been recorded at the same station 394.**

037 → Nothing to notice.

038 → Nothing to notice.

039 → Nothing to notice.

*******The casts 040 to 042 have been recorded at the same station 280.**

040 → The rosette descent rate is quite low (about 0.4 m/s).

041 → The rosette descent rate is quite low (about 0.4 m/s).

042 → The rosette descent rate is quite low (about 0.4 m/s).

043 → The rosette descent rate is quite low (about 0.4 m/s).

*******The casts 044 and 045 have been recorded at the same station 260.**

044 → Nothing to notice.

045 → Nothing to notice.

046 → There is an oxygen artifact at 14 db.

*******The casts 047 and 053, 054 have been recorded at the same station 240.**

047 → Nothing to notice.

048 → There is an oxygen artifact at 15 db.

*******The casts 049 to 052 have been recorded at the same station 220.**

049 → Nothing to notice.

050 → There is an oxygen artifact at 9 db.

051 → The rosette descent rate is quite low (about 0.4 m/s). The irregular descent rate leads to some doubtful data.

052 → The rosette descent rate is quite low (about 0.4 m/s). The irregular descent rate leads to some doubtful data.

*******The casts 047 and 053, 054 have been recorded at the same station 240.**

053 → The rosette descent rate is quite low (about 0.6 m/s).

054 → The rosette descent rate is quite low (about 0.6 m/s) and irregular that lead to some doubtful data.

*******The casts 055 to 058 have been recorded at the same station 110.**

055 → There is an oxygen artifact at 21 db.

056 → There is a light density inversion at the surface which is not recorded on the ascendant profile.

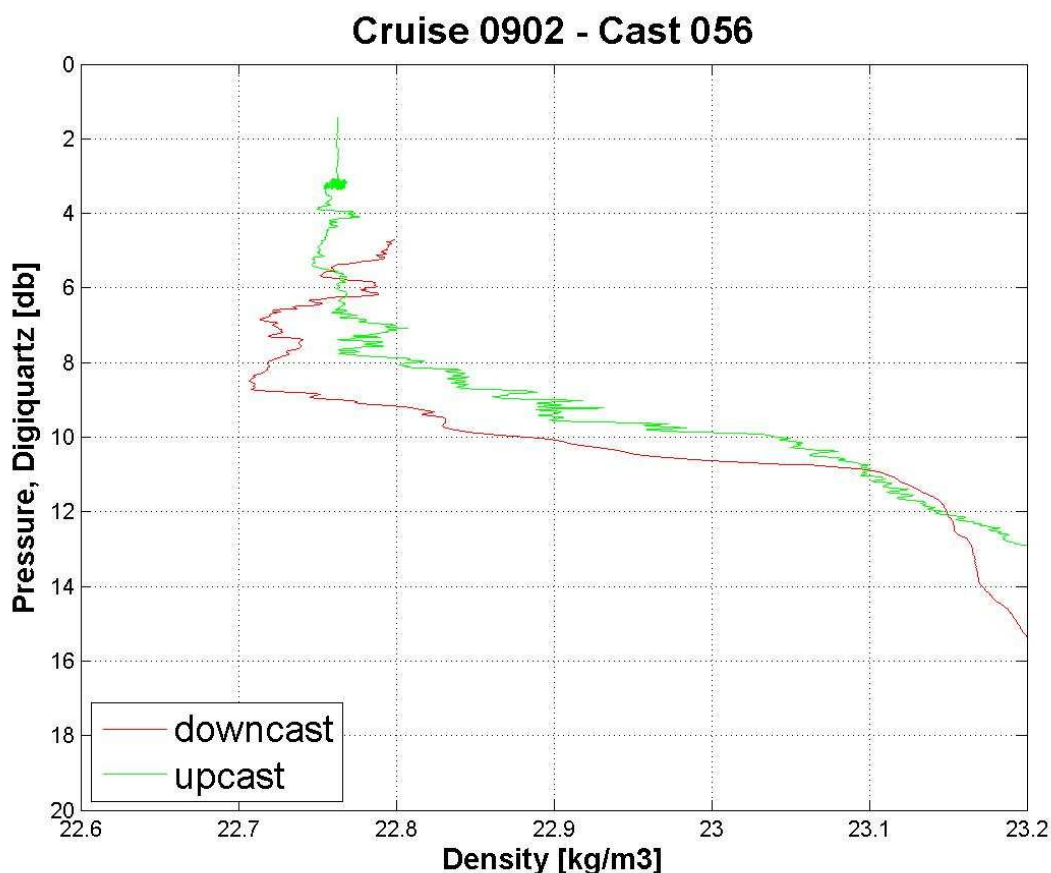


Figure 21. Evolution of the density profiles for the cast 056.

057 → The rosette descent rate is quite low (about 0.5 m/s). There are several salinity spikes.

058 → The rosette descent rate is quite low (about 0.6 m/s). The first 25 db profiles are quite irregular. The irregular descent rate leads to some doubtful data.

059 → There is an oxygen artifact at 17 db.

*******The casts 060 and 061 have been recorded at the same station 130.**

060 → The rosette descent rate is so low (about 0.3 m/s). The first 17 db are very chaotic maybe linked with the chaotic rosette acceleration. The surface ascendant and descendant profiles are quite different.

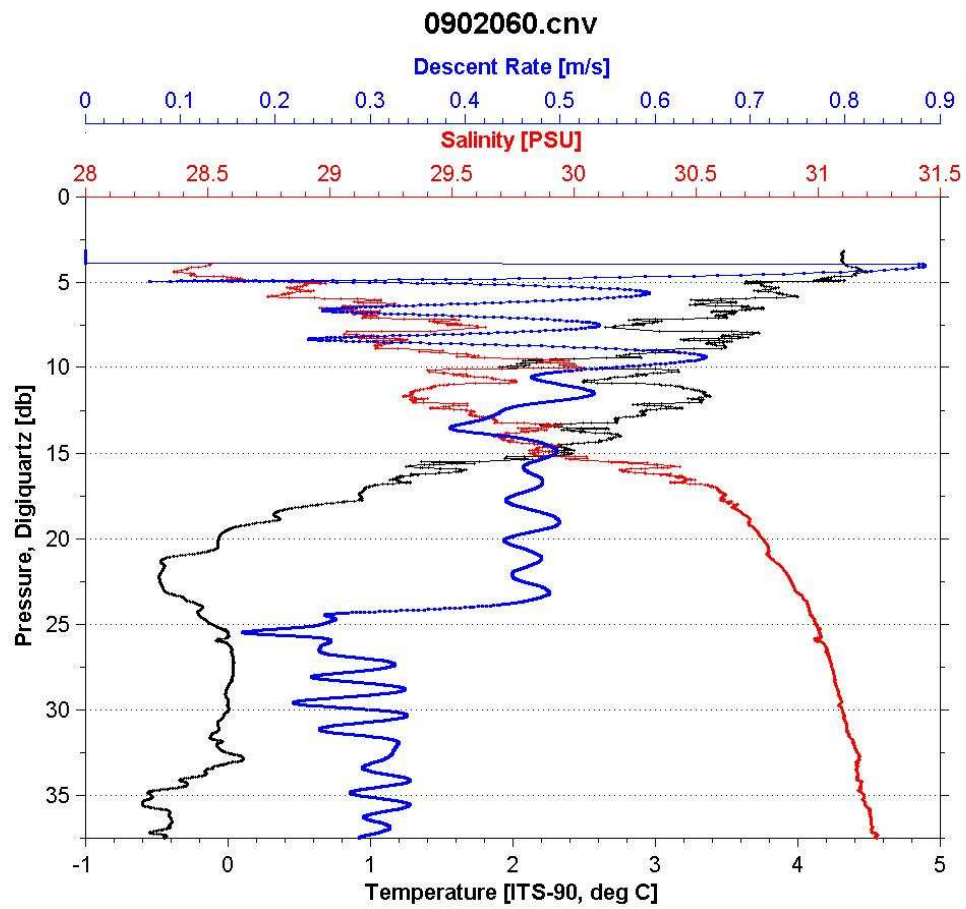


Figure 22. Evolution of the descendant temperature, salinity and descent rate for the cast 060.

