CATARINA Cruise Report

22 June – 12 August 2012

On board BIO Sarmiento de Gamboa

by

The Group CATARINA

Project funded by MICINN, Ref. CTM2010-17141 and co-funded by FEDER

PREAMBLE

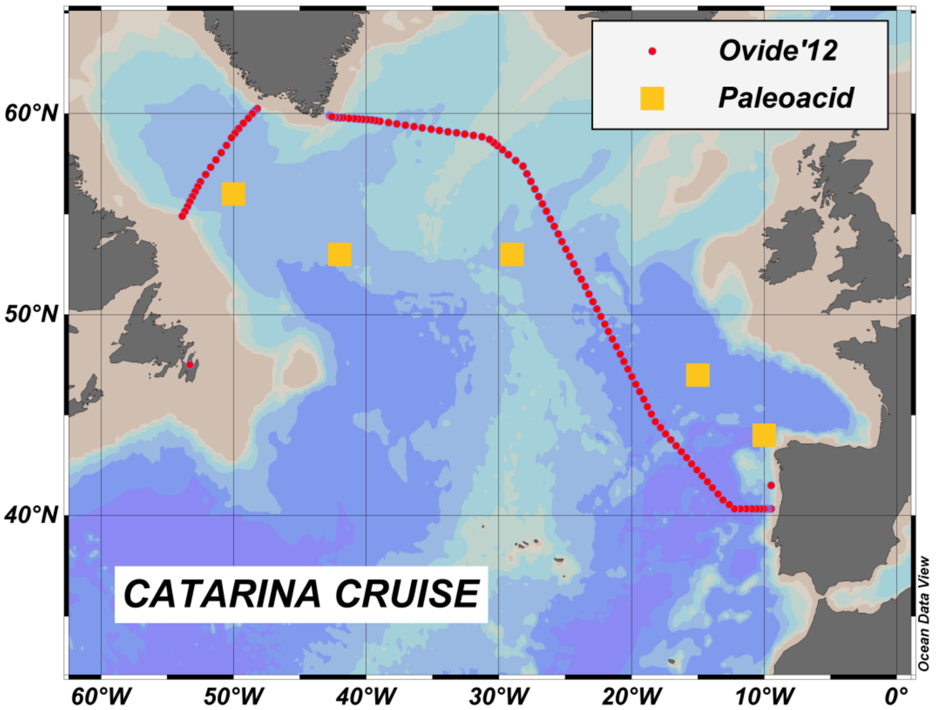
The objectives of the CATARINA project are a) to quantify the Meridional Overturning Circulation and water mass ventilation changes and their effect on the changes in the anthropogenic carbon ocean uptake and storage capacity, and b) to evaluate the effect of present CO_2 emissions and past atmospheric CO_2 concentrations in the production and preservation of $CaCO_3$, both in the North Atlantic

To can achieve these objectives, the CATARINA cruise was organized in two phases according to the two main activities of the project: "Circulation and anthropogenic CO_2", and "Past and recent acidification impacts".

LEG 1: Section OVIDE 2012 including Labrador: 103 stations.
Chief Scientist: Aida F. Ríos.

LEG 2: Paleoacid: 6 areas of sampling.
Chief Scientist: Guillermo Frances.

This report is organized in two parts: **Leg 1 (pages 2-61)** and **Leg 2 (pages 62-91),** and finishing with a **Miscellany (pages 92-98)** that covers common issues on internationalization, outreach, incidences during the cruise and acknowledgements.



CATARINA Cruise

LEG 1

Section OVIDE 2012

and Labrador Sea

(Vigo-St. Johns)

22 June – 24 July 2012

Chief Scientist: Aida F. Ríos.

1. INTRODUCTION

Taking into account that the subpolar gyre of the North Atlantic is a critical zone where the changes of circulation, Meridional Overturning Circulation (MOC), and ventilation of water masses can be examined, the motivation of the Leg 1 of CATARINA cruise, framed in the Module 1 of the project, is to better understand the interannual to decadal variability of anthropogenic carbon (C_{ANT}) storage and transport by acquiring a long-term time series of physical and biochemical properties across the MOC between the Iberian Peninsula and Greenland. Thus, we had proposed to re-occupy the OVIDE hydrography/geochemistry section for the 7^{th} time in 2012, leading to a 15-year long time-series. Indeed, this line has been performed since 2002 every two years, after a first occupation by the NOCS in 1997.

The Leg 1 of CATARINA cruise consisted in the main section OVIDE for the determination of the currents that control the flow of heat, water and anthropogenic carbon in the North Atlantic. This section is the seventh repetition since 1997 which will reveal decadal and interannual variability of the circulation in the North Atlantic. Also in this Leg 1, the small section AR07W in the Labrador Sea has was partially repeated; it had been performed in 2008 on board R/V Thalassa. Both OVIDE and AR07W sections have been identified by the GOSHIP project (IOCCP, CLIVAR) as high-frequency lines (http://www.go-ship.org/RefSecs/GOSHIPMap_April2011.pdf).

The Leg 1 CATARINA cruise aims to assess the transport of water, salt, anthropogenic carbon, and other biogeochemical tracers along the OVIDE section that has been repeated since 2002 (http://www.ifremer.fr/lpo/ovide/) and that is part of the GOSHIP and CLIVAR / IOPCC international programs. These programs allow coordinating the different actions in the Atlantic Ocean.

The work on board was developed in three types of operations: i) Deployments of buoys to measure the intensity of turbulence (VMP) and to obtain meteorological and hydrographical data (SVP, PORVOR); ii) ADCP (Acoustic Doppler Current Profiler) indispensable to determine the velocity field to build the inverse model; iii) the CTD hydrographic stations and the work linked to them. So, the scientific work presented in this report is organized in four sections: Deployment of Buoys, Ship SADCP OS75 and OS150, CTD hydrographic stations, and Chemical and Biological analysis. Three other sections are devoted to the Internationalization, Outreach and Incidences.

During this Leg 1 of the cruise CATARINA, 26 scientist and technicians have participated. The following list contains the team with the tasks developed by each participant.

PARTICIPANTS

Nom	Sex	Nationality	Organism	Task
Fernández Rios, Aida	F	Spanish	CSIC-IIM	Chief Scientists
Fernández Pérez, Fiz	M	Spanish	CSIC-IIM	Chemical Coordinator
Gil Coto, Miguel	M	Spanish	CSIC-IIM	Physical Coordinator
de la Paz Arándiga, Mercedes	F	Spanish	CSIC-IIM	Nutrients and N_2O/CH_4
Fajar González, Noelia M.	F	Spanish	CSIC-IIM	Alkalinity, pH, CO_3, C_T
García Ibañez, Mª Isabel	F	Spanish	CSIC-IIM	pH, alkalinity
Carracedo Segade, Lidia	F	Spanish	CSIC-IIM	CTD and Salinity
González Iglesias, Javier	M	Spanish	CSIC-IIM	CTD and Secretary
Alonso Pérez, Fernando	M	Spanish	CSIC-IIM	Nutrients
Castaño Carrera, Mónica	F	Spanish	CSIC-IIM	C_T and Nutrients
Velo Lanchas, Anton	M	Spanish	CSIC-IIM	Oxygen
Cobo Viveros, Alba Marina	F	Colombian	CSIC-IIM	Sampler and Plankton
Rosón Porto, Gabriel	M	Spanish	Univ. Vigo	Underway Coordinator
Grande Miranda, Alberto	M	Spanish	Univ. Vigo	Sampler and Oxygen
Galindo Lorente, Maxim	M	Spanish	Univ. Barcelona	Sampler and Nutrients
Lherminier, Pascale	F	French	IFREMER/LPO	SADCP and LADCP
Ferron, Bruno	M	French	IFREMER/LPO	VMP, PROVOR, SVP
Branellec, Pierre	M	French	IFREMER/LPO	VMP, PROVOR, SVP
Leizour, Stephane	M	French	IFREMER/LPO	CTD and Secretary
Broda, Nadine Kerstin	F	German	Unv. Bremen	CFCs
Rumpel, Verena Lydia	F	German	Unv. Bremen	CFCs
Llinas del Torrent, Joaquim	M	Spanish	CSIC-UTM	Chief Technicians
Alvarez Alvarez, Cristina	F	Spanish	CSIC-UTM	CTD Technician
Arias González-Anleo, Alberto	M	Spanish	CSIC-UTM	CTD Technician
Vidal Jerez, Xavier	M	Spanish	CSIC-UTM	CTD Technician
Arcilla Santos, Eduardo	M	Spanish	CSIC-UTM	Computer Technician

2. DEPLOYMENTS OF BUOYS

Bruno Ferron, Stephane Leizour

VMP deployments

The Vertical Microstructure Profiler (VMP) measures the intensity of turbulence. It is an untethered instrument that gives vertical profiles to depths of 6000 m. The profiler holds 5 microstructure probes (2 shear probes, 2 fast thermistors, 1 conductivity probe) and a classical Seabird CTD. It operates autonomously (without connection to the ship) and records data on the downward portion of the profile with a vertical velocity close to 0.7 m/s. At a programmed depth, the VMP releases its ballast and returns to the surface with a velocity around 0.9 m/s.

Once at the surface, it can be located with the help of VHF beacon, strobe, and ARGO positioning transmitter.

During the CATARINA cruise, a total of 18 profiles (Figure 1, blue squares) were measured from the surface down to 70 m above the bottom. Most of them are concentrated in the vicinity of the shelves of Portugal and Greenland. Due to cruise time constraints only four stations were made between the Iberian Abyssal Plain and the Irminger Sea.

Two VMPs were used during the cruise. The VMP 5500 that was used at the beginning and at the end of the cruise gave high quality measurements with a low noise level in the dissipation (lower than $1x10^{-10}$ W/kg). For the remaining 40% profiles, the VMP 6000 was used and it showed an erratic noise that strongly contaminated the shear signals for several hundreds of meters. Unfortunately, we were not able to fix the problem on board.

SVP buoy deployments

Initially developed for the Surface Velocity Program (SVP), drifting buoys are well established as platforms for gathering both meteorological and oceanographic data from the world's oceans. They track surface currents at the depth corresponding to the length of their drogue (15 meters) whilst collecting surface and subsurface measurements. They are easy to deploy, relatively inexpensive to operate and reliably measure the atmosphere and ocean surface conditions for an average of 18 months

The sixteen SVP buoys deployed during the CATARINA cruise (Figure 1, magenta triangles) all measure air temperature, sea level atmospheric pressure and sea surface temperature. The first four buoys deployed had also the capability of measuring conductivity to estimate sea surface salinity.

After each deployment, a short report was sent from the ship to Météo-France that contained the same physical parameters returned by the buoy but measured by the on board meteorological station and the thermosalinograph. After one month at sea, the buoys worked as expected and did not show any failure.

PROVOR deployments

The PROVOR floats are part of the international ARGO network. Each float drifts during ten days at around 1000 m, then dives down to 2000 m and comes up to the surface and collects vertical profiles of data. The data are transmitted (Argos/Iridium) to satellites when the float is at the surface. After transmission, the float starts a new cycle and dives to its parking depth at 1000 m for the next 10 days.

During this cruise a total of fifteen floats (10 PROVOR-CTS3 with oxygen sensor, 4 ARVOR, 1 PROVBIO) were embarked. Twelve floats were successfully deployed (Figure 1, red stars) without any problem and provide good data quality. Two floats (1 ARVOR, 1 PROVBIO) showed some failures during the test procedures on board and were not deployed. Two days after its deployment at sea, one ARVOR showed a failure and stayed at the surface.

Fortunately it was retrieved during the second leg of the CATARINA cruise (St Johns-Vigo).

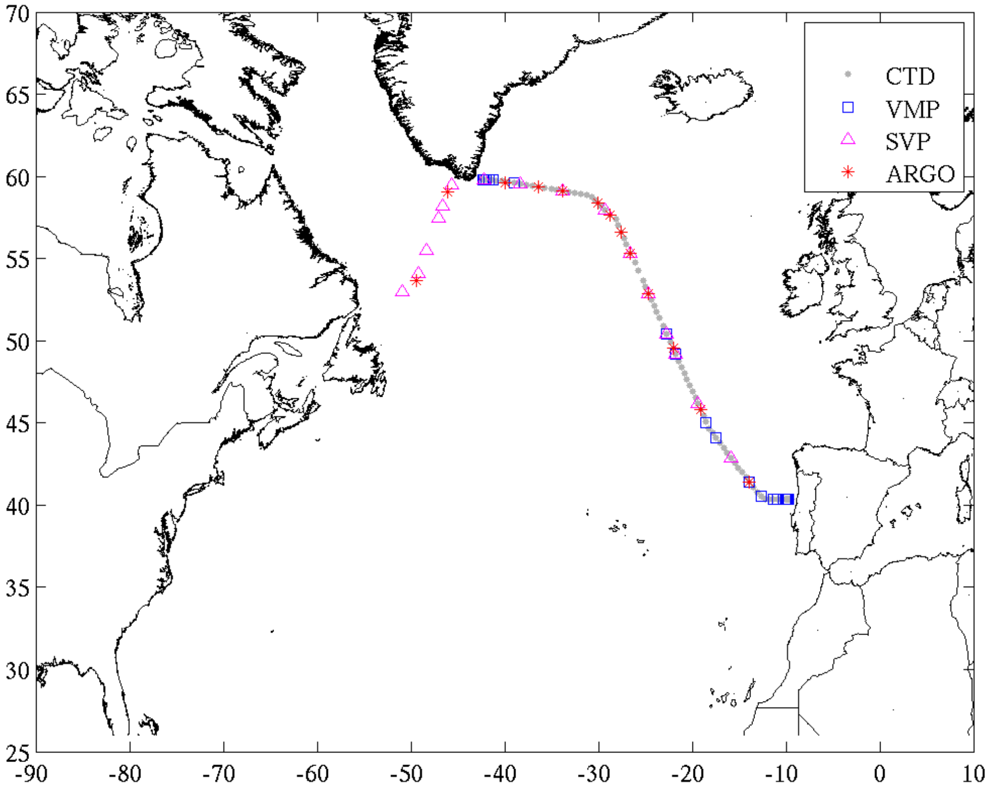


Figure 1: *Deployment positions of VMP, SVP buoys and Argo floats*

3. Ship Acoustic Doppler Current Profiler (SADCP) OS75 and OS150

Pascale Lherminier

Both the OS75 and the OS150 performed well. The OS150, configured in broad band, is more precise but has a more limited range (about 200m). Since we are more interested in the 700m range of the OS75 for the CATARINA project, and to prevent any interference between the instruments, the OS150 was set as 'slave' of the OS75, i.e. its pings were triggered by the OS75 pings. The OS75 was configured in narrow band to increase its range. Both SADCP are mounted in the keel where they were lowered at 10.5 meters below the surface, in flush water. Details of the configuration and data acquisition are given in the Annex I. A brief analysis of the OS75 data (processed aboard) is given below.