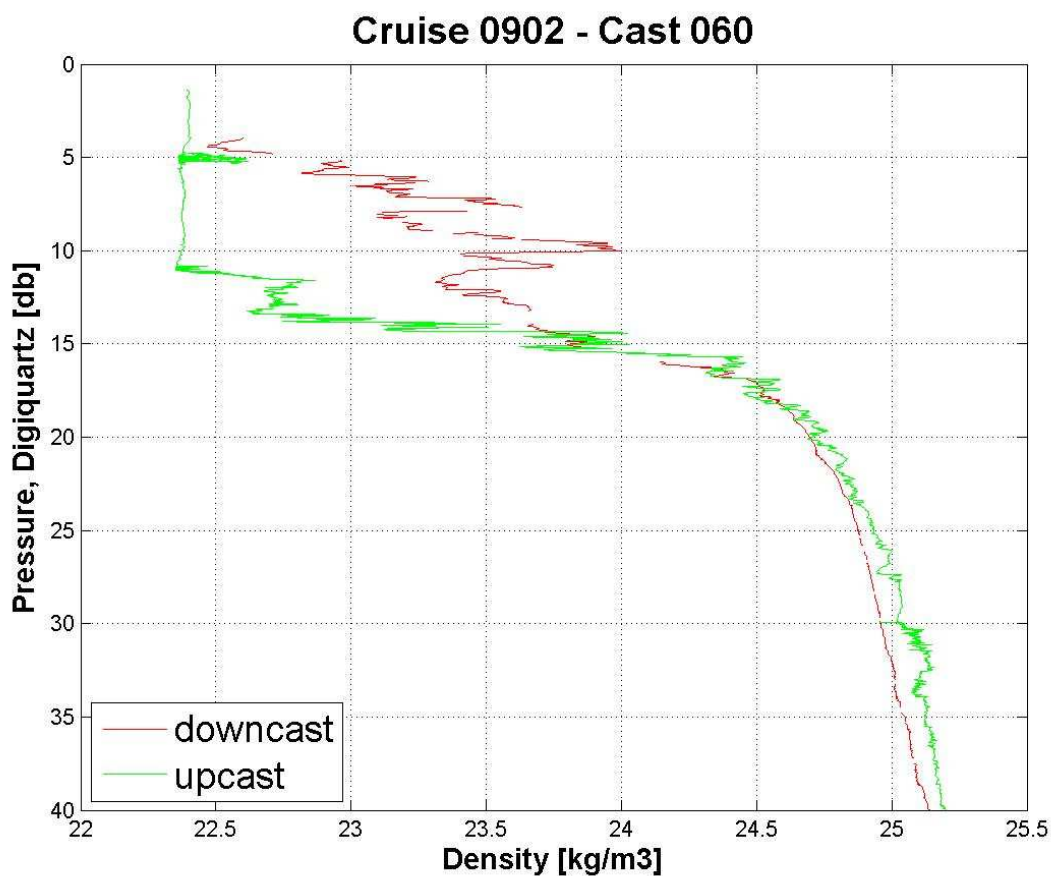


Figure 23. Evolution of the density profiles for the cast 060.

061 → There is an oxygen artifact at 17 db.

062 → There is an oxygen artifact at 11 db. The irregular descent rate leads to some doubtful data.

*******The casts 063, 068 and 069 have been recorded at the same station 150.**

063 → The rosette descent rate is quite low (about 0.35 m/s).

064 → The rosette descent rate is quite low (about 0.35 m/s).

*******The casts 065 to 067 have been recorded at the same station 170.**

065 → There is a density inversion at the surface which is not recorded on the ascendant profile.

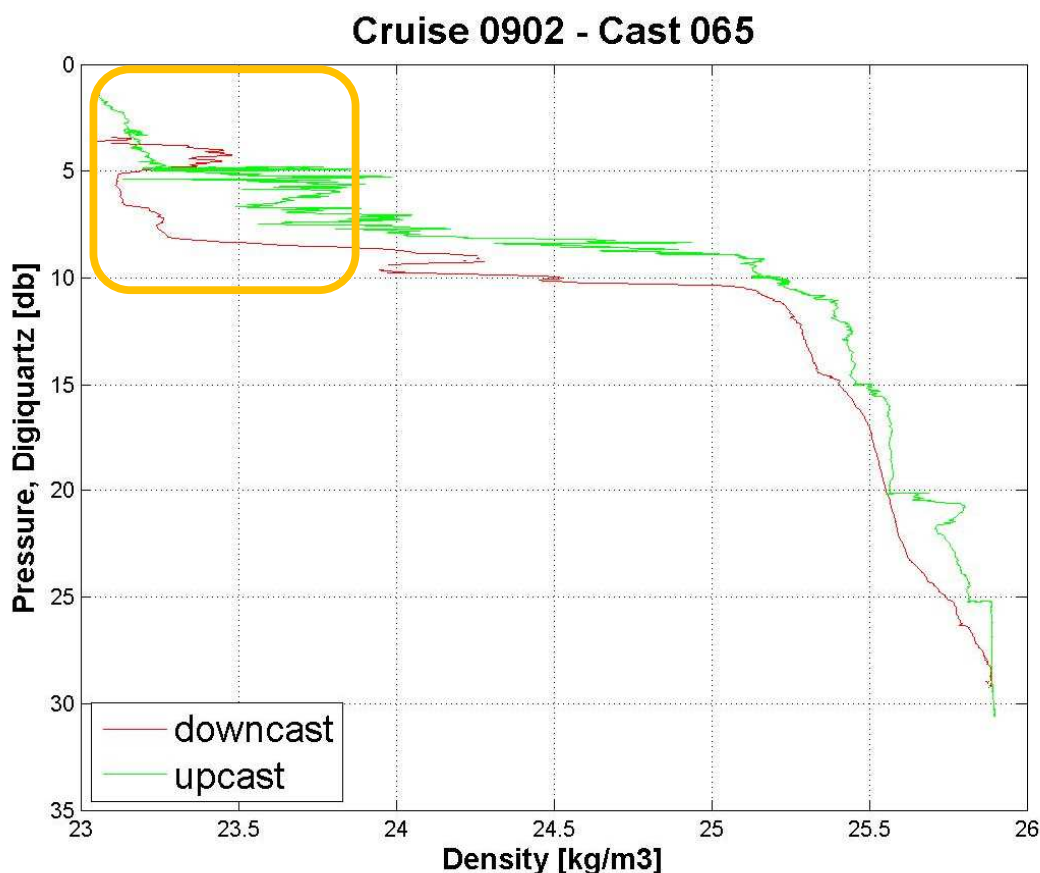


Figure 24. Evolution of the density profiles for the cast 065.