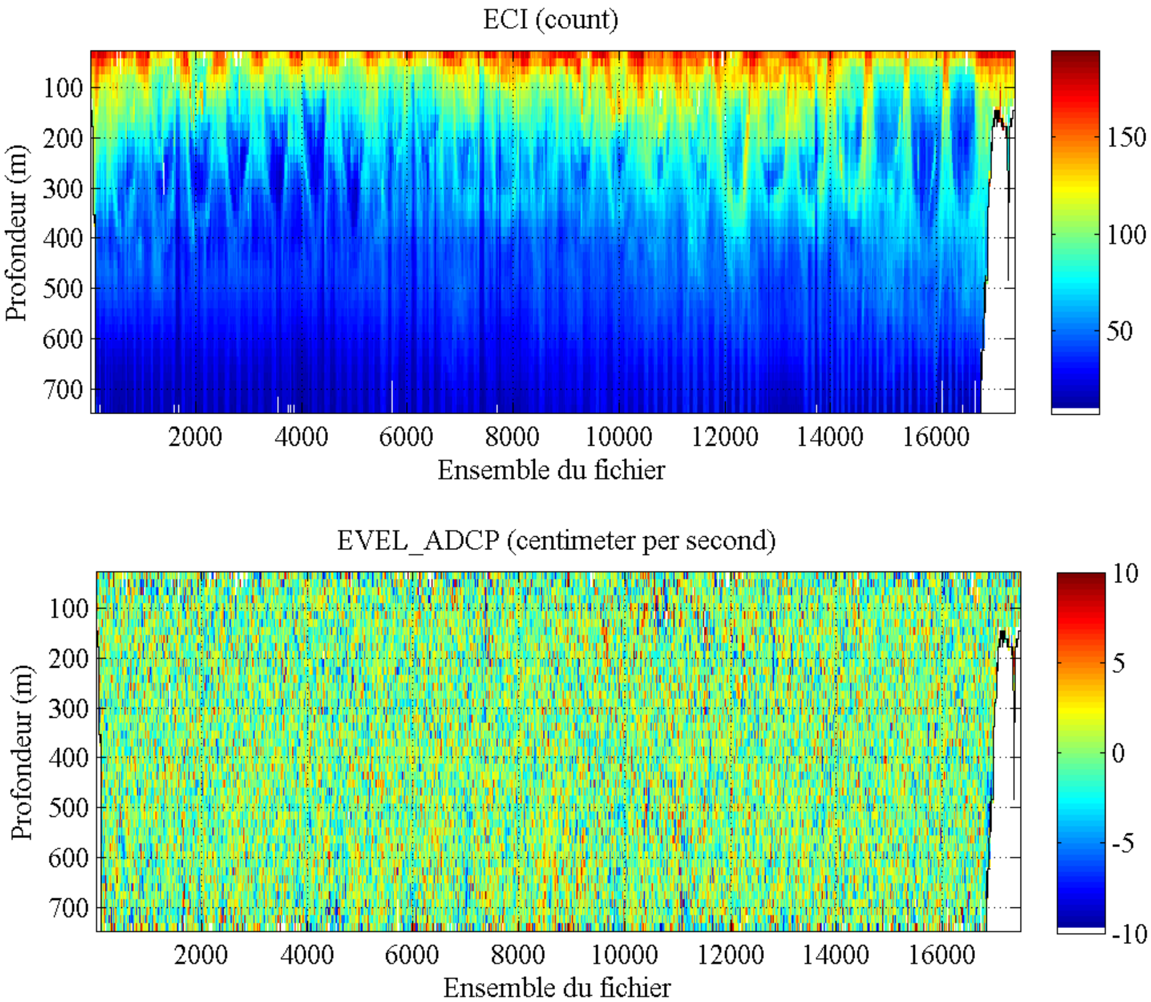
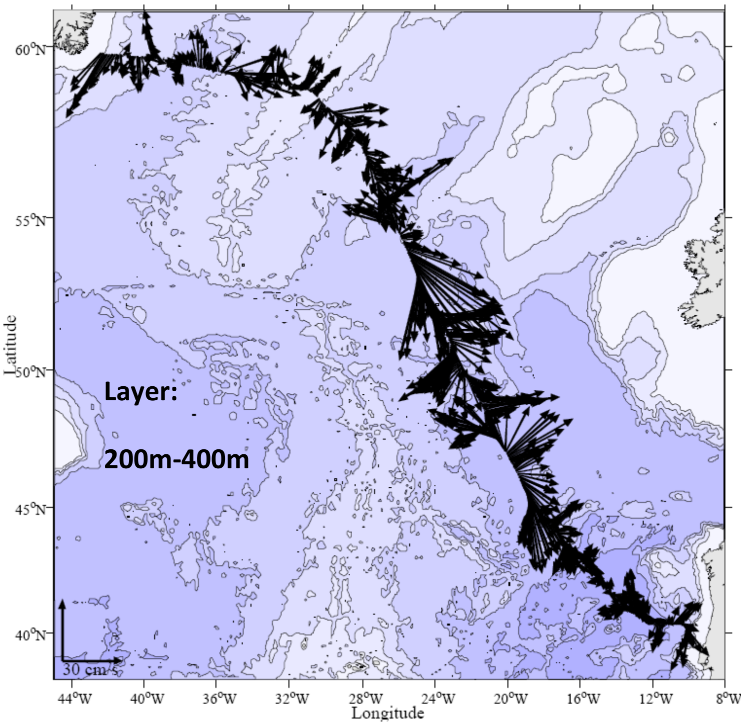


***Figure 2**: Echo Intensity (top) and Error Velocity (bottom)*

Data are processed from the .STA files, where velocity measurements were averaged internally over 2 minutes (~49 pings), i.e. over a distance of 600 meters when the ship is steaming at 10 knots. The depth range of the OS75 exceeded 750m most of the time with an excellent quality (Figure 2). The error on the water velocity is consistent with the expected value (2.5 cm/s), except in the first and last bins (16m-32m and 730-746m) where it reaches 5 cm/s. To obtain water velocities that are uncorrelated with the ship velocity, a -0.4° correction was applied to the alignment of the OS75.



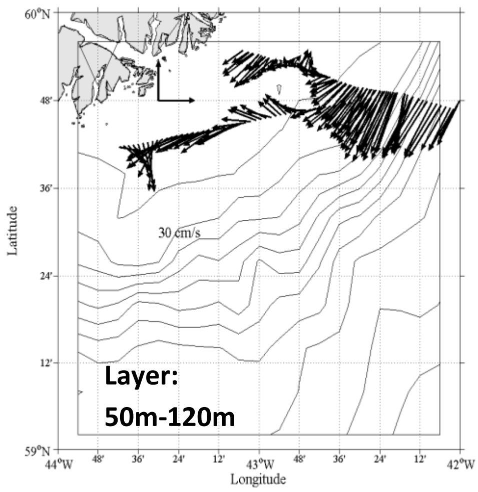
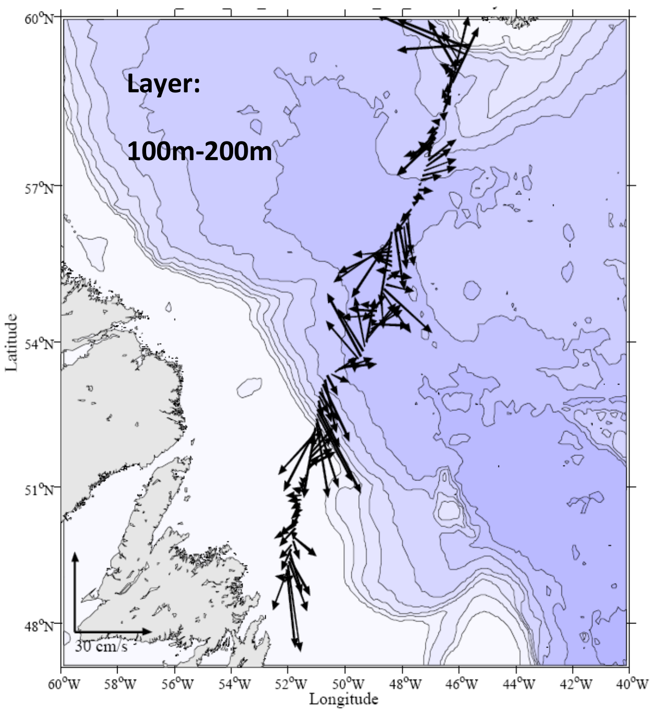


Figure 3: water velocities averaged in a specific layer and plotted over the bathymetry, after correction of the barotropic tide and alignment. Top left: OVIDE section; top right: over the Greenland shelf; right: Labrador section.



The resulting current measurements are shown on Figure 3 in the different regions. On the Ovide section, one can recognize the energetic and meandering North Atlantic Current (NAC) between 48°N and 54°N. Over the Greenland shelf, the southward East Greenland-Irminger Current (EGIC) on the slope is clearly distinct from the East Greenland Coastal Current (EGCC) near the coast. On the Labrador section, the westward West Greenland Current can be observed on the Greenland slope, and the surface signature of the southeastward Deep Western Boundary Current is consistent with the data of the mooring at 53°N. The interior basin is characterized by a strong mesoscale activity that will be analyzed with the surface temperature and salinity measured by the ship thermosalinograph.

4. HYDROGRAPHIC STATIONS CTD

Miguel Gilcoto, Pierre Branellec, Gabriel Rosón, Lidia Carracedo, Javier González, Cristina Alvarez, Xavier Vidal, Alberto Arias,.

To achieve the general objective of the cruise, 95 full depth CTD casts were completed in the OVIDE section from the Iberian Peninsula to Greenland (Figure 4). Only 8 full depth CTD casts of the 23 planned for the Labrador Sea (AR07W) were performed due to the backlog by bad weather and vessel speed. Just at the beginning of the cruise, station 0 was carried out and all the 24 Niskin bottles were fired at the same level (1134 m) to check the equipments and to verify the precision of the different methods.

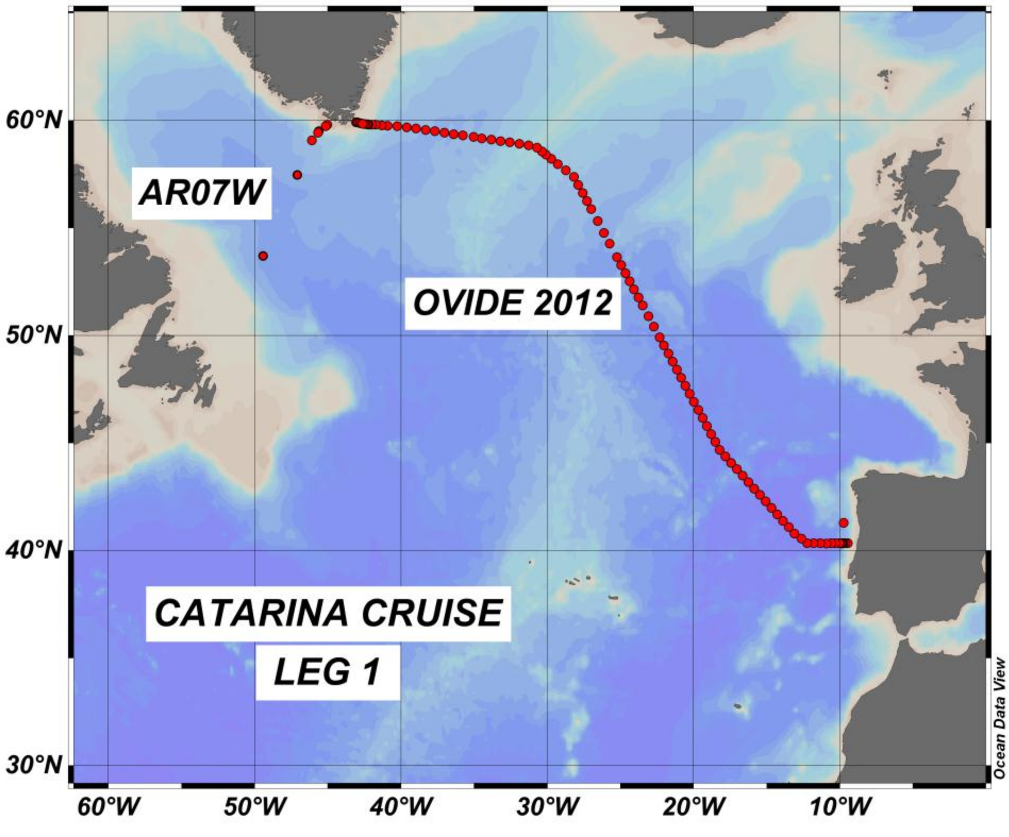


Figure 4: *Geographical positions of the stations*

A SBE911plus (Sea-Bird Electronics) CTD probe was used for the station-based profiling of the water column (from surface to a distance of ~15 meters from the bottom). The CTD unit was equipped with dual temperature and conductivity sensors, a Digiquartz with TC pressure sensor, a SBE-43 oxygen probe, a SeaPoint fluorometer, a SeaPoint turbidimeter and an altimeter. The rosette was equipped with 24 Niskin bottles (12 L). At each station, the cable was placed during the downcast at a speed of 1 meter per second (0.5 m/s or less for the ~100 m surface). During the upcast, the winch was stopped at 24 depth levels for Niskin bottle sampling. Pre-processed (SeaSoft®) potential temperature, salinity and oxygen downcast-CTD data are shown in Figures 5 to 7.

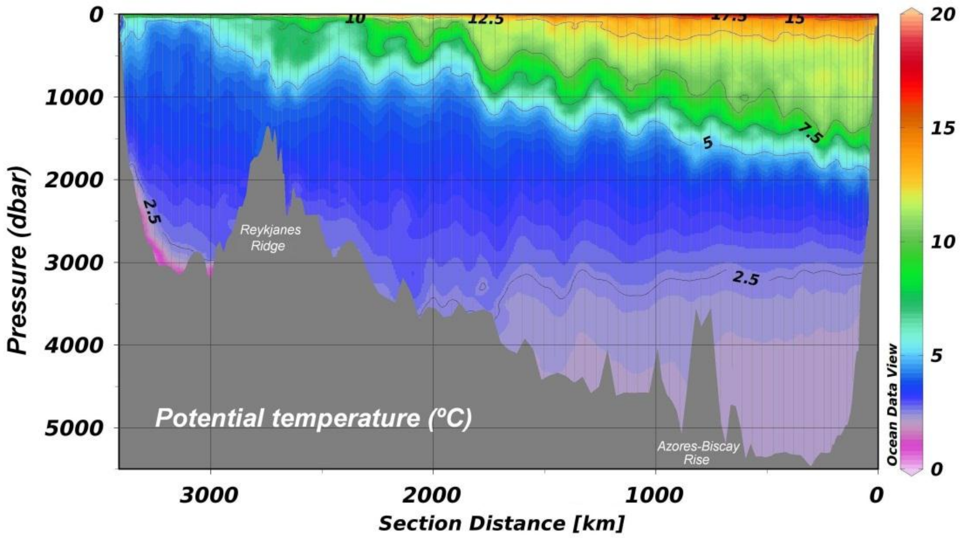


Figure 5: *Vertical distribution of CTD temperature along the OVIDE section*

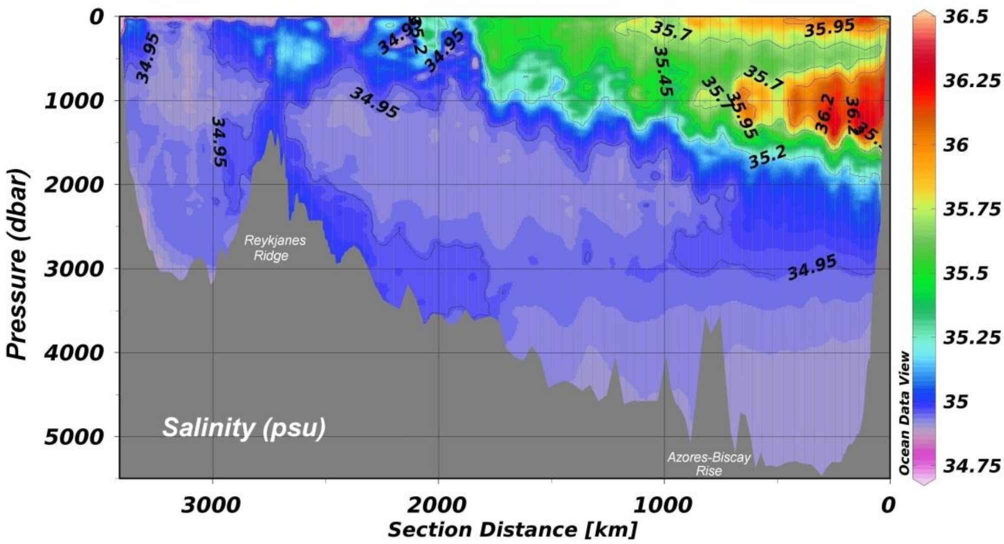


Figure 6: *Vertical distribution of CTD salinity along the OVIDE section*

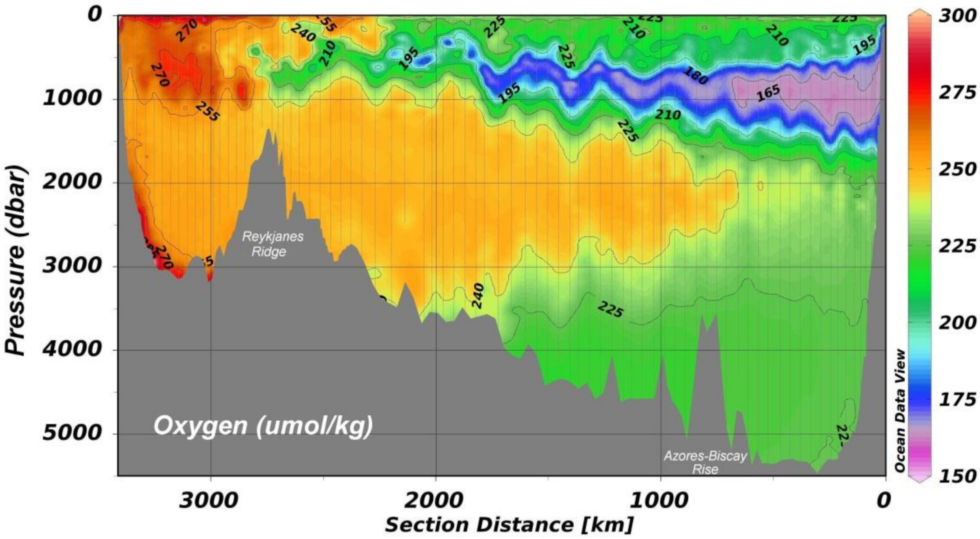


Figure 7: *Vertical distribution of CTD oxygen along the OVIDE section*

5. CHEMICAL AND BIOLOGICAL ANALYSIS

5.1. Seawater sampling

Maxim Galindo, Alba M. Cobo Viveros, Alberto Grande Miranda, Miguel Gilcoto, Pierre Branellec, Gabriel Rosón, Lidia Carracedo, Javier González

A total of 11969 samples were collected during this Leg 1 of CATARINA from the Niskin bottles of the CTD-rosette. The sampling of the different variables followed the strict order given in Table 1. The total samples collected for each variable during this first leg of the cruise is also given in Table 1. The geographical positions of the stations sampled and the bottom depth are given in Table 2. The Table in Annex II gives details of the samples collected in each station and depth.