066 → Nothing to notice.

067 → The rosette descent rate is quite low (about 0.5 m/s).

*******The casts 063, 068 and 069 have been recorded at the same station 150.**

068 → The rosette descent rate is quite low (about 0.35 m/s). There is an oxygen artifact at 5 db.

069 → The rosette descent rate is quite low (about 0.6 m/s). The temperature profile is noisy from 44 db to the bottom.

*******The casts 025 to 027 and 070 have been recorded at the same station 390.**

070 → The rosette descent rate is quite low (about 0.35 m/s).

*******The casts 071 to 073 have been recorded at the same station 380.**

071 → The rosette descent rate is quite low (about 0.35 m/s).

072 → Nothing to notice.

073 → The rosette descent rate is quite low (about 0.5 m/s). There is an oxygen artifact at 8 db.

074 → Nothing to notice.

*******The casts 075 and 076 have been recorded at the same station 360.**

075 → The rosette descent rate is quite low (about 0.35 m/s).

076 → The rosette descent rate is quite low (about 0.35 m/s).

077 → The rosette descent rate is quite low (about 0.35 m/s).

*******The casts 078 and 086, 087 have been recorded at the same station 340.**

078 → There is an oxygen artefact at 16 db.

*******The casts 079 and 085 have been recorded at the same station 330.**

079 → Nothing to notice.

*******The casts 080 and 082 to 084 have been recorded at the same station 320.**

080 → There is an oxygen artefact at 12 db.

081 → Nothing to notice.

*******The casts 080 and 082 to 084 have been recorded at the same station 320.**

082 → The CTD pump is blocked. All the CTD data have been flagged as doubtful.

083 → The rosette descent rate is quite low (about 0.4 m/s).

084 → Nothing to notice.

*******The casts 079 and 085 have been recorded at the same station 330.**

085 → The salinity and density profiles are quite from the surface to 30 db (maybe sensor misalignment issues).

*******The casts 078 and 086, 087 have been recorded at the same station 340.**

086 → The rosette descent rate is quite low (about 0.35 m/s).

087 → The rosette descent rate is quite low (about 0.35 m/s). The low and irregular descent rate lead to some doubtful data.

*******The casts 032 to 036 and 088 have been recorded at the same station 680.**

088 → The rosette descent rate is quite low (about 0.4 m/s). There is an oxygen artefact at 9 db.

*******The casts 089 to 091 have been recorded at the same station 670.**

089 → The rosette descent rate is quite low (about 0.35 m/s) leading to doubtful data.

There is an oxygen artifact at 10 db.

090 → There is an oxygen artifact at 11 db. The rosette descent rate is quite low (about 0.35 m/s).

091 → The rosette descent rate is quite low (about 0.50 m/s).

*******The casts 092 and 093 have been recorded at the same station 660.**

092 → The rosette descent rate is quite low (about 0.35 m/s).

093 → There is an oxygen artifact at 7 db.

094 → Nothing to notice.

*******The casts 095 and 103 have been recorded at the same station 660.**

095 → Nothing to notice.

*******The casts 096 and 102 have been recorded at the same station 630.**

096 → There is an oxygen artifact at 6 db.

*******The casts 097 and 099 to 101 have been recorded at the same station 620.**

097 → Nothing to notice.

098 → Nothing to notice.

099 → The temperature and salinity profiles are step like from 278 db to the end (301 db).

100 → The rosette descent rate is quite low (about 0.4 m/s). The temperature and salinity profiles are step like from 270 db to the end (300 db).

101 → The rosette descent rate is quite low (about 0.5 m/s). The temperature and salinity profiles are step like from 270 db to the end (300 db).

*******The casts 096 and 102 have been recorded at the same station 630.**

102 → There is a density inversion at the surface. There is an oxygen artifact at 11 db. The rosette descent rate is quite low (about 0.35 m/s).

*******The casts 095 and 103 have been recorded at the same station 660.**

103 → The rosette descent rate is quite low (about 0.4 m/s).

104 → Has been removed (3 db depth).

*******The casts 105 to 108 have been recorded at the same station 360.**

105 → Nothing to notice.

106 → The rosette descent rate is quite low (about 0.5 m/s).

107 → The rosette descent rate is quite low (about 0.4 m/s).

108 → The rosette descent rate is quite low (about 0.4 m/s).

109 → The rosette descent rate is quite low (about 0.4 m/s) that leads to noisy and doubtful data.

*******The casts 110 to 111 have been recorded at the same station 780.**

110 → The rosette descent rate is very low (about 0.3 m/s).

111 → The rosette descent rate is very low (about 0.35 m/s).

*******The casts 112 to 130 have been recorded at the same station 345.**

112 → Nothing to notice.

113 → Nothing to notice.

114 → Nothing to notice.

115 → There is a density inversion at the surface.

116 → Nothing to notice.

117 → There is a density inversion at the surface which may be detected on the ascendant profile.

118 → Nothing to notice.

119 → Nothing to notice.

120 → There is a density inversion at the surface.

121 → Nothing to notice.

122 → There is a density inversion at the surface which may be detected on the ascendant profile.