Table 1: *Number of samples collected during the Leg 1.*

Variable	Number of samples
CFC	564
Oxygen	2399
N_2O/CH_4	613
pH	2040
C_T	443
DIC-Paris	65
CO_3	221
Alkalinity	935
Nutrients	2011
Salinity	2019
^{18}O and ^{13}C	560
Coccoliths	39
Chlorophyll	20
Plankton	40

Table 2: *Geographical positions of the stations sampled*

STATION	DATE	LATITUDE N	LONGITUDE W	BOTTOM DEPTH (m)
0	23/06/2012	41.28357	-9.73180	3393
1	23/06/2012	40.33264	-9.45940	155
2	23/06/2012	40.33318	-9.63692	389
3	23/06/2012	40.33434	-9.76776	822
4	23/06/2012	40.33360	-9.80204	1340
5	24/06/2012	40.33066	-9.87688	2555
6	24/06/2012	40.33390	-9.94598	3396
7	24/06/2012	40.33424	-10.03592	3511
8	24/06/2012	40.33504	-10.30128	3897
9	25/06/2012	40.33686	-10.57737	4360
10	25/06/2012	40.33134	-10.90650	4848
11	25/06/2012	40.33238	-11.34096	5096
12	26/06/2012	40.33346	-11.77960	5212
13	26/06/2012	40.33216	-12.21936	5251
14	26/06/2012	40.55158	-12.63471	5301
15	26/06/2012	40.78726	-13.10026	5335
16	27/06/2012	41.08456	-13.49228	5345
17	27/06/2012	41.38358	-13.88898	5344
18	27/06/2012	41.68192	-14.27704	5336
19	28/06/2012	41.98330	-14.67300	5330
20	28/06/2012	42.28168	-15.06506	5306
21	28/06/2012	42.58284	-15.45899	5055
22	29/06/2012	42.87960	-15.84974	4204
23	29/06/2012	43.18080	-16.24359	5130
24	30/06/2012	43.47822	-16.63600	4174
25	30/06/2012	43.77918	-17.03066	4008
26	30/06/2012	44.07718	-17.42410	3778
27	30/06/2012	44.37758	-17.81458	4854
28	01/07/2012	44.67374	-18.20998	4820
29	01/07/2012	45.05124	-18.50356	4764
30	01/07/2012	45.42006	-18.79576	4565
31	02/07/2012	45.79319	-19.08980	4513
32	02/07/2012	46.16990	-19.38048	4602
33	02/07/2012	46.54478	-19.67090	4479
34	03/07/2012	46.91694	-19.96946	4497
35	03/07/2012	47.28986	-20.26148	4514
36	03/07/2012	47.66522	-20.55331	4352
37	04/07/2012	48.03766	-20.84742	4452
38	05/07/2012	48.41320	-21.14132	4333
39	05/07/2012	48.78710	-21.42890	4075
40	05/07/2012	49.15886	-21.72622	4428
41	06/07/2012	49.53050	-22.01660	4195
42	06/07/2012	49.90418	-22.31162	4004
43	06/07/2012	50.40380	-22.70312	3460
44	07/07/2012	50.90198	-23.09160	3916
45	07/07/2012	51.40118	-23.48071	3268
46	07/07/2012	51.76932	-23.77438	3866
47	08/07/2012	52.14748	-24.07226	3914
48	08/07/2012	52.52004	-24.35832	3610
49	08/07/2012	52.89080	-24.65704	3624
50	08/07/2012	53.26542	-24.95095	3536
51	09/07/2012	53.63928	-25.23586	3568

STATION	DATE	LATITUDE N	LONGITUDE W	BOTTOM DEPTH (m)
52	09/07/2012	54.26672	-25.72713	2449
53	09/07/2012	54.76116	-26.12272	3607
54	10/07/2012	55.32862	-26.55936	2882
55	10/07/2012	55.88258	-26.99845	2746
56	10/07/2012	56.25196	-27.29242	2720
57	10/07/2012	56.62780	-27.57928	2752
58	10/07/2012	57.00396	-27.87881	2612
59	11/07/2012	57.37780	-28.17244	2466
60	12/07/2012	57.67488	-28.73080	2130
61	12/07/2012	57.97210	-29.27956	2223
62	12/07/2012	58.20805	-29.72579	2179
63	12/07/2012	58.40802	-30.10288	1582
64	13/07/2012	58.54992	-30.36232	1443
65	13/07/2012	58.72426	-30.69782	1342
66	13/07/2012	58.84274	-31.26550	1665
67	13/07/2012	58.91064	-31.90782	1854
68	13/07/2012	58.97356	-32.55546	2284
69	13/07/2012	59.04052	-33.19636	2276
70	14/07/2012	59.10286	-33.82543	2485
71	14/07/2012	59.16426	-34.47460	2924
72	14/07/2012	59.22858	-35.04069	3100
73	14/07/2012	59.29974	-35.76214	3095
74	14/07/2012	59.36272	-36.39666	3117
75	15/07/2012	59.42808	-37.03930	3112
76	15/07/2012	59.49140	-37.68065	3040
77	15/07/2012	59.55649	-38.31659	2928
78	15/07/2012	59.62372	-38.95823	2795
79	15/07/2012	59.68576	-39.59904	2658
80	16/07/2012	59.72282	-40.25244	2272
81	16/07/2012	59.75768	-40.90472	2035
82	16/07/2012	59.77318	-41.30090	1845
83	16/07/2012	59.79461	-41.73094	1722
84	16/07/2012	59.79924	-42.00292	1190
85	17/07/2012	59.80852	-42.23538	891
86	17/07/2012	59.81554	-42.27522	539
87	17/07/2012	59.81772	-42.31248	306
88	17/07/2012	59.82280	-42.39874	230
89	17/07/2012	59.83062	-42.51964	167
90	17/07/2012	59.91414	-43.07696	169
91	17/07/2012	59.90438	-43.00079	185
92	17/07/2012	59.89022	-42.90672	185
93	17/07/2012	59.87648	-42.79558	188
94	17/07/2012	59.86019	-42.70192	200
95	17/07/2012	59.84608	-42.61554	131
101	18/07/2012	59.79730	-45.02974	136
102	18/07/2012	59.73993	-45.14778	495
103	18/07/2012	59.50192	-45.61922	1078
104	18/07/2012	59.46341	-45.64902	1681
105	18/07/2012	59.43478	-45.66572	2473
106	18/07/2012	59.06758	-46.08328	3017
107	19/07/2012	57.45528	-47.08820	3712
108	20/07/2012	53.69182	-49.43388	3712

5.2. CFC

Nadine K. Broda,Verena L. Rumpel

CFC samples were taken almost every second station (Table Annex II). The analyses of these samples with respect to the components CFC-11 and CFC-12 will be performed at the gas chromatography lab at the Institute of Environmental Physics, University of Bremen, after the cruise. These sea water samples were collected in so called through-flow containers, which consist of a glass ampoule (volume ~ 100 ml) connected to a head carrying a movable central and a fixed side tubing, both made of stainless steel. After flushing with water from the Niskin bottles, the side tubing was closed with a plug. Later on, purified nitrogen was inserted into the side tubing, thereby creating a head space in the neck-part of the ampoule. This neck part was then flame sealed, and the remaining molten glass pieces were stuck to the ampoules after cooling. In order to determine the CFC concentration, the total weight of the flame sealed ampoules has to be known in addition to their net weight, which has been determined prior to the cruise at the Bremen lab.

Altogether, 564 CFC samples have been taken during the cruise, out of these 17 are double samples. Due to their time dependent input into the ocean, CFCs carry information on the age and the ventilation of water masses. It is also possible to infer the concentration of anthropogenic carbon from the CFC/age- data. Special focus of the analyses will be on the different components of North Atlantic Deep Water and Labrador Sea Water and their variability compared to previous cruises.

5.3. Oxygen

Antón Velo, Alberto Grande Miranda

With the main purpose of calibrating the O_2 sensor of CTD, samples of O_2 were taken in all the stations at 24 depths in the CATARINA 2012 section. The O_2 samples were analysed following the widely applied Winkler method.

The O_2 samples were always the firsts taken from the Niskin bottles of the rosette or after CFC samples when they were sampled. Samples were collected in calibrated flasks (~113 mL) with a silicone pipe avoiding bubble formation. Sample fixation (precipitation) was done by adding 0.6 mL of manganous salt ($MnCl_2 \cdot 4H_2O$) and 0.6 mL of alkali-iodide solution (NaOH + NaI). These samples were stored in darkness at least 24 hours before being measured. Then, 0.8 mL of sulphuric acid was added to dissolve the precipitate and to titrate the O_2 sample with thiosulfate using an automatic 5 mL burette “Titrando Metrohm”. Concentration of thiosulfate solution was periodically controlled by standardization with potassium iodate 0.02N for each session. Blanks were also measured periodically during the cruise. O_2 concentration is obtained in µmol kg^{-1} by recording sampling temperature and thus having the mass of pickled sea water.

O_2 concentration distribution of OVIDE section is represented using the Ocean Data View program (ODV) (Schlitzer, 2011) in Figure 8..

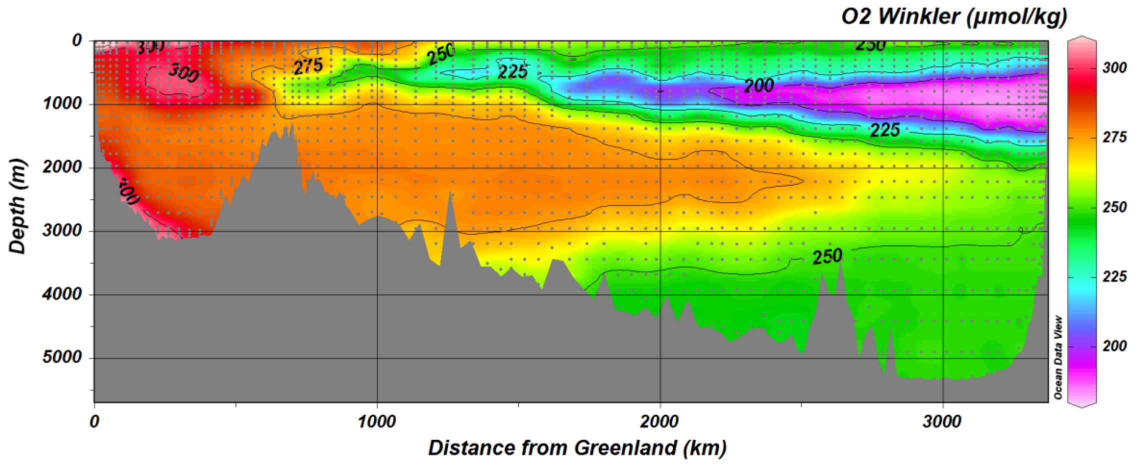


Figure 8: *O_2 distribution along the OVIDE section.*

5.4. N_2O/CH_4

Mercedes de la Paz Arándiga

Discrete samples from the water column were taken every second station. For each water depth, three replicates were taken from the Niskin bottles after arrival on deck. The right sampling order (according to solubility of the different gases), should be after the CFC´s and oxygen sampling. Samples were taken in 100 mL vials for the simultaneous analysis of N_2O and CH_4. Vials are filled using a silicon tube squeezing air bubbles to assure air bubble free sampling. The silicon tube is placed on the bottom of the vial, then left for seawater overflow for at least 2 times the vial volume, and finally the vials were closed vial with a rubber plug under running water. Close attention was paid when closing the vials in order to avoid trapping air bubbles in the sample. When all samples for one station were collected, the vials were close with an aluminium capsule using a crimping tool. The samples were conserved right after sampling one station using saturated $HgCl_2$. Later, lid and bottleneck were fully covered with Paraffin to avoid air exchange during the storage.

The N_2O and CH_4 concentration will be determined by gas chromatography in the laboratories of the IIM-CSIC. Gas trace samples can be stored up to 10 months without an effect on the N_2O and CH_4 concentration if stored properly. Samples will be analysed with a static equilibration method: a headspace of 20 mL with a secondary standard will be added to the sample vial and left to equilibrate with the liquid phase for at least 2 h. Afterwards subsamples will be taken from the headspace and injected automatically into the gas chromatographic system. N_2O and CH_4 will be determined simultaneously by ECD and FID detectors, respectively.

5.5. pH

Mª Isabel García Ibáñez, Noelia M. Fajar, Fiz F. Pérez

Seawater pH samples were taken at 24 levels in all the stations along the Leg 1 of the CATARINA section. pH measurements were made using the spectrophotometric method described in Clayton and Byrne (1993). This method consists of adding 75 µL of m-cresol purple (mCP) to the seawater sample and measuring its absorbance at 3 wavelengths, i.e., λ_{HI} =434 nm; λ_{I} =578 nm and $\lambda_{non\text{-}abs}$=730 nm. The reaction of interest at seawater pH is the second dissociation $HI^{-}_{(aq)}=H^{+}_{(aq)}+I^{2-}_{(aq)}$ in which I is the indicator. Then, the total hydrogen ion concentration can be determined by $pH=pK_2+\log_{10}[I^{2-}]/[HI^{-}]$.

pH samples were taken directly from the Niskin bottles into special optical glass spectrophotometric cells of 28 mL of volume and 100 mm of path length. These cells were carefully stored in a thermostatic bath at 25.0ºC around one hour before the analysis. Absorbance measurements were performed with a Perkin Elmer Lambda 800 UV-VIS spectrophotometer on board the R/V Sarmiento de Gamboa. pH values were given following the equations described in Dickson *et al*. (2007), who includes a correction due to the difference between seawater and the acidity indicator (ΔR).

The complete OVIDE pH profile was plotted using ODV, as shown in Figure 9.

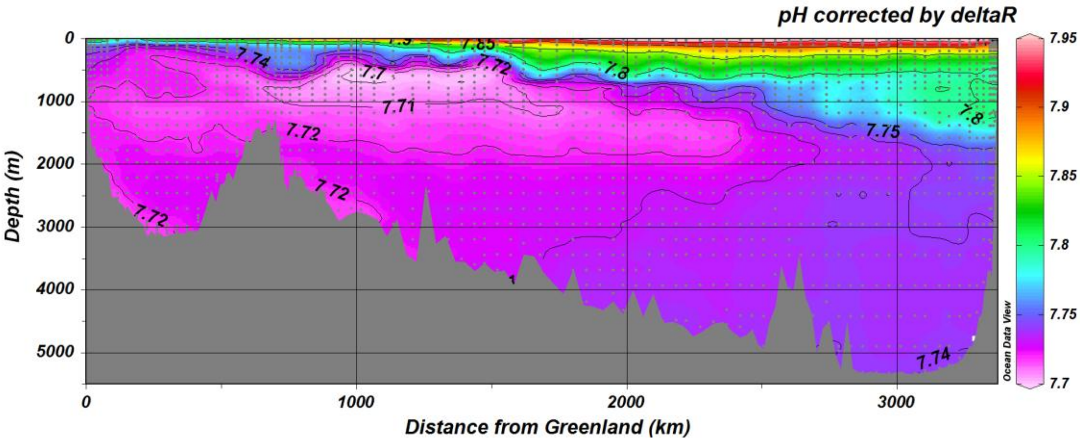


***Figure 9**: pH distribution along the OVIDE section.*

5.6. Total Inorganic Carbon (C_T)

Mónica Castaño-Carrera, Noelia M. Fajar

A total of 443 seawater samples for C_T were collected in 250 mL glass bottles. Samples were rinsed and filled smoothly from the bottom, overflowing the water by at least a half bottle volume. A headspace of 1% of the bottle volume is left. The Table in Annex II shows the selected stations and depths of the C_T samples.

Samples for total inorganic carbon were analysed with a device called AIRICA (Automated Infra - Red Inorganic Carbon Analyzer). AIRICA-10 was designed by Marianda. The principle of the AIRICA is: the samples are acidified with H_3PO_4, the generated CO_2 is driven out quantitatively by a carrier gas. The amount of CO_2 is measured using an infrared detector (Li-cor 6262). The acidification of the sample generates a peak of CO_2 above the baseline and will slowly get back to the baseline. The area of this peak is directly proportional to the CO_2 liberated from the sample. With knowledge of the exact amount of the sample, this will give its C_T concentration.

Certified Reference Material (CRM) for CO_2 analyses were performed in order to control the accuracy of C_T measurements. In every C_T-analysis session, a CRM from batch 118 provided by Dr. Andrew Dickson was analysed.

The AIRICA-10 is a new device in the IIM. It had never been on a cruise before, for this reason samples were taken at selected stations and depths (Table Annex I) to measure its C_T in the IIM with the SOMMA. The SOMMA is the device used to perform these measures usually. Clean borosilicate glass bottles (600 mL) were rinsed and filled from the bottom, overflowing half a volume. A headspace of 1% of the bottle volume is left. Saturated aqueous solution of mercuric chloride (300 µL) was added to the sample as a preservative of fouling formation. The bottle was sealed with glass stoppers covered with Apiezon-L grease and stored in a dark box. These samples will be analysed in the lab of IIM in Vigo (Spain) using the SOMMA (Single-Operator Multiparameter Metabolic Analyzers) system connected to a model CM101_093 coulometer. The analysis consists on acidifying an aliquot of 20 mL with H_3PO_4 in a glass stripping chamber. Then, the resulting CO_2 gas is carried in the equipment by a free-CO_2 gas (N_2) into a coulometric cell, in which the coulometrical tritation is performed (Johnson et al., 1993).

5.7. $^{18}O/^{13}C$ and dissolved inorganic carbon (DIC)

Mª Isabel García Ibañez, Mónica Castaño-Carrera

In the frame of the collaboration with the Laboratoire d'Océanographie et du Climat (LOCEAN) from the University Pierre et Marie Curie, at all surface stations along the section OVIDE and in the even station at the Irminger Sea, 280 samples were taken for each isotope analysis (^{18}O and ^{13}C). The samples were poisoned with $HgCl_2$ to avoid primary production inside the flasks. These isotopes will be used to determine the source of fresh water (continental, rain, etc.) that the seawater has. A total of 65 samples were collected for DIC at all surface stations and in one stations at the Irminger Sea. These samples were also poisoned with $HgCl_2$. All these samples of DIC will be analyzed at the University Pierre and Marie Curie in Paris.

5.8. Ion Carbonate (CO_3^{2-})

Noelia M. Fajar

Seawater samples of CO_3^{2-} were collected from the whole water column along 11 stations during the section OVIDE, in, at least, 15 depths. Seawater was transferred directly from Niskin bottles into cylindrical quartz Perkin Elmer cells of 28 mL of volume and 100 mm of path length. These cells were carefully stored in a thermostatic bath at 25ºC at least one hour before the analysis.

Absorbance measurements were performed with a Perkin Elmer Lambda 800 UV-VIS spectrophotometer on board the R/V Sarmiento de Gamboa, following the spectrophotometric method described in Byrne and Yao (2008). This method consists on the addition of 225 µL of stock solution of $PbCl_2$ (1.1 mM) to the seawater sample, so this Pb^{+2} reacts with the dissolved

CO_3^{2-} of the sample obtaining the complex $PbCO_3$. The $[CO_3^{2-}]$ is calculated in terms of UV absorbance ratios using the eq. 5 of Byrne and Yao (2008).

$$-\log[CO_3^{2-}]_T = \log_{CO3}\beta_1 + \log\left(\frac{R - e_1}{e_2 - R \cdot e_3}\right)$$

Where $R = \left(\frac{\lambda_2 - \lambda_3}{\lambda_1 - \lambda_3}\right)$, in which λ_1 (234 nm) is the UV absorbance wavelengths at the isobestic point of $PbCO_3$, λ_2 (250 nm) is the mean value of wavelengths that present high absorbance variation and λ_3 (350 nm) is a non-absorbing wavelength used to correct the sample manipulation.

The good agreement between these measured CO_3^{2-} and those calculated from A_T and pH using the excel CO_2sys program (Pierrot *et al*., 2006) with the acid constants of Mehrbach *et al*. (1973) refitted by Dickson & Millero (1987) is shown in figure 10, in which calculated CO_3^{2-} fits well with the provisional data of CO_3^{2-} measured (R^2=0.954).

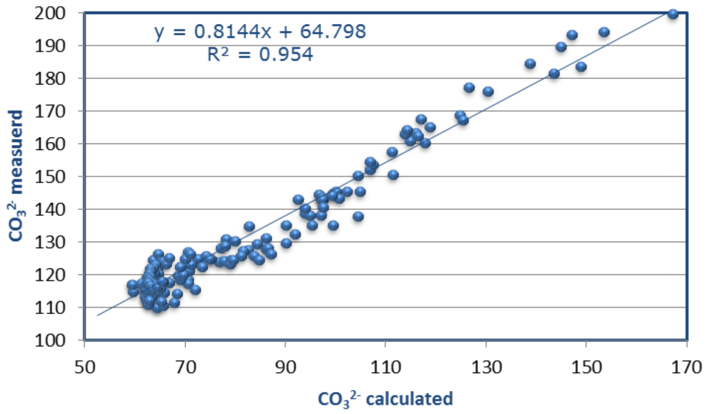


Figure 10: *Lineal adjustment between calculated and measured CO_3^{2-}.*

Due to this high correlation, the calculated CO_3^{2-} profile is shown in the Figure 11 for the OVIDE section. After quality control analysis to the data, this is the expected CO_3^{2-} distribution.

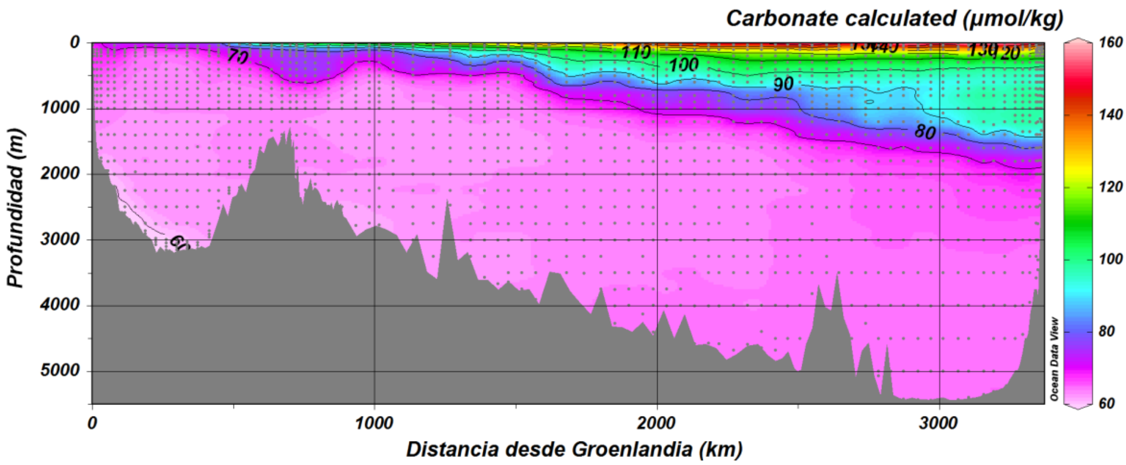


Figure 11: *CO_3^{2-} calculated distribution along the OVIDE section.*

5.9 Alkalinity

Noelia M. Fajar, Mª Isabel García Ibáñez, Fiz F. Pérez

Samples of A_T were taken during the Leg 1 of CATARINA in 50 stations, almost half of the total stations. In order to analyse these A_T samples on board, the water was transferred directly from the Niskin bottle to 600 mL borosilicate glass bottles and stored for 24 hours before the analyses. Measurements of A_T were done by a one endpoint method using an automatic potentiometric titrator (Dosino 800 Metrohm) with a combined glass electrode (Perez and Fraga, 1987). A Knudsen pipette (~195 mL) was used to transfer the samples into an open Erlenmeyer flask in which the potentiometric titration was carried out with HCl (0.1 M). The final volume of titration was determined by means of two pH endpoints (Mintrop *et al.*, 2000). These A_T measurements were done in 14 sets of analysis.

In order to estimate the accuracy of the A_T method, A_T measurements of certified reference material (CRM) for CO_2 from batch 118 provided by Dr. Andrew Dickson were analysed. And in addition, an extra calibration (substandard) was made by using a closed container of 75 L filled with open ocean surface water.

The distribution of A_T concentrations in $\mu mol \cdot Kg^{-1}$ of the OVIDE section is shown in Figure 12, which was drawing using ODV.

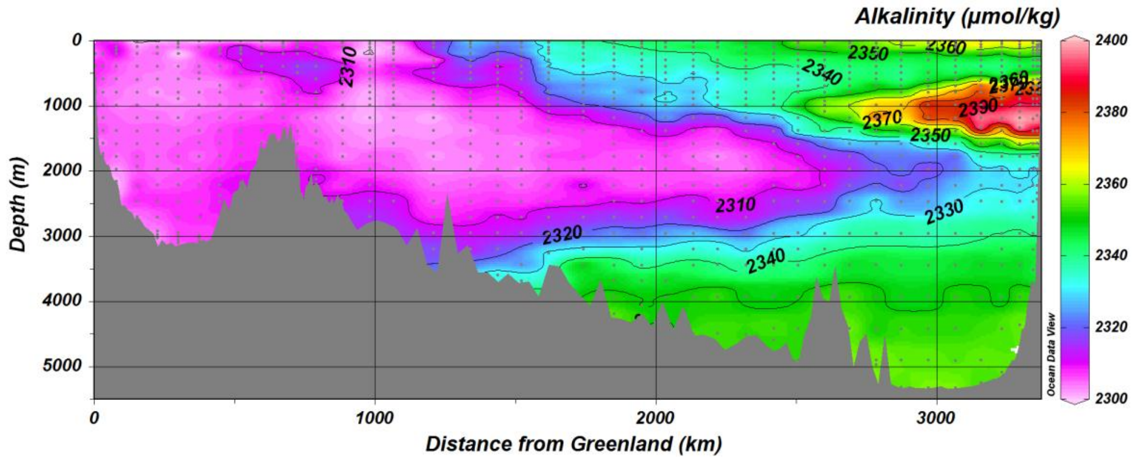


***Figure 12:** A_T distribution along the OVIDE section*

5.10. Nutrients

Fernando Alonso-Pérez, Mercedes de la Paz, Mónica Castaño-Carrera, Maxim Galindo

Dissolved nutrients were sampled in all stations and all depths after tracer gases, dissolved oxygen, total inorganic carbon, pH and alkalinity. Samples were withdrawn to 30 mL solid-polyethylene containers after rinsing twice with the same water. Samples were preserved in the dark at 4ºC when analyses started more than one hour after collection, and they were analysed no more than 24 hours after collection. Nutrient analyses were performed by using a SKALAR segmented flow auto-analyser. Nitrate+nitrite, phosphate and silicate were simultaneously determined. Determination procedure was settled as a pumping cycle of 120 seconds sucking the sample and 80 seconds sucking from a milli Q water reservoir. Every analysis spent ~8 mL of sample. Determinations of nitrate, phosphate and silicate were carried out following methods described by Hansen and Grassoff (1983) with some improvements (Mouriño and Fraga, 1985).

Calibration

Primary standards for nitrate+nitrite, phosphate and silicate were performed from nutrient salt materials (KNO_3, KH_2PO_4 and Na_2SiF_6, respectively) dried 24 hours over silica gel prior to weigh. Primary solutions were performed with milli Q in calibrated volumetric flasks. A stock standard solution was prepared by mixing the three primary standards and preserved in the dark at 4 ºC. Daily working standard solutions were produced dissolving different volumes of stock standard solution in low nutrient seawater (LNSW), filtered through 0.2 µm. These solutions were prepared every two days and preserved in the darck at 4 ºC. Concentrations of each nutrient in the working standard solution are showed in Table 3.

Table 3: *Working calibration standards*

	Volume (mL)		Concentration (µmol kg^{-1})			
STD	**Stock STD**	**Final Volume**	**NO_3^-**	**NO_2^-**	**HPO_4^{2-}**	**SiO_2**
1	1	500	12.807		0.952	23.588
2	2	500	25.613		1.905	47.176
3	2	500		26.988		

Two LNSW sets were used in the cruise. LNSW_1 from station 1 to station 44. LNSW_2 from station 45 to station 95. Nutrient concentrations of these LNSWs are showed in Table 6. At station 14, water deeper than 4000 metres, corresponding to North East Atlantic Deep Water Lower waters (NEADWL) was collected and filtered through 0.2 µm in order to have a high nutrient standard. NEADWL standard was since then measured every day of analysis; its nutrient concentration is showed in Table 4.

Table 4: *Nutrient concentrations ± standard deviation for Low Nutrient SeaWaters and North East Atlantic Deep Water Lower.*

	Concentration (µmol kg^{-1})		
	NO_3^-	**HPO_4^{2-}**	**SiO_2**
LNSW_1	0.05 ± 0.04	0.01 ± 0.007	0.41 ± 0.05
LNSW_2	0.04 ± 0.02	0.01 ± 0.008	0.60 ± 0.09
NEADWL	22.57 ± 0.25	1.49 ± 0.01	45.21 ± 0.79

Regarding linearity, the analytical system of nitrate showed a linear response over the working range. However, systems for phosphate and silicate have been deviated from linearity. For silicate, in order to cover the working range, two segments (0-23 and 23-52 µmol kg^{-1}) have been considered. For phosphate two segments (0-0.95 and 0.95-1.90 µmol kg^{-1}) have been considered.