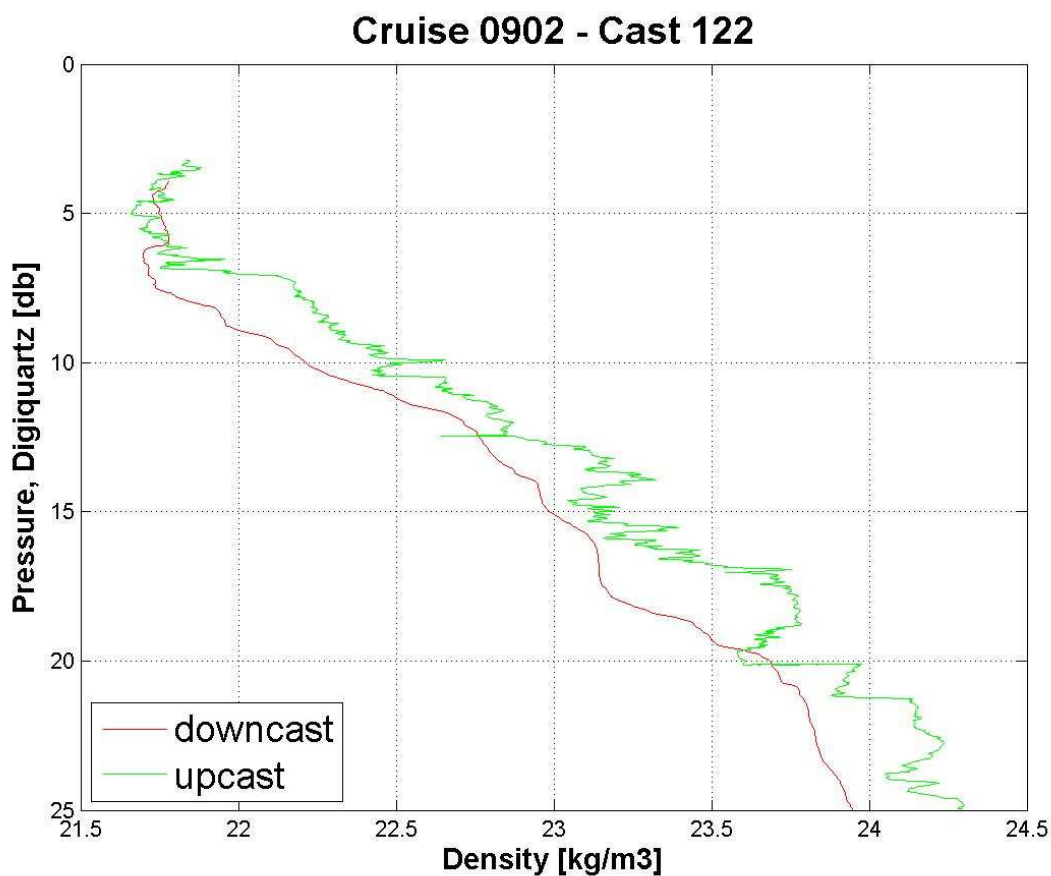


Figure 25. Evolution of the surface density profiles for the cast 122.

123 → There is an oxygen artifact at 16 db.

124 → The rosette descent rate is quite low (about 0.5 m/s). The rosette descent rate leads to some doubtful data. The temperature and salinity profiles are pretty noisy particularly between 63 and 105 db.

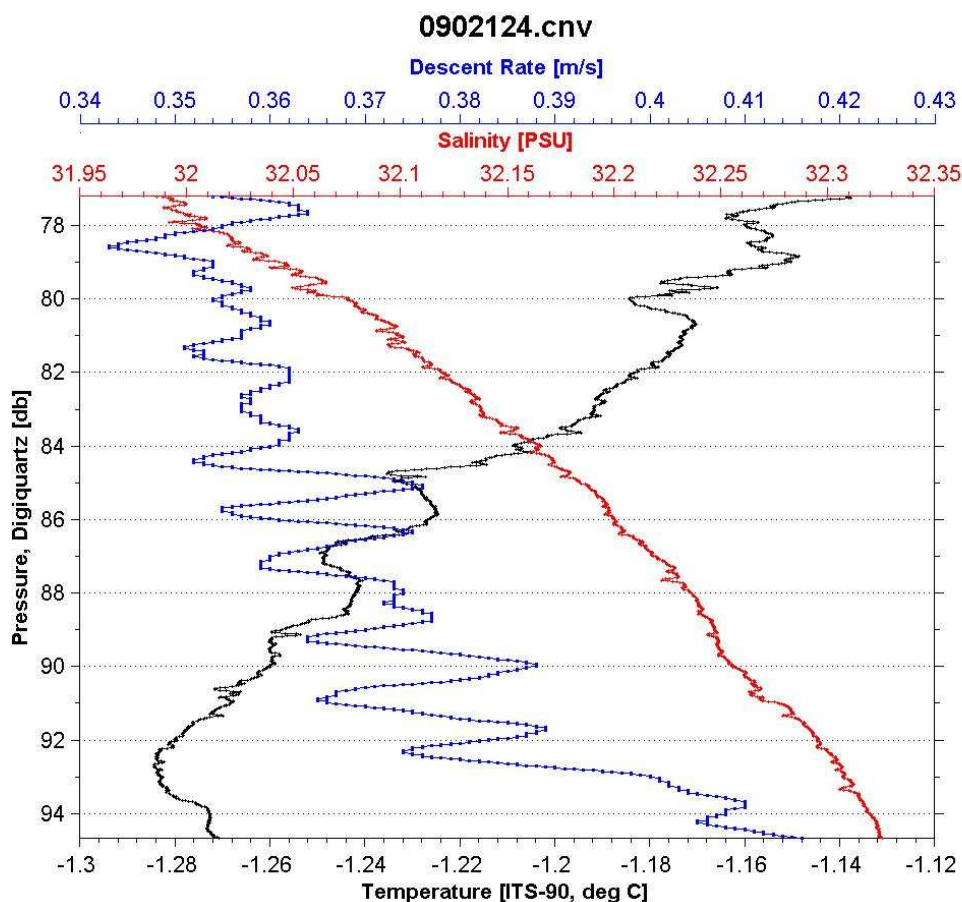


Figure 26. Evolution of the temperature and salinity data for the cast 124.

125 ➔ There is an oxygen artifact at 13 db.

126 ➔ There is an oxygen artifact at 16 db.

127 ➔ There is an oxygen artifact at 13 db. There is a density inversion at the surface which is not recorded on the ascendant profile.

128 ➔ There is an oxygen artifact at 13 db.

129 ➔ There is an oxygen artifact at 16 db.

130 ➔ Nothing to notice.

131 ➔ The irregular descent rate leads to some doubtful data.

132 ➔ Nothing to notice.

133 ➔ Nothing to notice.

*******The casts 134 to 136 have been recorded at the same station 540.**

134 → Nothing to notice.

135 → Nothing to notice.

136 → Nothing to notice.

137 → Nothing to notice.

*******The casts 138 to 140 have been recorded at the same station 430.**

138 → Nothing to notice.

139 → The rosette descent rate is very low (about 0.40 m/s).

140 → Nothing to notice.

141 → Nothing to notice.

142 → Nothing to notice.

143 → The rosette descent rate is very low (about 0.40 m/s). The end of the profiles is very noisy due to the rosette deceleration. There is a density inversion at the surface which is not recorded on the ascendant profile.

144 → The rosette descent rate is very low (about 0.40 m/s). The rosette descent rate at both the surface and the bottom is very irregular and that leads to noisy data.

*******The casts 145 to 148 have been recorded at the same station 460.**

145 → The rosette descent rate is very low (about 0.40 m/s). There is a density inversion at the surface.

146 → The rosette descent rate is low (about 0.50 m/s) and irregular that leads to doubtful data. There is a density inversion at the surface which is not recorded on the ascendant profile.