Precision

The WOCE requirements for precision (Joyce et al., 1991) are silicate 0.2 % full scale (150 µmol kg^{-1}) nitrate 0.2 % full scale (40 µmol kg^{-1}) and phosphate 0.4% full scale (2.5 µmol kg^{-1}).

Sampling error. Duplicate samples

In order to test sampling error, 15 pairs of bottles were fired at the same depth at different stations. Absolute differences average between samples pairs are showed in Table 5. Silicate and phosphate errors are within the WOCE requirements; however these errors are slightly higher in the case of Nitrate.

Table 5: *Summary of differences between samples fired at the same depth*

	Nitrate	**Phosphate**	**Silicate**
Absolute differences average	0.10	0.01	0.12
C.V.fs (%)	0.25	0.39	0.08
WOCE requirements	0.20	0.40	0.20

Consistency of measurements. Quality control

At station 0, the 24 oceanographic bottles were fired at the same depth, 1146 m. Results are showed in Table 6, standard deviation was 0.13 for nitrate, 0.01 for phosphate and 0.16 for silicate. Standard deviations referred to full scale were lower than WOCE requirements in the case of silicate, slightly higher for phosphate and 0.14% higher for nitrate.

Table 6: *Summary of differences between quality control measurements*

	Average	**S.D.**	**C.V. (%)**	**C.V. fs (%)**
Nitrate	16.02	0.13	0.84	0.34
Phosphate	0.90	0.01	1.36	0.49
Silicate	11.46	0.16	1.39	0.11

Preliminary Results

The vertical distribution in the concentration of nitrate, phosphate and silicate for the OVIDE section is showed in Figure 13.

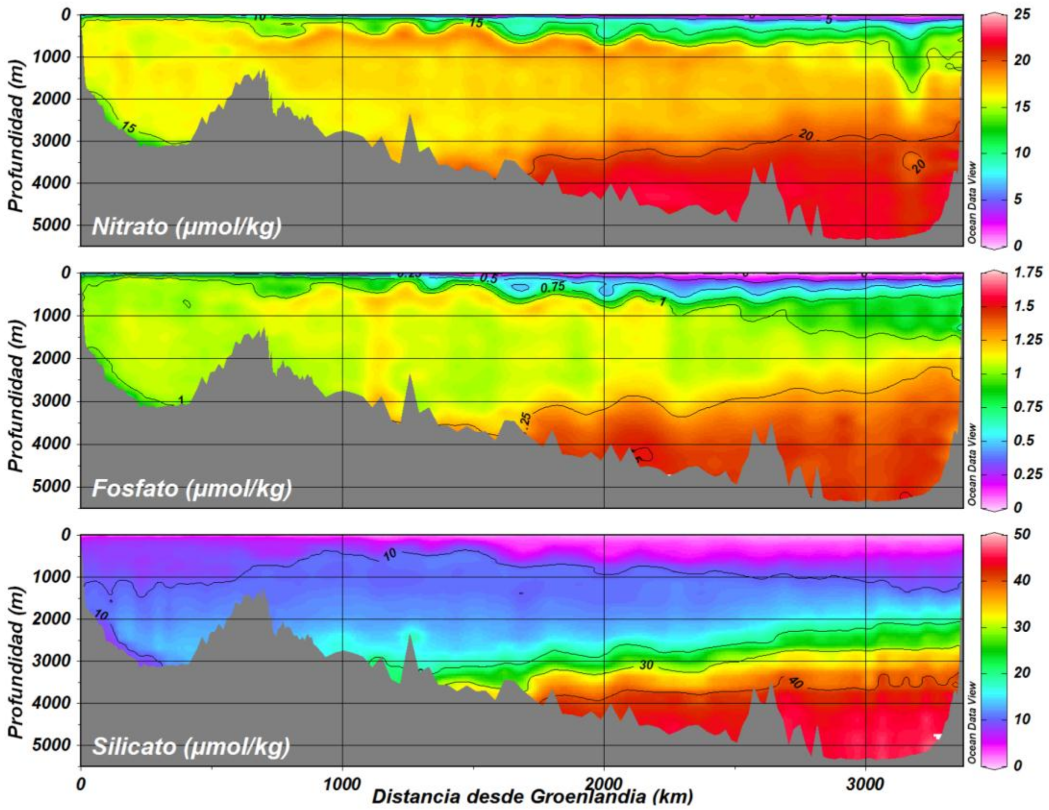


Figure 13: *Vertical distribution of nitrate, phosphate and silicate (µmol kg^{-1}) along the OVIDE section.*

5.11. Salinity

Gabriel Rosón, Lidia Carracedo

Salinity samples were collected in all stations and all depths to calibrate the conductivity sensor installed in the CTD bathysonde and in the underway thermosalinograph . Samples were stored during 24 hours in the laboratory under controlled temperature (22ºC) before analysis. Samples were analyzed using a PORTASAL Guildline and calibrated with IAPSO standard seawater from batch P154 with conductivity (K15) of 0.99990 and salinity 34.996.

There is a very good correlation (r^2 =0.9998) between CTD salinity and the salinity analyzed with a slope of 1.0008 (Figure 14). The average difference between CTD and analyzed salinity is 0.0013±0.062 (Figure 15)

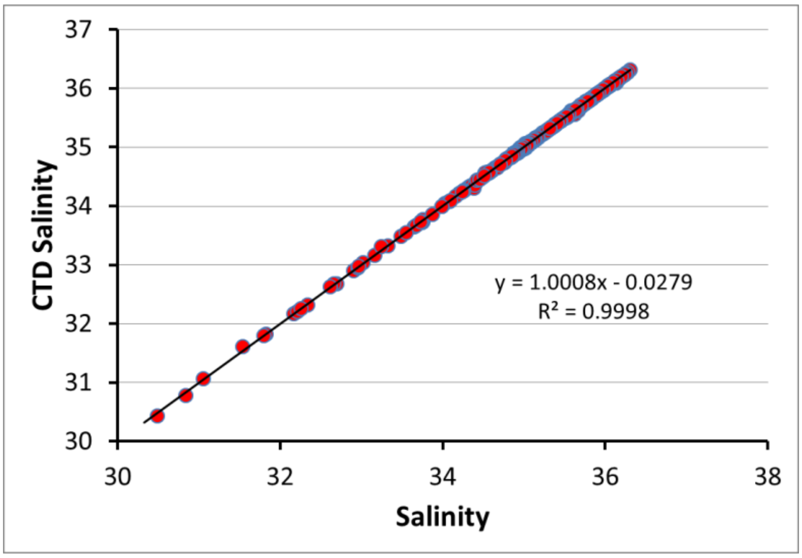


Figure 14: *Regression between CTD and analyzed salinity.*

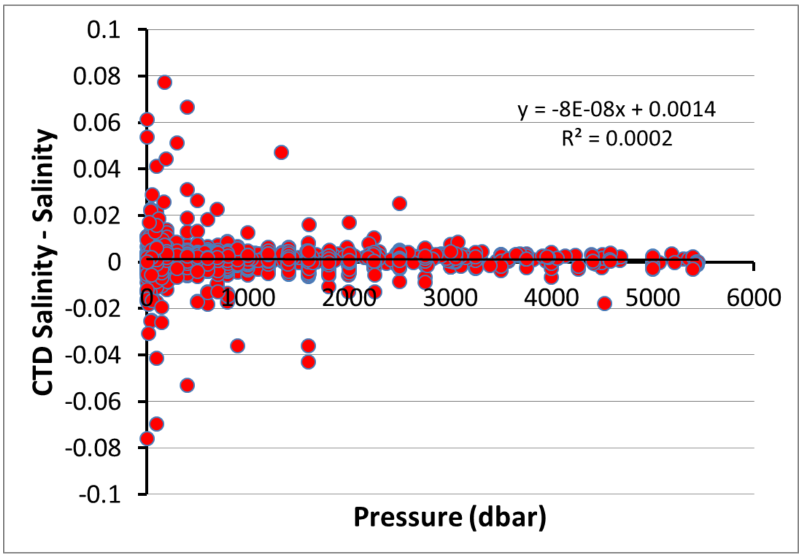


Figure 15: *Distribution of the difference between CTD salinity and analyzed salinity versus pressure in dbar.*

5.12. Coccoliths

Noelia M. Fajar

During the OVIDE section and at three levels (surface, depth chlorophyll maximum and 100 m) in 11 stations, 400 ml of seawater were taken to determine the content of coccoliths, species of plankton actively involved in the sequestration of atmospheric carbon dioxide since they have calcareous shells in their cellular structure. Samples were filtered through a filter of 25 mm of diameter. The filters were later placed in pretri dishes and stored in an oven at 50ºC to preserve them until subsequent analysis on land. This is a collaboration with the Instituto de Ciencias del Mar of CSIC in Barcelona. Table 7 contains the details of the samples collected.

Table 7: *Samples collected to determine the content of coccoliths*

Station	Niskin	Pressure (dbar)	Filtred volume (ml)	Station	Niskin	Pressure (dbar)	Filtred volume (ml)	Station	Niskin	Pressure (dbar)	Filtred volume (ml)
6	22	100.87	500	31	23	39.51	500	59	24	6.71	500
6	23	65.86	500	31	24	5.95	500	63	18	100.39	350
6	24	4.92	500	39	22	101.74	500	63	19	51.00	350
12	22	100.78	500	39	23	51.47	500	63	24	5.78	500
12	23	45.23	500	39	24	9.70	500	71	20	99.12	400
12	24	5.51	500	49	22	100.23	350	71	21	39.30	350
19	22	100.75	500	49	23	31.11	250	71	24	6.62	500
19	23	45.89	500	49	24	5.78	500	81	19	98.32	450
19	24	5.61	500	55	20	99.91	350	81	20	37.14	250
23	22	100.31	500	55	21	30.27	350	81	24	4.94	500
23	23	39.56	500	55	22	6.50	500	107	21	99.85	500
23	24	7.02	500	59	20	100.29	350	107	22	50.00	500
31	22	102.12	500	59	21	35.38	350	107	24	5.49	500

5.13. Plankton composition and Chlorophyll

Alba Marina Cobo-Viveros

Daily plankton counts were done in water sampled from the continuum and from the rosette bottle closed at the chlorophyll maximum depth (DCM). Samples were taken for quantitative and qualitative analysis of plankton, particle count using the flowcam, and measurement of chlorophyll concentration. The procedure is detailed below.

Qualitative analysis of marine plankton: seawater was collected in a 50ml plastic bottle, preserved with 4ml of formaldehyde and put away for posterior analysis by the Instituto Tecnolóxico para o Control do Medio Mariño de Galicia (INTECMAR).

Quantitative analysis of marine plankton: seawater was collected in a 50ml plastic bottle, preserved with 3 drops of lugol and put away for posterior analysis by the INTECMAR.

Flowcam particle count: a small sample of seawater was collected in a 50ml plastic bottle for its direct observation in the flowcam. This instrument had to be turned on and immediately purged 3 times: one time with 2ml of bleach, the next with 2ml of bleach + distilled water, and finally 2 ml of distilled water. In the "*Setup and focus mode*" I had to make sure no bubbles appeared on the screen. Afterwards, the particle count was performed while the instrument took pictures of what it understood by particle. After finishing the daily counts, the instrument was purged again as explained before and turned off until the next day.

The particle count was done with 2ml of sample. Three replicas of each sample were done, in order to increase the possibilities of finding organisms that had been missed by the first count. Afterwards, the particle counts were saved in the folder "*Export data*" and "*Export summary data*". The counts were codified according to the station sampled, date and hour of count, and if it was a sample from the continuum or from the DCM bottle. The plankton pictures were saved according to its size fraction.

Particulate chlorophyll analysis: A volume of 100 ml of seawater were filtered through a syringe that had two kinds of filters at the tip: a GF/D filter of 2.7 μm (at the top) and a GF/F filter of 1μm (at the bottom). Afterwards, each filter was introduced in a test tube and put in the freezer at -20ºC for its posterior spectrophotometry analysis by INTECMAR.

Some pictures taken throughout the campaign are shown in Figure 16. Sampled stations, continuous or DCM bottle sample, depth of chlorophyll maximum, quantitative or qualitative plankton analysis and whether a sample was taken for chlorophyll measurement, is shown in Table 8.

Figure 16: *Pictures taken throughout the cruise that shown several species of plankton.*

Station 25, sample from bottle 23, first count, f0-30.

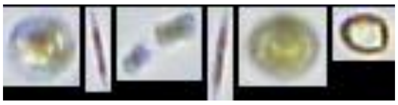
Station 29, sample from bottle 23, first count, f10-50, f50-60.

Station 29, sample from bottle 23, second count, f10-60.

Station 39, sample from continuum, first count, f10-20, f50.

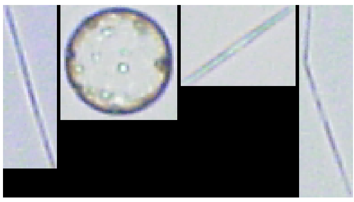
Station 42, sample from bottle 23, second count, f20-30.

Station 48, sample from continuum, first count, f50-100.

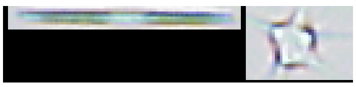


Station 48, sample from continuum, second count, f10-30.

Station 52, sample from bottle 21, second count, f10-40.



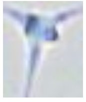
Station 60, sample from continuum, second count, f20-50.



Station 61, sample from continuum, first count, f20-40.

Station 61, sample from continuum, third count, f20-40.

Station 78, sample from bottle 23, first count, f10-30.



Station 82, sample from continuum, second count, f0-50.

Station 82, sample from continuum, third count, f0-60.

***Table 8**: Sample date and time, origin of the sample (continuum or DCM bottle), analysis performed (quantitative, qualitative, flowcam or chlorophyll) and comments on the sampled stations in the OVIDE section of the CATARINA 2012 oceanographic cruise.*

STATION	DATE AND	CONTINUOUS	DCM BOTTLE	QUANTITAVE SAMPLE	QUALITATIVE SAMPLE	FLOWCAM	CHLOROPHYLL	COMMENTS
1	23/06/2012 16:20	x		x	x	x	x	Some chains of organisms were observed in a pH tray. Filtrations were done and preserved in a Petri dish.
5	24/06/2012 9:08	x		x	x	x	x	The flowcam cell seems to have clogged up.
7	24/06/2012 19:12	x		x	x	x	x	
10	25/06/2012 8:15	x		x	x	x	x	We decided to change the clogged up flowcam cell.
11	25/06/2012 17:20		Bottle 23 (52.9m)	x	x	x	x	The flowcam cell broke while we tried to clean it.
13	26/06/2012 6:40	x		x	x	x	x	We decided to stop concentrating the sample that we put in the flowcam, in order to prevent the flowcam cell from clogging.
	26/06/2012 7:20		Bottle 23 (59.74m)	x	x	x	x	
17	27/06/2012 8:50	x		x	x	x	x	
	27/06/2012 11:10		Bottle 23 (36.5m)	x	x	x	x	The pictures that are being taken seem to be from the dirt in the cell… the particle count was saved, as well as the pictures.
20	28/06/2012 7:53	x		x	x	x	x	
	28/06/2012 8:50		Bottle 23 (43.81m)	x	x	x	x	The cell seems to be working better: it has stopped counting the dirt particles, and there are fewer bubbles.
22	29/06/2012 7:30	x		x	x	x	x	The cell continues to clog; it was taken out, put it in water with bleach, dried it and put back on. The image showed some dots in the cell. The particle count was saved, but I don't think it is right because it is counting repeatedly the filthiness on the cell. Also, the ship is moving a lot today, and I think this affects the vision field by changing it continuously, so the instrument starts counting dirt in the cell as particles.
	29/06/2012 10:40		Bottle 23 (41.07m)	x	x	x	X	