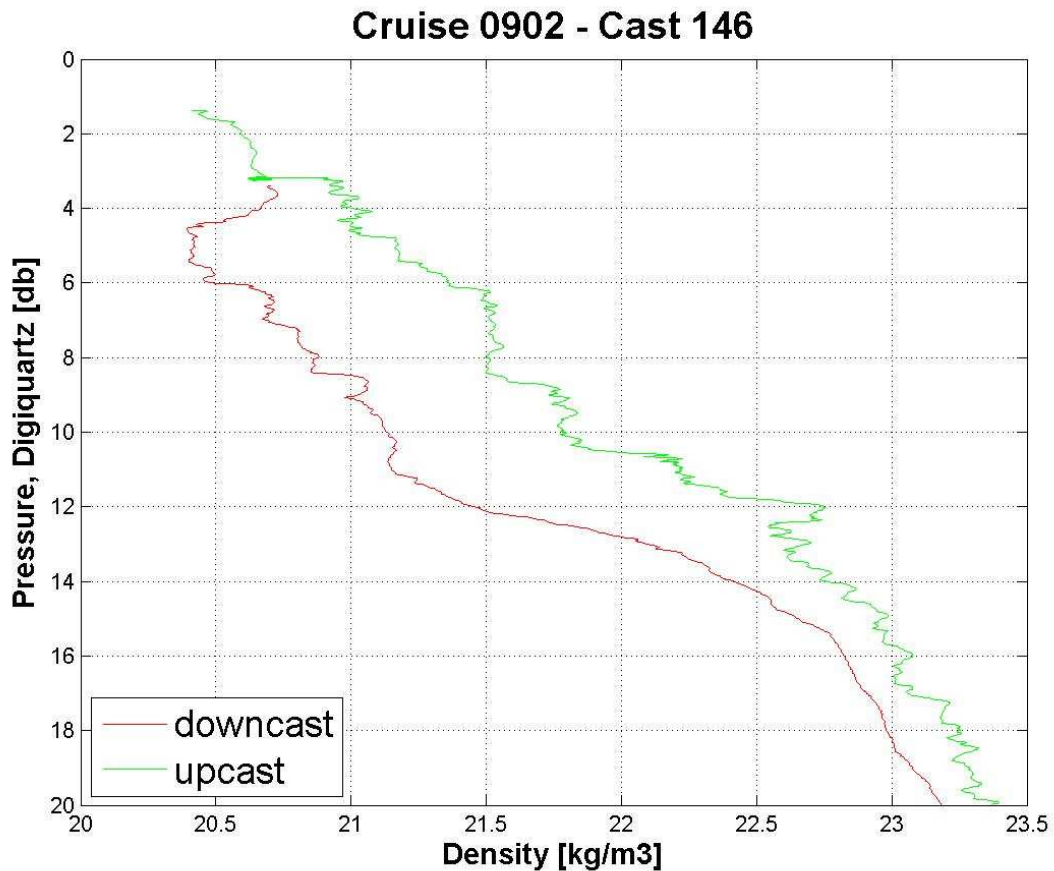


Figure 27. Evolution of the surface density profiles for the cast 146.

147 → The rosette descent rate is very low (about 0.40 m/s).

148 → The rosette descent rate is very low (about 0.40 m/s).

*******The casts 149 to 163 have been recorded at the same station 135.**

149 → Nothing to notice.

150 → The rosette descent rate is low (about 0.50 m/s). The end of the profile is quite noisy due to the rosette deceleration. There is a high density inversion at 17 db which may be detected on the ascendant profile.

151 → The rosette descent rate is low (about 0.50 m/s) that leads to doubtful data.

152 → The rosette descent rate is low (about 0.50 m/s). There is an oxygen artifact at 16 db. The first 20 db are quite noisy and irregular.

153 → The rosette descent rate is low (about 0.50 m/s).

- 154 → The rosette descent rate is low (about 0.50 m/s).
 155 → The rosette descent rate is low (about 0.50 m/s).
 156 → The rosette descent rate is low (about 0.50 m/s).
 157 → The rosette descent rate is low (about 0.50 m/s).
 158 → The rosette descent rate is low (about 0.50 m/s).
 159 → The rosette descent rate is low (about 0.50 m/s).
 160 → The rosette descent rate is low (about 0.50 m/s). There is a large density inversion at 10 db which is not recorded on the ascendant profile.

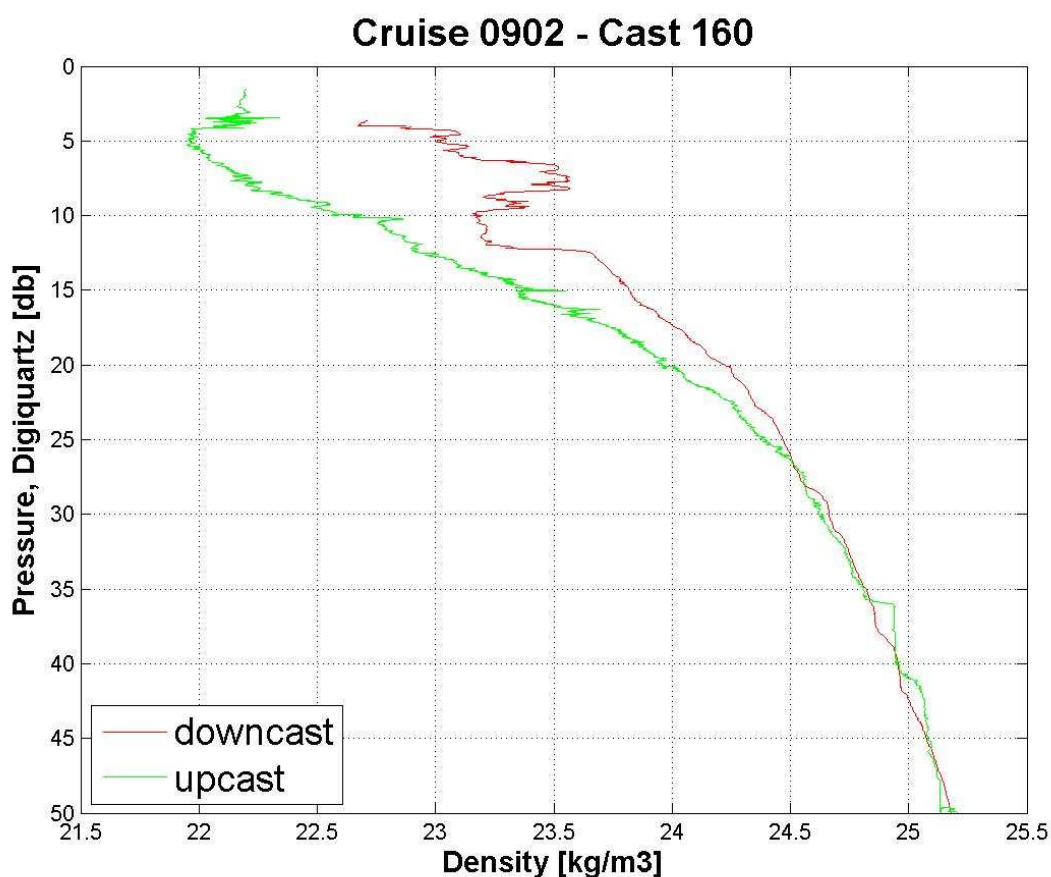


Figure 28. Evolution of the surface density profiles for the cast 160.

- 161 → The rosette descent rate is low (about 0.50 m/s). The first 25 db are quite noisy.

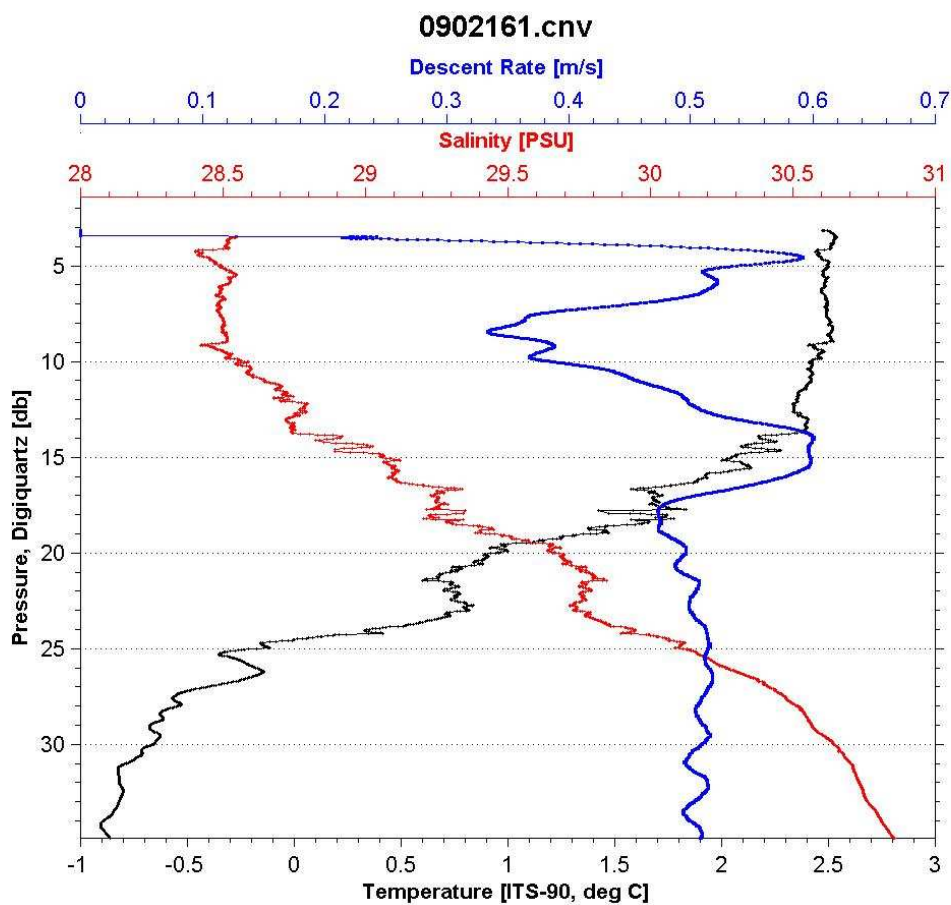


Figure 29. Evolution of the surface temperature and salinity data for the cast 161.

162 → The rosette descent rate is very low (about 0.40 m/s).

163 → There is a density inversion at 9 db which is not recorded on the ascendant profile.

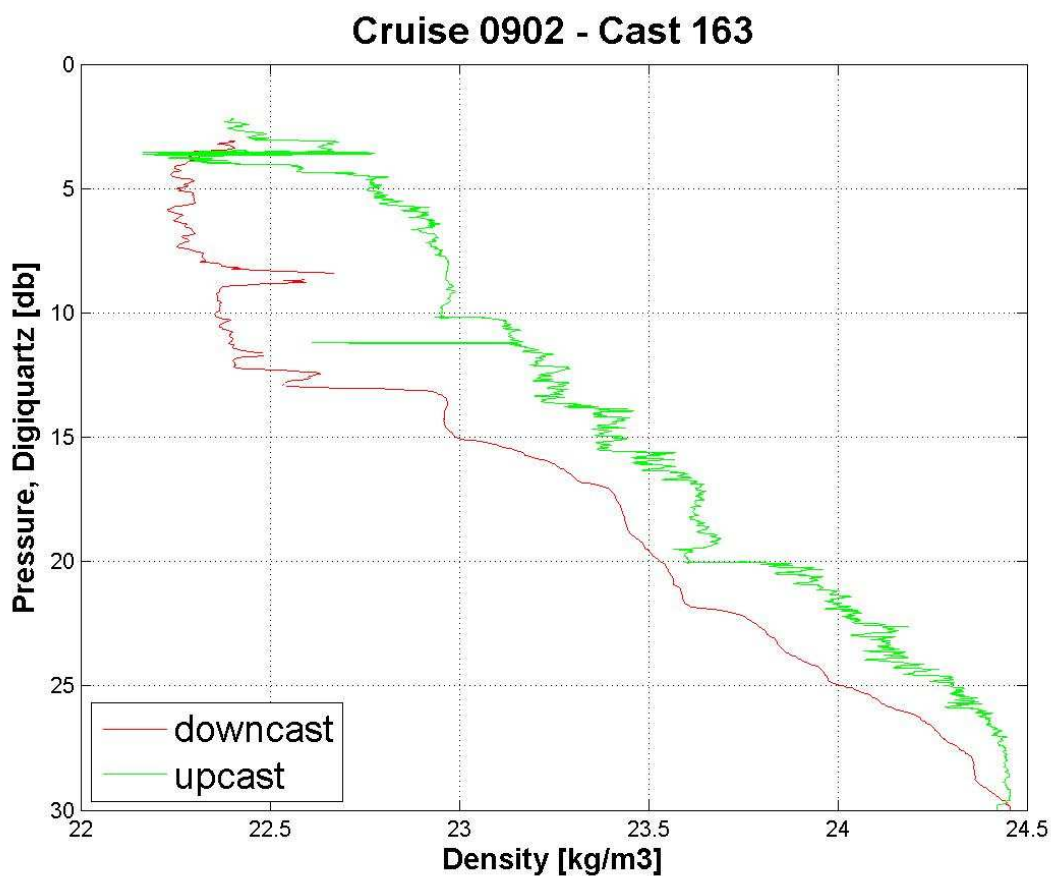


Figure 30. Evolution of the surface density profiles for the cast 163.

*******The casts 164 to 191 have been recorded at the same station 235.**

164 → Nothing to notice.

165 → Nothing to notice.

166 → Nothing to notice.

167 → Nothing to notice.

168 → Nothing to notice.

169 → There is a density inversion at the surface which is not recorded on the ascendant profile.

170 → There is a density inversion at the surface which may be detected on the ascendant profile.

171 → Nothing to notice.

172 → Nothing to notice.

173 → Nothing to notice.

174 → Nothing to notice.

175 → The irregular descent rate leads to some doubtful data.

176 → There is a density inversion at the surface which may be detected on the ascendant profile.

177 → Nothing to notice.

178 → Nothing to notice.

179 → Nothing to notice.

180 → The first 18 db are quit irregular with several density inversions which are not recorded on the ascendant profile.