25	30/06/2012 8:08	x		x	x	x	x	I finally decided to change the cell. It seems to be working better, or at least the particle count seems to be more real. There is a long filament in f200-300.
	30/06/2012 9:10		Bottle 23 (34.1m)	x	x	x	x	Interesting organism! In the first count, in the fraction between 0-30… it seems to be like a nauplius, even though the size doesn't fit.
27	30/06/2012 23:17		Bottle 23 (38.1)	x	x	x	x	The DCM was clearly visible around 38m in the CTD profile, but I didn't see any organism in the flowcam. I tried concentrating the sample, but that just makes the image to appear with more bubbles than normal.
29	01/07/2012 13:50	x		x	x	x	x	
	01/07/2012 16:20		Bottle 23 (25.3m)	x	x	x	x	Organisms found in sample from bottle 23, first particle count, f10-50 and f50-60. Also in the second particle count, in f10-60.
32	02/07/2012 10:12	x		x	x	x	x	
	02/07/2012 15:40		Bottle 23 (30m)	x	x	x	x	
35	02/07/2012 8:19	x		x	x	x	x	
	02/07/2012 11:45		Bottle 23 (22.81m)	x	x	x	x	
39	05/07/2012 8:52	x		x	x	x	x	Organisms in the first particle count from the continuum, in the fractions f50 and f10-20.
	05/07/2012 11:30		Bottle 23 (51.23m)	x	x	x	x	
42	06/07/2012 9:46	x		x	x	x	x	During the first particle count there were organisms, but the program shut down!!! The pictures weren't saved by size fraction, but they were saved in the count folder.
	06/07/2012 11:45		Bottle 23 (50.4m)	x	x	x	x	Organism found in the second particle count, in the f20-30 fraction.
44	07/07/2012 7:37	x		x	x	x	x	
	07/07/2012 11:30		Bottle 23 (40m)	x	x	x	x	
48	07/07/2012 8:33	x		x	x	x	x	*Ceratium* cf. *furca* was found in the first particle count, in the f50-100 fraction. In the second count, in the f10-30 fraction.
	08/07/2012 11:00		Bottle 23 (51m)	x	x	x	x	
52	09/07/ 11:03	x		x	x	x	x	
	09/07/2012 12:45		Sample from bottle 21 (50.5m)	x	x	x	x	*Ceratium* cf. *fusus* was found in the second particle count, in the f10-40 fraction.
56	10/07/2012 9:44	x		x	x	x	x	The measurement was done almost 24h after the sample was taken, because the flowcam cell was clogged with fuzz. The initial images had a lot of bubbles in it, which is why I think the particle count wasn't ok.
	10/07/2012 13:45		Sample from bottle 21 (50.4m)	x	x	x	x	
60	11/07/2012 16:30	x		x	x	x	x	There were diatoms (*Coscinodiscus* sp.) in the second particle count, in the fraction f20-50.
61	12/07/2012 13:30	x		x	x	x	x	There were some organisms in the first particle count, in the f20-40 fraction; in the third particle count, in the f10-20 and f20-40, there may be some *Coscinodiscus* sp.
	12/07/2012 15:30		Bottle 20 (13.8m)	x	x	x	x	
66	13/07/2012 8:54	x		x	x	x	x	
	13/7/12 10.00h		Bottle 15 (50.8m)	x	x	x	x	
72	14/07/2012 10:14	x		x	x	x	x	There was no bottle sampling because there was no chlorophyll maximum.

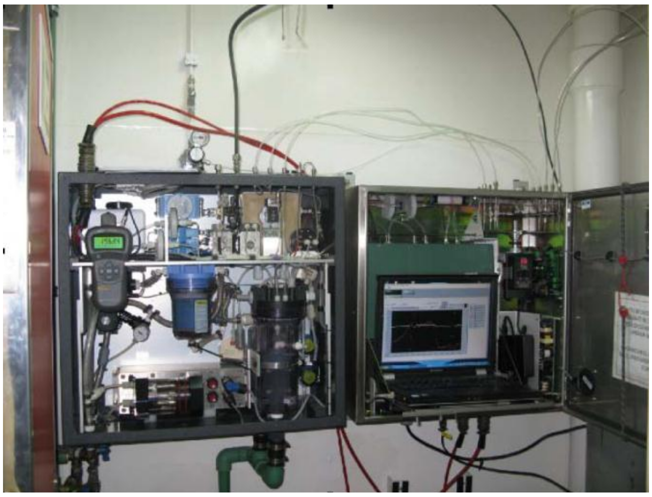
78	15/07/12 18.49h	x		x	x	x	x	
	15/07/2012 20:45		Bottle 23 (50m)	x	x	x	x	There were diatoms in the first particle count, in f10-30; and in the second particle count, in f10-20.
82	16/07/2012 10:59	x		x	x	x	x	In the second and third particle count there seems to be a dinoflagelate. There are two samples from the continuum because a copepod and other organisms were found in a burette. The sample is marked as "E82-Continuous pH".
	16/07/2012 13:40		Bottle 23 (21.3m)	x	x	x	x	
90	17/07/2012 10:46	x		x	x	x	x	The cell had some kind of stain in the center, which doesn't allow a proper particle count. I tried to clean it with bleach, diethyl ether, but neither of these worked. I left the cell overnight soaking in distilled water and bleach, after which I cleaned the cell and mounted it on the flowcam again. There was no notable improvement, but I was able to avoid the bubble and make the measurement on the vision field above the bubble.
	17/07/2012 11:40		Bottle 5 (39m)	x	x	x	x	

5.14. Underway measurements

Gabriel Rosón, Alba Marina Cobo-Viveros, Antón Velo, Xosé Antonio Padin,

A continuous sea-surface underway sampling has been performed along the CATARINA cruise track (Figure 4) to determine the CO_2 exchange, the thermohaline structure, oxygen and the chlorophyll concentration. The variables measured were: Partial pressure of CO_2 in air and seawater, salinity and temperature, oxygen, chlorophyll by fluorescence, and meteorological variables (wind, atmospheric pressure, air temperature) and geographical position (GPS).

The underway measurements of sea-surface and atmospheric molar fractions of CO_2 were performed with an underway CO_2 measuring system, namely, the model 8050 from General Oceanics. The analytical principle of this instrument is based on the equilibration of atmospheric air with the seawater sample under analysis. The device configuration and the data reduction routines were based on the recommendations for autonomous underway pCO_2 measuring systems of Pierrot et al. (2009). An Optode oxymeter from Aanderaa and Seapoint fluorometer were connected in parallel to the same uncontaminated seawater supply. These apparatus recorded underway oxygen and chlorophyll-a concentration at sea surface.



Underway CO_2 measuring system General Oceanics 8050

Other variables as ship position data and meteorological information were gathered via the vessel mounted oceanographic data acquisition system that include the surface temperature and salinity measurements of a thermosalinograph (SBE-45-MicroTSG) as well. The on board internet connection allows us to receive real-time data and manage the different operating modes of these equipments using the Remote Desktop software. During the CATARINA cruise, we checked the remote control functionality of the on-board measurement system in addition to underway measuring of these biogeochemical variables.

These pCO_2 underway measurements together with the physical and biogeochemical variables will be part of the project TRANCOS of the Instituto de Investigaciones Marinas that together with the the Institut de Ciències del Mar (ICM) and the Unidad de Tecnología Marina (UTM) of Barcelona, have developed a Voluntary Observing Ship (VOS) for the estimation of the ocean CO_2 uptake within the international effort of the VOS program using the BIO Sarmiento de Gamboa as a platform. These underway measurements will be included in the international project SOCAT (Surface Ocean CO_2 Atlas).

The preliminary distribution of sea-surface fugacity of CO_2 together with sea-surface temperature (SST), salinity (SSS) and oxygen along the latitude is shown in Figure 17.

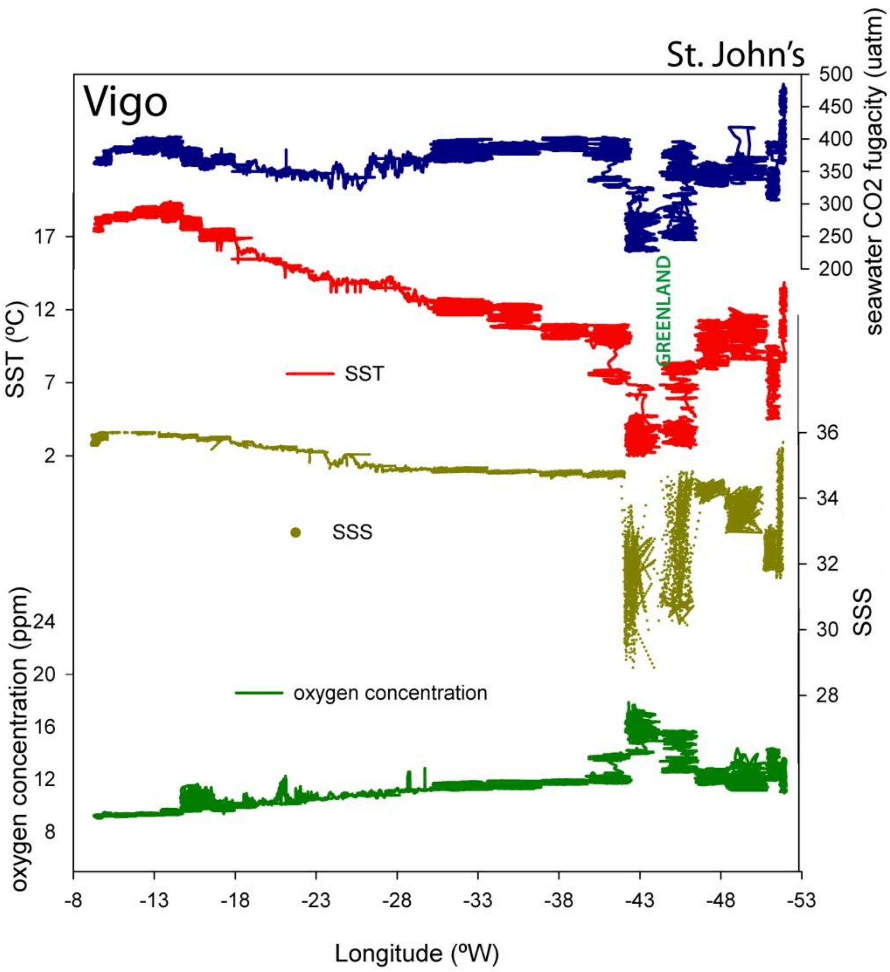


Figure 17: *Longitudinal distribution of seawater CO_2 fugacity, SST, SSS and oxygen concentration as measured in the Leg 1 of Catarina cruise.*

5.15 Atmospheric greenhouse gases

Mercedes de la Paz, Alberto Grande Mirtanda

Samples were taken daily to analyze atmospheric nitrous oxide (N_2O) and methane (CH_4) to be analyzed at the Institute for Marine and Atmospheric Research Utrecht (Netherlands) and the University of London (United Kingdom), respectively, in the frame of the European project INGOS. These atmospheric samples were taken in the bow of the vessel en route between stations to avoid any contamination. The samples of N_2O were taken using a pump in a stainless steel container (Table 9) and the sample of CH_4 were stored in a bag of inert material (Table 10), also using a pump.

On the top, sampling of the CH_4 in a bag of inert material.

On the left, sampling the N_2O in a stainless steel can

Table 9: *Cans collected for N_2O greenhouse gas to be analyzed at the Institute for Marine and Atmospheric Research Utrecht (IMAU) of Netherlands*

CAN #	DATE / TIME	LONGITUDE	LATITUDE	TEMPERATURE
1	25/06/2012 13:59	-11.317	40.331	17.908
2	26/06/2012 14:58	-12.664	40.570	18.253
3	27/06/2012 13:24	-13.975	41.451	18.976
4	28/06/2012 10:59	-15.288	42.446	17.510
5	29/06/2012 11:47	-15.941	42.948	15.696
6	30/06/2012 10:26	-17.182	43.894	16.085
7	01/07/2012 14:45	-18.550	45.109	16.583
8	02/07/2012 14:49	-19.547	46.384	16.329
9	03/07/2012 11:05	-20.312	47.354	14.660
10	05/07/2012 12:17	-21.583	48.978	14.744
11	06/07/2012 12:15	-22.487	50.127	14.019
12	07/07/2012 10:00	-23.214	51.059	12.991
13	07/07/2012 10:59	-23.312	51.187	13.130
14	08/07/2012 12:22	-24.566	52.780	12.387
15	09/07/2012 12:59	-25.930	54.520	13.852
16	10/07/2012 13:28	-27.489	56.511	13.284
17	12/07/2012 12:32	-29.279	57.972	11.764
18	12/07/2012 19:09	-29.728	58.210	11.084
20	14/07/2012 21:42	-36.397	59.363	11.705
21	15/07/2012 11:38	-38.317	59.557	10.792
22	16/07/2012 13:44	-41.574	59.786	8.757
23	17/07/2012 11:38	-43.001	59.904	5.169
24	17/07/2012 22:21	-43.754	59.684	3.644
25	18/07/2012 16:10	-46.066	59.088	7.957
26	19/07/2012 21:15	-48.356	55.778	10.091
27	21/07/2012 16:50	-51.363	51.263	8.918
28	22/07/2012 21:12	-52.242	48.595	15.061

Table 10: *Bags collected for CH_4 greenhouse gas to be analyzed at the Royal Holloway of*

SAMPLE NUMBER	NEAR STATION	DATE	TIME (UT)	LATITUDE	LONGITUDE	WEATHER (IF AVAILABLE):	WIND SPEED	DIRECTION	TEMPERATURE	PRESSURE
1	St 11	25/06/2012	14:27	40.55	-12.6372		12.257	39.057	17.598	1030.605
2	St 14	26/06/2012	15:00	40.573	-12.6701	Partly cloudy, windy	12.030	65.634	18.292	1027.775
3	After St 17	27/06/2012	13:31	41.555	-14.1109	Partly cloudy, windy.	5.404	328.881	18.998	1026.055
4	After St 20	28/06/2012	11:07	42.459	-15.3035	Roughly sea, spray	12.611	305.491	17.600	1023.040
5	After St 22	29/06/2012	11:57	42.963	-15.9598		9.325	11.350	15.965	1025.571
6	After St 25	30/06/2012	10:45	43.922	-17.2188	Sunny day	8.806	27.527	16.141	1031.820
7	St 29	01/07/2012	15:05	45.142	-18.5764	Cloudy - covered	No meteo	180.000	16.608	1029.788
8	St 3	02/07/2012	15:05	46.404	-19.5627	Cloudy - All covered	12.285	298.508	16.244	1024.274
9	St 35	03/07/2012	11:20	47.383	-20.3336	Cloudy	11.277	99.364	14.548	1025.080
10	After St 39	05/07/2012	12:21	48.986	-21.5891	Cloudy	10.535	329.103	14.770	1026.849
11	After St 42	06/07/2012	12:29	50.155	-22.5083		14.429	61.031	14.363	1031.377
12	After St 44	07/07/2012	11:05	51.201	-23.3222	Cloudy, cold	12.030	66.231	13.155	1035.290
13	After St 48	08/07/2012	12:30	52.799	-24.5808	Calm sea, cloudy	5.448	111.997	12.344	1034.841
14	After St 52	09/07/2012	13:05	54.536	-25.9425	Calm sea, cloudy	3.377	166.079	13.876	1036.439
15	After St 56	10/07/2012	13:30	56.252	-27.2924	Calm sea, flat sea surface, clared sky	2.253	52.240	13.286	1031.595
16	St 61	12/07/2012	12:45	57.972	-29.2793	Rough sea, spray.	12.969	136.482	11.796	1019.925
17	St 68	13/07/2012	15:50	58.974	-32.5555	Sunny, calm sea.	5.179	155.129	12.091	1027.850
18	St 74	14/07/2012	21:24	59.363	-36.3966	Daylight yet.	10.096	105.122	11.782	1022.186
19	St 79	15/07/2012	22:50	59.686	-39.599	Daylight, sunny	4.640	20.636	10.705	1022.797