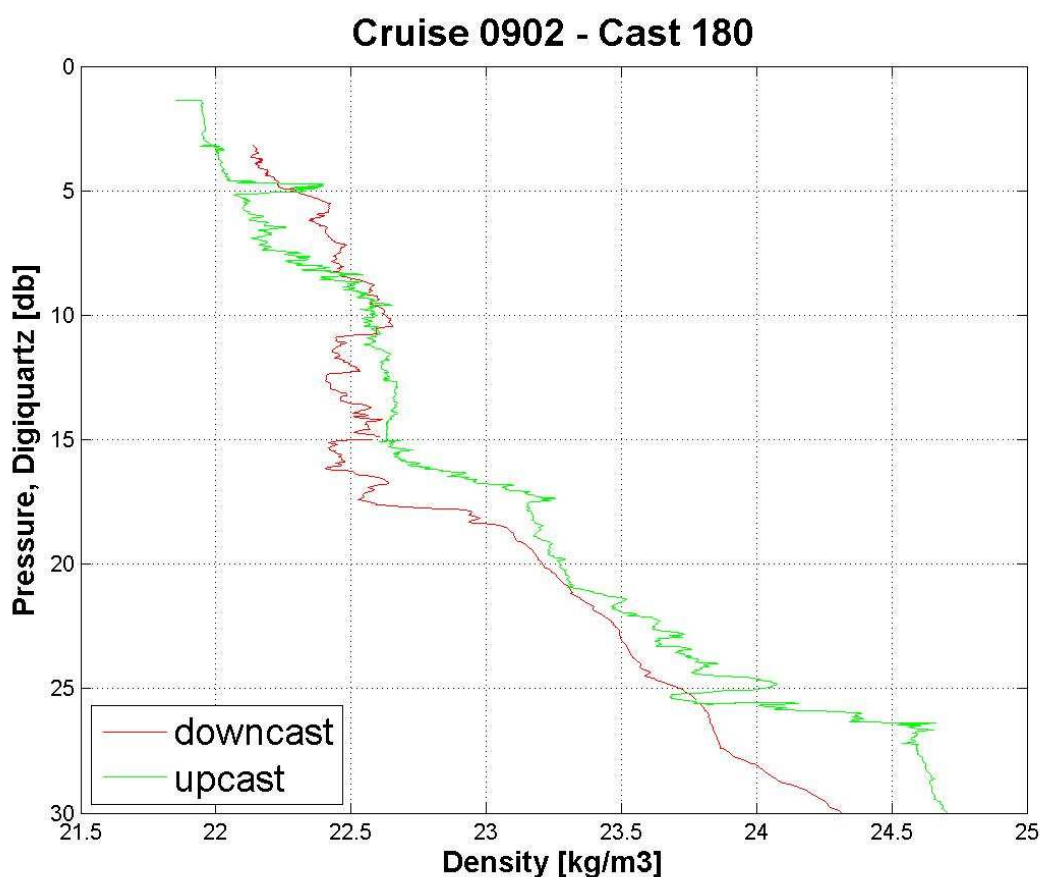


Figure 31. Evolution of the surface density profiles for the cast 180.

181 → There is a density inversion at the surface.

- 182 → Nothing to notice.
- 183 → There is an oxygen artifact at 23 db. The rosette descent rate is low (0.5 m/s) until 200 db.
- 184 → The rosette descent rate is low (0.5 m/s) until 200 db.
- 185 → The rosette descent rate is low (0.5 m/s) until 200 db.
- 186 → The rosette descent rate is low (0.5 m/s) until 200 db.
- 187 → The rosette descent rate is low (0.5 m/s) until 200 db.
- 188 → The rosette descent rate is low (0.5 m/s) until 200 db.
- 189 → The rosette descent rate is low (0.5 m/s) until 200 db.
- 190 → The rosette descent rate is very low (0.35 m/s). The first 20 db are noisy.
- 191 → Nothing to notice.

3.6. Salinity comparisons.

There are not enough salinity data to get a reliable comparison.

Downcast profiles versus bottle data.

Mean(AutoSAL-CTD) = 0.17549 ± 0.38666 (12 data)

Mean(AutoSAL-CTD 100db+) = 0.019759 ± 0.053127 (9 data)

Mean(AutoSAL-CTD 100db-) = 0.64269 ± 0.61191 (3 data)

Upcast profiles versus bottle data.

Mean(AutoSAL-CTD) = 0.11824 ± 0.32951 (14 data)

Mean(AutoSAL-CTD 100db+) = 0.019765 ± 0.047137 (11 data)

Mean(AutoSAL-CTD 100db-) = 0.4793 ± 0.66766 (3 data)

The upcast and downcast comparisons are quite similar and not so good.

3.7. TS diagram from controlled data.

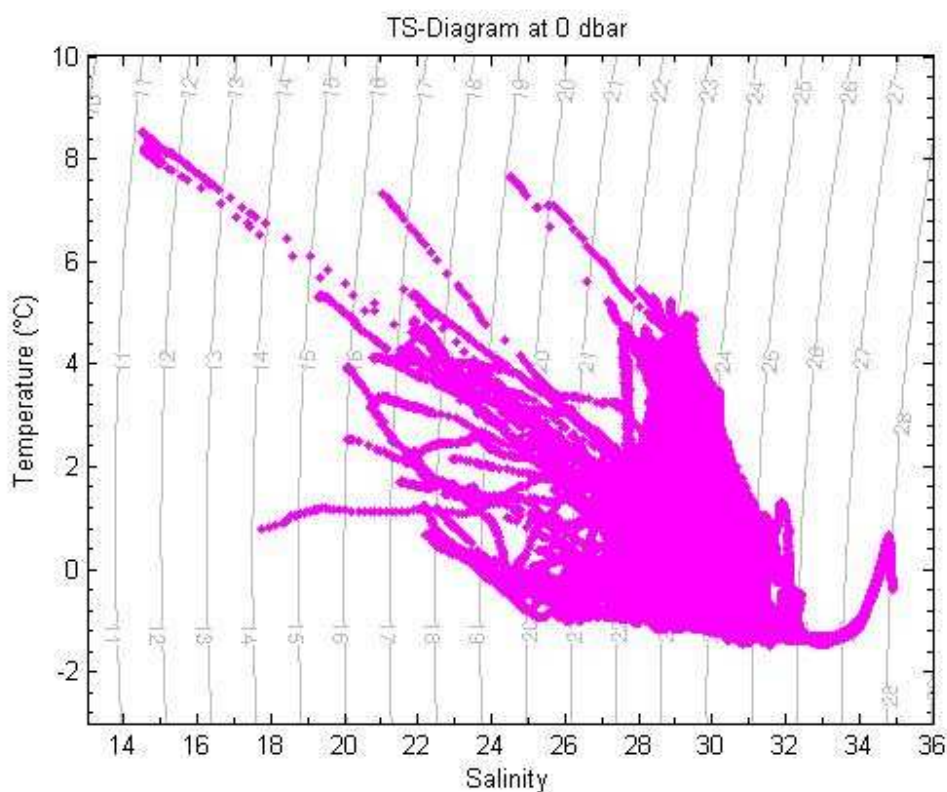


Figure 32. TS-diagram for the cruise IOL/Malina 0902 (leg 2).

4. DATA AVERAGE AND INTERPOLATION.

Data are typically averaged using 1 db interval. I use the same method as Sea-Bird “Bin Average” module, that is:

$$\text{pressure} - 0.5 \text{ db} < \text{center pressure} \leq \text{pressure} + 0.5 \text{ db}$$

After average step, missing data are linearly interpolated (see the table 10 at Annex A to have the complete list of interpolated data).

Remark.

When more than two successive values are missing, interpolated data are not computed.

Annex A

Interpolated value for missing data.

Table 10. Interpolation results for missing temperature, salinity and oxygen data.