SAMPLE NUMBER	NEAR STATION	DATE	TIME (UT)	LATITUDE	LONGITUDE	WEATHER (IF AVAILABLE):	WIND SPEED	DIRECTION	TEMPERATURE	PRESSURE
20	After St 82	16/07/2012	13:30	59.782	-41.4946	Near Groenland	11.928	43.925	8.748	1021.957
21	After St 91	17/07/2012	12:38	59.902	-42.9901		5.004	40.457	5.591	1024.825
22	Near St 105	18/07/2012	16:15	59.077	-46.0792	Foggy, calm wind. During navigation.	2.649	155.977	7.937	1025.927
23		19/07/2012	21:30	55.738	-48.3538	Foggy, calm wind. Rough sea	10.495	289.336	10.016	1004.483
24		21/07/2012	17:00	51.246	-51.3695		10.858	297.670	8.941	1020.781
25		22/07/2012	21:24	48.58	-52.2465	Clear sky, sunny calm sea.	4.845	265.774	14.808	1026.636

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ANNEX I

ADCP LOG BOOK

Start Time	End time	Files OS75	Config OS75	Files OS 150	Config OS150	Sea state	Remarks
2012/06/22, 19:50	2012/06/22, 20:07	catarina_OS75002*	OS75_NB_NBT.txt	catarina_os150000*	OS150_BB_NBT.txt	1	No pitch & roll on OS150; plug trigger output of OS75 on trigger input of OS150
2012/06/22, 20:10	2012/06/23, 06:49	catarina_OS75003*	OS75_NB_NBT.txt	catarina_os150001* catarina_os150002*	OS150_BB_NBT.txt	1	**Both OS:** pings every 2 to 2.5 sec. STA of 2 minutes, i.e. 1 ensemble = ~48 pings & a distance of 540m @ 9 knots
2012/06/23, 06:50	2012/06/23, 08:00	catarina_OS75004*	OS75_NB_NBT.txt	catarina_os150003*	OS150_BB_NBT.txt	1	
2012/06/23, 08:01	2012/06/23, 08:52	catarina_OS75005*	OS75_NB_NBT.txt	catarina_os150004*	OS150_BB_NBT.txt	1	**OS75**: RDI gives an rms of 17 cm/s in NB => err ~ 2.45cm/s per ensemble
2012/06/23, 08:53	2012/06/23, 12:46	catarina_OS75006*	OS75_NB_NBT.txt	catarina_os150005*	OS150_BB_NBT.txt	1	corrected a few inconstitencies in config (in comm rates)
2012/06/23, 12:53	2012/06/23, 15:36	catarina_OS75007*	OS75_NB_NBT_01.txt	catarina_os150007*	OS150_BB_NBT_01.txt	1	skipped file 6 on OS 150
2012/06/23, 15:36	2012/06/24, 10:53	catarina_OS75008*	OS75_NB_NBT_01.txt	catarina_os150008*	OS150_BB_NBT_01.txt	1	OVIDE section begins. Station 1, just before. Clocks sync
2012/06/24, 10:56	2012/06/24, 16:42	catarina_OS75009*	OS75_NB_NBT_01.txt	catarina_os150009* catarina_os150010*	OS150_BB_NBT_01.txt	1	Station 5, CTD 1600m desc. - OS150 interr. at 15:22 (for station 7) and restarted at 17:37 during upcast to check the interferences with the LADCP
2012/06/24, 16:44	2012/06/26, 19:00	catarina_OS75010*	OS75_NB_NBT_01.txt	catarina_os150011*	OS150_BB_NBT_01.txt	1	Station 11, CTD 4850m. Clocks sync.
2012/06/26, 19:01	2012/06/27, 16:52	catarina_OS75011*	OS75_NB_NBT_01.txt	catarina_os150012*	OS150_BB_NBT_01.txt	1	Station 15, CTD 3820m desc.
2012/06/27, 16:52	2012/06/28, 20:21	catarina_OS75012*	OS75_NB_NBT_01.txt	catarina_os150013*	OS150_BB_NBT_01.txt	2-3	Station 18, CTD bottom asc. Clocks sync.
2012/06/28, 20:22	2012/06/29, 05:40	catarina_OS75013*	OS75_NB_NBT_01.txt	catarina_os150014*	OS150_BB_NBT_01.txt	3	Stationning station 22 for bad weather.
2012/06/29, 05:40	2012/06/30, 21:09	catarina_OS75014*	OS75_NB_NBT_01.txt	catarina_os150015*	OS150_BB_NBT_01.txt	2	Station 22 (just before starting)
2012/06/30, 21:09	2012/07/02, 01:47	catarina_OS75015*	OS75_NB_NBT_01.txt	catarina_os150016*	OS150_BB_NBT_01.txt	2	Station 27 approaching bottom. Clocks sync.

2012/07/02, 01:47	2012/07/02, 19:10	catarina_OS75016*	OS75_NB_NBT_01.txt	catarina_os150017*	OS150_BB_NBT_01.txt	1	Station 31, just before. Clocks sync.
2012/07/02, 19:10	2012/07/03, 14:24	catarina_OS75017*	OS75_NB_NBT_01.txt	catarina_os150018*	OS150_BB_NBT_01.txt	1	Station 33, bottom.
2012/07/03, 14:30	2012/07/03, 21:13	catarina_OS75018*	OS75_NB_NBT_01.txt	catarina_os150019*	OS150_BB_NBT_01.txt	2	Station 36, 600m desc. Add attitude on OS150 (NMEA2 on COM2 used for heading & att.). OS150 restarted at 14:35. OS75: new plug and COM1 to transmit to OS150.
2012/07/03, 21:13	2012/07/04, 17:57	catarina_OS75019*	OS75_NB_NBT_01.txt			2-3	Station 37, just before. Stopped OS75 only for clock sync. and checking changes. **Note**: CTD work stopped from 5:00 to 23:22 (July 4) because of weather. Ship stationned at station 38 position.
2012/07/04, 17:57	2012/07/05, 15:02	catarina_OS75020*	OS75_NB_NBT_01.txt	catarina_os150020*	OS150_BB_NBT_01.txt	2	Waiting at station 38.
2012/07/05, 15:02	2012/07/07, 14:03	catarina_OS75021*	OS75_NB_NBT_01.txt	catarina_os150021*	OS150_BB_NBT_01.txt	1	Station 40, 800m, desc. Clocks sync.
2012/07/07, 14:03	2012/07/08, 21:28	catarina_OS75022*	OS75_NB_NBT_01.txt	catarina_os150022*	OS150_BB_NBT_01.txt	1	Station 45,~2800m, desc. Clocks sync.
2012/07/08, 21:28	2012/07/09, 16:44	catarina_OS75023*	OS75_NB_NBT_01.txt	catarina_os150023*	OS150_BB_NBT_01.txt	1	Station 50, ~2000m, asc.
2012/07/09, 16:44	2012/07/10, 21:02	catarina_OS75024*	OS75_NB_NBT_01.txt	catarina_os150024*	OS150_BB_NBT_01.txt	1	Station 53, 2220m, asc. Clocks sync.
2012/07/10, 21:02	2012/07/11, 22:16	catarina_OS75025*	OS75_NB_NBT_01.txt	oops	OS150_BB_NBT_01.txt	2-3	Station 58, asc. The OS150 did not restqrt properly. Clocks sync.. Waiting near station 60 from 11/07 05:12.
2012/07/11, 22:16	2012/07/12, 22:00	catarina_OS75026*	OS75_NB_NBT_01.txt	catarina_os150025* (3 minutes only) catarina_os150026*	OS150_BB_NBT_01.txt	3-2	Waiting for better sea state. Station 60 begins at 06:55, after 2 trials. During the night, the ship steamed slowly back & forth along the Ovide line from st. 60 towards station 59 (on ~3Nm). Clocks sync.
2012/07/12, 22:00	2012/07/14, 04:09	catarina_OS75027*	OS75_NB_NBT_01.txt	catarina_os150027*	OS150_BB_NBT_01.txt	1	Station 63 bottom.
2012/07/14, 04:09	2012/07/15, 12:15	catarina_OS75028*	OS75_NB_NBT_01.txt	catarina_os150028*	OS150_BB_NBT_01.txt	1	Station 71, juste before. Clocks sync.
2012/07/15, 12:15	2012/07/16, 19:08	catarina_OS75029*	OS75_NB_NBT_01.txt	catarina_os150029*	OS150_BB_NBT_01.txt	1	Station 77, 2200m, asc. Clocks sync.

2012/07/16, 19:08	2012/07/17, 10:45	catarina_OS75030*	OS75_NB_NBT_01.txt	catarina_os150030*	OS150_BB_NBT_01.txt	1	Station 84, 800m, desc.
2012/07/17, 10:45	2012/07/17, 22:15	catarina_OS75031*	OS75_NB_BT_01.txt	catarina_os150031*	OS150_BB_BT_01.txt	1	Station 90, end. Closes the Ovide section. We come back along the section to better sample the shelf. Change both ADCP config: same but with bottom track.
2012/07/17, 22:15	2012/07/18, 03:04	catarina_OS75032*	OS75_NB_BT_01.txt	catarina_os150032*	OS150_BB_BT_01.txt	1	During transit to Lab section; 59°41N 43°43W (Cape Farewell). Check config result: OS75: amplitude 1, misalignmt -0.4 and pitch corr. 2° OK.
2012/07/18, 03:06	2012/07/18, 07:42	catarina_OS75033*	OS75_NB_BT_01.txt	catarina_os150033*	OS150_BB_BT_01.txt	1	Station 101, just before. Clocks sync. Beginning of the Labrador section.
2012/07/18, 07:43	2012/07/19, 06:37	catarina_OS75034*	OS75_NB_NBT_01.txt	catarina_os150034*	OS150_BB_NBT_01.txt	1	Station 103, just before. Back to previous config since we leave the shelf.
2012/07/19, 06:37	2012/07/20, 20:00	catarina_OS75035*	OS75_NB_NBT_01.txt	catarina_os150035*	OS150_BB_NBT_01.txt	2-3	Station 107, 1100m, desc.
2012/07/20, 20:00	2012/07/22, 18:34	catarina_OS75036*	OS75_NB_NBT_01.txt	catarina_os150036*	OS150_BB_NBT_01.txt	4-2	Over station 109: no stop because of bad weather. Clocks sync. Captain changed the 'quille' depth without warning the 22/07/2012 at 6:30am. ADCPs not stopped and shallowed from 10m to 6m depth during a stop.
2012/07/22, 18:36		catarina_OS75037*	OS75_NB_BT_01.txt	catarina_os150037*	OS150_BB_BT_01.txt	1	Transit over the shelf (335m, 49°06.43'N 52°04.63'W). Clocks sync.

The main command files are given hereafter. Two initialization files, generated by VmDAS, are also given to check that all the parameters were correctly implemented (since both the command files and the software interface command the SADCP).

OS75_NB_NBT means OS75 in Narrow Band and no bottom track configuration.
OS150_BB_BT means OS150 in Braod Band and bottom track configuration

Configuration files:

OS75_NB_NBT_01.txt

```
;------------------------------------------------------\
; ADCP Command File for use with VmDas software.
;
; ADCP type:     75 Khz Ocean Surveyor
; Setup name:    default
; Setup type:    Low resolution, long range
profile(narrowband)
;
; NOTE:  Any line beginning with a semicolon in the first
;        column is treated as a comment and is ignored by
;        the VmDas software.
;------------------------------------------------------\

; Restore factory default settings in the ADCP
cr1

; set the data collection baud rate to 38400 bps,
; no parity, one stop bit, 8 data bits
; NOTE:  VmDas sends baud rate change command after all
; other commands in this file, so that it is not made
; permanent by a CK command.
cb611

; Set for narrowband single-ping profile mode (WP),
; forty-five (NN) 16 meter bins (NS),
; 8 meter blanking distance (NF)
WP0
NN045
NP00001
NS1600
NF0800

; Disable bottom track (BP),
; Set maximum bottom search depth to 1200 meters (BX)
BP000
BX12000

; output velocity, correlation, echo intensity, percent
; good and status
ND111110000

; Ping as fast as possible
TP000000

; Three seconds between ensembles
; Since VmDas uses manual pinging, TE is ignored by the
; ADCP. You must set the time between ensemble in the
; VmDas Communication options
;TE00000300

; Set to calculate speed-of-sound, no depth sensor,
; external synchro heading sensor, no pitch or roll being
; used, no salinity sensor, use internal transducer temp
EZ1000001

; Output beam data (rotations are done in software)
EX00000

; Set transducer misalignment (hundredths of degrees)
EA04513

; Set transducer depth (decimeters)
ED0105

; Set Salinity (ppt)
ES35

;  synchro
;   cx0,1   no synchro IN  ,  synchro out ON
;   cx1,1   synchro IN  ,  synchro out   ON
cx0,1

; save this setup to non-volatile memory in the ADCP
CK
```

OS150_BB_NBT_01.txt

```
;----------------------------------------------------------\
; ADCP Command File for use with VmDas software.
;
; ADCP type:     150 Khz Ocean Surveyor
; Setup name:    default
; Setup type:    high precision, lower range
; profile(broadband)
;
; NOTE:  Any line beginning with a semicolon in the first
;        column is treated as a comment and is ignored by
;        the VmDas software.
;
; NOTE:  This file is best viewed with a fixed-point font
;----------------------------------------------------------/

; Restore factory default settings in the ADCP
cr1

; set the data collection baud rate to 9600 bps,
; no parity, one stop bit, 8 data bits
; NOTE:  VmDas sends baud rate change command after all
; other commands in this file, so that it is not made
; permanent by a CK command.
cb411

; Set for broadband single-ping profile mode (WP),
; 37 (WN) 8 meter bins (WS),
; 4 meter blanking distance (WF)
WP1
WS0800
WN37
NP0
WF0400

; Disable bottom track (BP),
; Set maximum bottom search depth to 1200 meters (BX)
BP000
BX12000

; output velocity, correlation, echo intensity, percent
; good and status
WD111110000

; Ping as fast as possible
TP000000

; Three seconds between ensembles
; Since VmDas uses manual pinging, TE is ignored by the
; ADCP. You must set the time between ensemble in the
; VmDas Communication options
;TE00000300

; Set to calculate speed-of-sound, no depth sensor,
; external synchro heading sensor, no pitch or roll being
; used, no salinity sensor, use internal transducer temp
EZ1000001

; Output beam data (rotations are done in software)
EX00000

; Set transducer misalignment (hundredths of degrees)
EA04688

; Set transducer depth (decimeters)
ED0105

; Set Salinity (ppt)
ES35

; synchro
cx1,0

; save this setup to non-volatile memory in the ADCP
CK
```

OS75_NB_BT_01.txt (only BP and BX change compared to NBT)

```
;-------------------------------------------------------\
; ADCP Command File for use with VmDas software.
;
; ADCP type:     75 Khz Ocean Surveyor
; Setup name:    default
; Setup type:    Low resolution, long range
; profile(narrowband)
;
; NOTE:  Any line beginning with a semicolon in the first
;        column is treated as a comment and is ignored by
;        the VmDas software.
;-------------------------------------------------------\

; Restore factory default settings in the ADCP
cr1

; set the data collection baud rate to 38400 bps,
; no parity, one stop bit, 8 data bits
; NOTE:  VmDas sends baud rate change command after all
; other commands in this file, so that it is not made
; permanent by a CK command.
cb611

; Set for narrowband single-ping profile mode (WP),
; forty-five (NN) 16 meter bins (NS),
; 8 meter blanking distance (NF)
WP0
NN045
NP00001
NS1600
NF0800

; Enable bottom track (BP),
; Set maximum bottom search depth to 1000 meters (BX)
BP001
BX10000

; output velocity, correlation, echo intensity, percent
; good and status
ND111110000

; Ping as fast as possible
TP000000

; Three seconds between ensembles
; Since VmDas uses manual pinging, TE is ignored by the
; ADCP. You must set the time between ensemble in the
; VmDas Communication options
;TE00000300

; Set to calculate speed-of-sound, no depth sensor,
; external synchro heading sensor, no pitch or roll being
; used, no salinity sensor, use internal transducer temp
EZ1000001

; Output beam data (rotations are done in software)
EX00000

; Set transducer misalignment (hundredths of degrees)
EA04513

; Set transducer depth (decimeters)
ED0105

; Set Salinity (ppt)
ES35

;  synchro
;   cx0,1   no synchro IN  ,  synchro out ON
;   cx1,1   synchro IN  ,  synchro out   ON
cx0,1

; save this setup to non-volatile memory in the ADCP
CK
```