Cast	Variable	Pressure	Interpolated Value
005	temperature	39.00	-0.839
009	temperature	496.00	0.544
009	salinity	496.00	34.823
009	salinity	579.00	34.840
009	oxygen	496.00	6.726
013	temperature	66.00	-1.180
013	salinity	66.00	31.928
017	temperature	560.00	0.457
017	temperature	561.00	0.453
017	temperature	618.00	0.372
017	temperature	619.00	0.369
017	salinity	560.00	34.834
017	salinity	561.00	34.834
017	salinity	618.00	34.844
017	salinity	619.00	34.845
017	oxygen	560.00	6.772
017	oxygen	618.00	6.808
017	oxygen	619.00	6.817
017	oxygen	649.00	6.843
019	temperature	626.00	0.420
019	temperature	627.00	0.418
019	salinity	626.00	34.843
019	salinity	627.00	34.843
019	oxygen	626.00	6.824
019	oxygen	627.00	6.823
021	temperature	668.00	0.362

021	temperature	669.00	0.362
021	temperature	999.00	-0.058
021	salinity	668.00	34.847
021	salinity	669.00	34.847
021	salinity	999.00	34.876
021	oxygen	668.00	6.779
021	oxygen	669.00	6.775
046	temperature	203.00	-0.823
046	salinity	203.00	34.142
074	temperature	62.00	-1.264
074	salinity	62.00	32.280
076	oxygen	65.00	7.858
089	salinity	31.00	30.149
116	temperature	496.00	0.420
116	salinity	496.00	34.837

Annex B

Note about problem of the SBE 43 oxygen data

Dissolved oxygen profiles recorded by the Sea-Bird SBE 43 sensor may show some doubtful sections. This doubtful data could have some origins. Two are presented in this paper.

1. The oxygen data processing mainly consists in two steps.

1) Improve sensor coefficient calibration with Winkler titrations. This step allows to calculate much accurate calibration values by fitting SBE 43 oxygen profiles with Winkler derived oxygen concentration coinciding in space and time. This step has no impact on doubtful data.

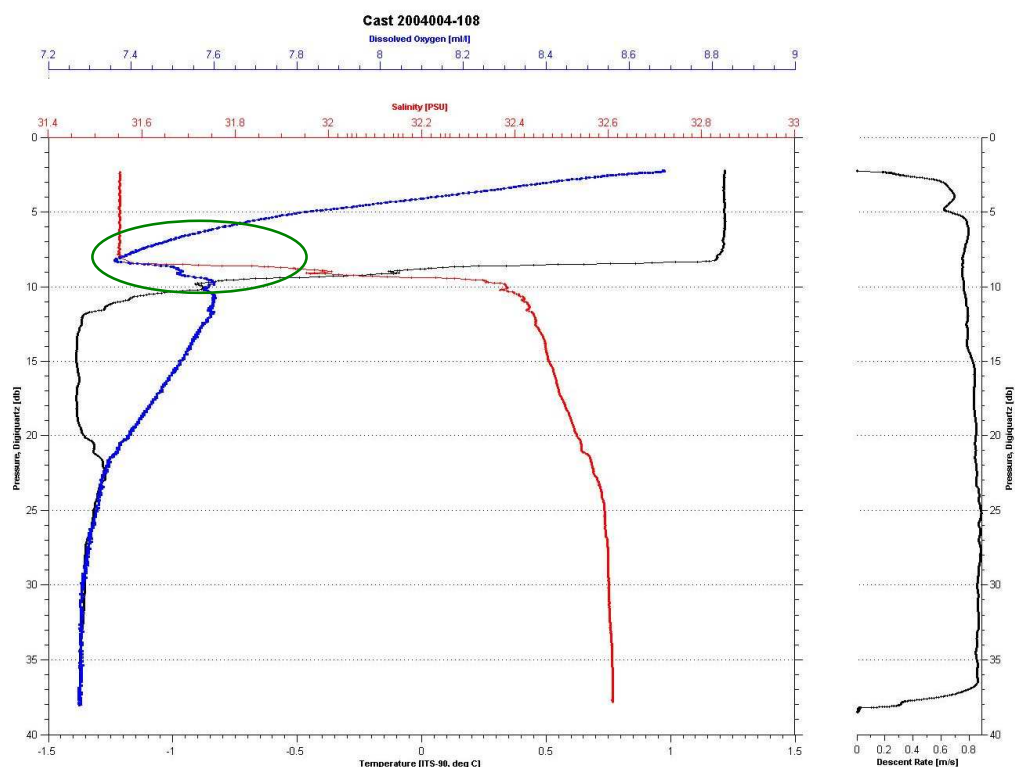
2) Align data in time, relative to pressure.

Dissolved oxygen data collected by the Sea-Bird 911*plus* CTD probe are characterized by a systematic delay with respect to pressure. The main causes are: 1) a time transit of the water through the pipe; according to Sea-Bird a typical plumbing delay for the SBE 43 DO sensor is about 5 seconds. 2) a long time constant of the oxygen sensor which is temperature inversely dependant; according to Sea-Bird this constant varies from approximately 2 seconds at 25 °C to up to 10 seconds at 0 °C. So the total delay should vary from 7 to 12 seconds. This delay must be corrected to ensure that the temperature and the salinity used to calculate the dissolved oxygen concentration from the SBE 43 voltage come from the same parcel of water, the higher the time correction, the greater the vertical shift of the oxygen data relative to the pressure. Sea-Bird suggests testing the "ALIGN CTD" module of the "SBE Data Processing-Win 32" software with different values in order to reduce the misalignment of the dissolved oxygen data between the upcast and the downcast profiles.

So choosing a correction value is a compromise between the different casts of a leg

and between the different sections of a profile. As a unique time correction is used for every cast and for all oxygen data of a cast, some misalignment issues may occur that could lead to hysteresis (hysteresis is a delay in the evolution of a physical or chemical parameter), and so to doubtful dissolved oxygen data.

2. For some oceanographic condition –cold water and sharp temperature gradient, the oxygen profile recorded by the SBE 43 sensor may be characterized by a spike coinciding with the thermocline (see the figure B1 for an example). This artefact should be taken with great care and may not reflect an actual oceanographic phenomenon. Actually this spike may be an artefact of the equation used to compute dissolved oxygen (see the equation 1). A term of this equation is saturation of oxygen (Ox_{sol}) which is function of temperature and salinity. Ox_{sol} is changing as fast as these 2 parameters are changing due to very short sensor time constant while the oxygen voltage (V) is changing much slower due to a high constant time which is exacerbated by cold temperature.



B 1. An example of oxygen artefact coinciding with a thermocline (the alignment correction is 10 seconds).

Where :

- — = time derivative of SBE43 output signal (volts/second).
- T = CTD temperature ($^{\circ}\text{C}$).
- K = CTD temperature ($^{\circ}\text{K}$).
- S = CTD salinity (psu).
- V = SBE 43 output voltage signal (volts).

- $Ox_{sol}(T, S)$ = oxygen solubility (ml/l) from temperature and salinity values using Garcia and Gordon equation.
- Soc , $Voffset$, $\tau(T, P)$, A , B , C and E are calibration coefficients:
 - o $\tau(T, P)$ = sensor time constant at temperature and pressure.
 - o Soc = calibration slope.
 - o $Voffset$ = electronic offset.
 - o A , B and C terms in a polynomial and E term in an exponential that compensate for changes in the sensor's sensitivity.