OS150_BB_BT_01.txt (only BP and BX change compared to NBT)

```
;-------------------------------------------------------\
; ADCP Command File for use with VmDas software.
;
; ADCP type:     150 Khz Ocean Surveyor
; Setup name:    default
; Setup type:    high precision, lower range
; profile(broadband)
;
; NOTE:  Any line beginning with a semicolon in the first
;        column is treated as a comment and is ignored by
;        the VmDas software.
;
; NOTE:  This file is best viewed with a fixed-point font
;-------------------------------------------------------/

; Restore factory default settings in the ADCP
cr1

; set the data collection baud rate to 9600 bps,
; no parity, one stop bit, 8 data bits
; NOTE:  VmDas sends baud rate change command after all
; other commands in this file, so that it is not made
; permanent by a CK command.
cb411

; Set for broadband single-ping profile mode (WP),
; 37 (WN) 8 meter bins (WS),
; 4 meter blanking distance (WF)
WP1
WS0800
WN37
NP0
WF0400

; Enable bottom track (BP),
; Set maximum bottom search depth to 700 meters (BX)
BP001
BX07000

; output velocity, correlation, echo intensity, percent
; good and status
WD111110000

; Ping as fast as possible
TP000000

; Three seconds between ensembles
; Since VmDas uses manual pinging, TE is ignored by the
; ADCP. You must set the time between ensemble in the
; VmDas Communication options
;TE00000300

; Set to calculate speed-of-sound, no depth sensor,
; external synchro heading sensor, no pitch or roll being
; used, no salinity sensor, use internal transducer temp
EZ1000001

; Output beam data (rotations are done in software)
EX00000

; Set transducer misalignment (hundredths of degrees)
EA04688

; Set transducer depth (decimeters)
ED0105

; Set Salinity (ppt)
ES35

; synchro
cx1,0

; save this setup to non-volatile memory in the ADCP
CK
```

catarina_OS75_01_NBT.ini

[Version Info]
VmDasVersion=Version 1.44
Option Table Version=1
[Expert only options]
SaveOnlyChangedOptions=TRUE
TurnedOffBeam=0
PashrImuFlagUseNormalInterpretation=TRUE
[ADCP Port Setup]
AdcpComPortName=COM3
AdcpComBaudRate=38400
AdcpComParity=NOPARITY
AdcpComStopBits=1
AdcpComDataBits=8
AdcpConfigFilename=C:\DATA\CATARINA\cfg_files\OS75_NB_NBT.txt
TimeoutNoRespCmd=1000
TimeoutHaveCharCmd=100
TimeoutNoRespSlowCmd=10000
TimeoutHaveCharSlowCmd=10000
TimeoutNoRespBreak=3000
TimeoutHaveCharBreak=2000
TimeoutNoEns=0
[NMEA Port Setup]
NMEANavComEnable=TRUE
NmeaNavComPortName=COM1
NmeaNavComBaudRate=9600
NmeaNavComParity=NOPARITY
NmeaNavComStopBits=1
NmeaNavComDataBits=8
NMEARPHComEnable=FALSE
NmeaRPHComPortName=COM4
NmeaRPHComBaudRate=9600
NmeaRPHComParity=NOPARITY
NmeaRPHComStopBits=1
NmeaRPHComDataBits=8
NMEA3ComEnable=FALSE
Nmea3ComPortName=None
Nmea3ComBaudRate=4800
Nmea3ComParity=NOPARITY
Nmea3ComStopBits=1
Nmea3ComDataBits=8
[NMEA Comm window]
NoDataTimeout(ms)=10000
AutoOpen=TRUE
NumNmeaDisplayedOnErrRecovery=10
[Serial Port for Binary Ensemble Data Output]
BinaryEnsembleOutputComEnable=FALSE
BinaryEnsembleOutputComPortName=None
BinaryEnsembleOutputComBaudRate=9600
BinaryEnsembleOutputComParity=NOPARITY
BinaryEnsembleOutputComStopBits=1
BinaryEnsembleOutputComDataBits=8
BinaryEnsembleOutputDataType(0:none;1:enr;2:enx;3:sta;4:lta)=0
BinaryEnsembleOutputRefVelType(0:none;1:Bottom;2:Mean)=0
BinaryEnsembleOutputStartBin=1
BinaryEnsembleOutputEndBin=4
BinaryEnsembleOutputMeanStartBin=1
BinaryEnsembleOutputMeanEndBin=4
BinaryEnsembleOutputLeader(0:no;1:yes)=TRUE
BinaryEnsembleOutputBottomTrack(0:no;1:yes)=TRUE
BinaryEnsembleOutputNavigation(0:no;1:yes)=TRUE
BinaryEnsembleOutputVelocity(0:no;1:yes)=TRUE
BinaryEnsembleOutputIntensity(0:no;1:yes)=TRUE
BinaryEnsembleOutputCorrelation(0:no;1:yes)=TRUE
BinaryEnsembleOutputPercentGood(0:no;1:yes)=TRUE
BinaryEnsembleOutputStatus(0:no;1:yes)=TRUE
[Serial Port for ASCII Ensemble Data Output]
AsciiEnsembleOutputComEnable=FALSE
AsciiEnsembleOutputComPortName=None
AsciiEnsembleOutputComBaudRate=9600
AsciiEnsembleOutputComParity=NOPARITY
AsciiEnsembleOutputComStopBits=1
AsciiEnsembleOutputComDataBits=8
AsciiEnsembleOutputDataType(0:none;1:enr;2:enx;3:sta;4:lta)=0
AsciiEnsembleOutputRefVelType(0:none;1:Bottom;2:Mean)=0
AsciiEnsembleOutputStartBin=1
AsciiEnsembleOutputEndBin=4
AsciiEnsembleOutputStoreToDisk(0:no;1:yes)=FALSE
AsciiEnsembleOutMeanStartBin=1
AsciiEnsembleOutputMeanEndBin=4
AsciiEnsembleOutputLeader(0:no;1:yes)=TRUE
AsciiEnsembleOutputBottomTrack(0:no;1:yes)=TRUE
AsciiEnsembleOutputNavigation(0:no;1:yes)=TRUE
AsciiEnsembleOutputVelocity(0:no;1:yes)=TRUE
AsciiEnsembleOutputIntensity(0:no;1:yes)=TRUE
AsciiEnsembleOutputCorrelation(0:no,1:yes)=TRUE
AsciiEnsembleOutputPercentGood(0:no;1:yes)=TRUE
AsciiEnsembleOutputStatus(0:no;1:yes)=TRUE
[Serial Port for Speed Log Output]
SpeedLogComEnable=FALSE
Speed Log ComPortName=None
Speed Log ComBaudRate=9600
Speed Log ComParity=NOPARITY
Speed Log ComStopBits=1
Speed Log ComDataBits=8
SpeedLogDataSource=STA
SpeedLogWLSource=WP
SpeedLogWLStartBin=3
SpeedLogWLEndBin=5
[IP Port for Binary Ensemble Data Output]
BinaryEnsembleOutputNetEnable=FALSE
BinaryEnsembleOutputIPPortNumber=5433
[IP Port for ASCII Ensemble Data Output]
AsciiEnsembleOutputNetEnable=FALSE
AsciiEnsembleOutputIPPortNumber=5433
[IP Port for Speed Log Output]
SpeedLogNetEnable=TRUE
SpeedLogHostName/IPAddress=5434
[Fake Data Options]
AdcpSimInAirEnable=FALSE
AdcpFakeDataEnable=FALSE
AdcpFakeDataFilename=C:\Archivos de programa\RD Instruments\VmDas\SAMPLE002_000000.ENR
FakeDataTimeBetweenEnsembles=2
NMEAFakeDataEnable=FALSE
NMEAFakeDataFilename=SimNav.nmr
[File Name Components]
EnableDualRecordDir=FALSE
FileRecordPath=C:\DATA\catarina\
FileRecordBackupPath=D:\
DeploymentName=catarina_OS75
DeploymentNumber=6
MaximumFileSize=10
[Bottom Track Data Screening Options]
BTAmpScreenEnable=FALSE
BTCorScreenEnable=FALSE
BTErrScreenEnable=FALSE
BTVertScreenEnable=FALSE
BTFishScreenEnable=FALSE
BTPctGoodScreenEnable=FALSE
BTAmplitudeThreshold=30
BTCorrelationThreshold=220

BTErrorVelThreshold=1000
BTVerticalVelThreshold=1000
BTFishThreshold=50
BTPctGoodThreshold=50
[Water Track Data Screening Options]
WTAmpScreenEnable=FALSE
WTCorScreenEnable=FALSE
WTErrScreenEnable=FALSE
WTVertScreenEnable=FALSE
WTFishScreenEnable=FALSE
WTPctGoodScreenEnable=FALSE
WTAmplitudeThreshold=30
WTCorrelationThreshold=180
WTErrorVelThreshold=1000
WTVerticalVelThreshold=1000
WTFishThreshold=50
WTPctGoodThreshold=50
[Profile Data Screening Options]
PRAmpScreenEnable=FALSE
PRCorScreenEnable=FALSE
PRErrScreenEnable=FALSE
PRVertScreenEnable=FALSE
PRFishScreenEnable=FALSE
PRPctGoodScreenEnable=FALSE
PRMarkBadBelowBottom=FALSE
PRAmplitudeThreshold=30
PRCorrelationThreshold=180
PRErrorVelThreshold=1000
PRVerticalVelThreshold=1000
PRFishThreshold=50
PRPctGoodThreshold=50
[2nd Band Profile Data Screening Options]
PRAmpScreenEnable=FALSE
PRCorScreenEnable=FALSE
PRErrScreenEnable=FALSE
PRVertScreenEnable=FALSE
PRFishScreenEnable=FALSE
PRPctGoodScreenEnable=FALSE
PRAmplitudeThreshold=30
PRCorrelationThreshold=180
PRErrorVelThreshold=1000
PRVerticalVelThreshold=1000
PRFishThreshold=50
PRPctGoodThreshold=50
[Transformation Options]
XformToEarth=TRUE
Allow3Beam=TRUE
BinMap=TRUE
BeamAngleSrc(0:auto,1:man)=0
ManualBeamAngle=30
HeadingSource(0:adcp,1:navHDT,2:navHDG,3:navPRDID,4:manual)=5
NMEAPortForHeadingSource=1
ManualHeading=0
TiltSource(0:adcp,1:nav,2:man)=3
NMEAPortForTiltSource=1
ManualPitch=0
ManualRoll=0
SensorConfigSrc(0:PRfixed,1:Pfixed,2:auto)=2
ConcavitySource(0:convex,1:concave,2:auto)=2
UpDownSource(0:dn,1:up,2:auto)=2
EnableHeadingCorrections=FALSE
SinCorrectionAmplitudeCoefficient=0
SinCorrectionPhaseCoefficient=0
MagneticOffsetEV=0
BackupMagneticOffsetEV=0
AlignmentOffsetEA=45.13
EnableVelocityScaling=FALSE
VelocityScaleFactorForBTVelocities(unitless)=1
VelocityScaleFactorForProfileAndWTVelocities(unitless)=1
EnableTiltAlignmentErrorCorrection=TRUE
TiltAlignmentHeadingCorr(deg)=0
EAOptionSource=TRUE
TiltAlignmentPitchCorr(deg)=0
TiltAlignmentRollCorr(deg)=0
[2nd Band Transformation Options]
EnableVelocityScaling=FALSE
VelocityScaleFactorForProfileVelocities(unitless)=1
[Backup HPR NMEA Source Options]
EnableBackupHeadingSource=FALSE
BackupHeadingSource(0:adcp,1:navHDT,2:navHDG,3:navPRDID,4:manual,5:PASHR,6:PASHR,ATT,7:PASHR,AT2)=5
NMEAPortForBackupHeadingSource=-1
BackupManualHeading=0
EnableBackupTiltSource=FALSE
BackupTiltSource(0:adcp,1:nav,2:man,3:PASHR,4:PASHR,ATT,5:PASHR,AT2)=0
NMEAPortForBackupTiltSource=-1
BackupManualPitch=0
BackupManualRoll=0
[Ship Pos Vel NMEA Source Options]
EnableGGASource=TRUE
NmeaPortForGGASource=1
EnableGGABackupSource=FALSE
NmeaPortForGGABackupSource=-1
EnableVTGSource=TRUE
NmeaPortForVTGSource=1
EnableTVGBackupSource=FALSE
NmeaPortForVTGBackupSource=-1
[Averaging Options]
AvgMethod(0:time,1:dist)=0
FirstAvgTime=120
SecondAvgTime=300
FirstAvgDistance=10
SecondAvgDistance=1000
EnableRefLayerAvg=FALSE
RefLayerStartBin=3
RefLayerEndBin=10
[Reference Velocity Options]
RefVelSelect(0:none,1:BT,2:WT,3:LYR,4:NDP,5:NAP,6:NSPD)=3
VelRefLayerStartBin=4
VelRefLayerEndBin=5
RefVelUnitVel(0:mm/s,1:m/s,2:knots,3:ft/s)=1
RefVelUnitDepth(0:m,1:cm,2:ft)=0
[User Exit Options]
UserWinAdcpEnable=FALSE
UserWinAdcpPath=C:\Program Files\RD Instruments\WinAdcp\WinAdcp.exe
UserWinAdcpUpdateInterval(sec)=10
UserWinAdcpFileType(0:enr,1:enx,2:sta,3:lta)=3
UserAdcpScreening=FALSE
UserNavScreening=FALSE
UserTransform=FALSE
[Shiptrack Options]
ShipTrack1Source(0:Nav;1:BT;2:WT;3:Layer)=0
ShipTrack2Source(0:Nav;1:BT;2:WT;3:Layer)=0
ShipTrack1RedStickEnable=FALSE
ShipTrack1GreenStickEnable=FALSE
ShipTrack1BlueStickEnable=FALSE
ShipTrack2RedStickEnable=FALSE
ShipTrack2GreenStickEnable=FALSE
ShipTrack2BlueStickEnable=FALSE
ShipTrack1RedBin=1
ShipTrack1GreenBin=2
ShipTrack1BlueBin=3
ShipTrack2RedBin=1
ShipTrack2GreenBin=2

ShipTrack2BlueBin=3
ShipTrack1DisplaySelect(0:Lat/Lon;1:Distance)=1
ShipTrack2DisplaySelect(0:Lat/Lon;1:Distance)=0
ShipTrack1WaterLayerStartBin=3
ShipTrack1WaterLayerEndBin=5
ShipTrack2WaterLayerStartBin=3
ShipTrack2WaterLayerEndBin=5
ShipTrackDistanceUnit=0
[Narrow Band Shiptrack Options]
RadioBtnSelForShipPosition1DataType=1
RadioBtnSelForShipPosition2DataType=1
ShipTrack1RedStickEnable=TRUE
ShipTrack1GreenStickEnable=TRUE
ShipTrack1BlueStickEnable=FALSE
ShipTrack2RedStickEnable=TRUE
ShipTrack2GreenStickEnable=TRUE
ShipTrack2BlueStickEnable=FALSE
ShipTrack1RedBin=2
ShipTrack1GreenBin=10
ShipTrack1BlueBin=10
ShipTrack2RedBin=2
ShipTrack2GreenBin=10
ShipTrack2BlueBin=10
[ADCP Setup Options]
SetProfileParameters=TRUE
NumberOfBins=100
BinSize(meters)=4
BlankDistance(meters)=8
TransducerDepth(meters)=0
SetBTEnable(0:SendBPCmd,1:Don'tSendBPCmd)=TRUE
ADCPSetupMethod(0:Options,1:CommandFile)=1
BtmTrkEnable(0:SendBP0,1:SendBP1)=1
MaxRange(meters)=200
SetHdgSensorType=FALSE
HdgSensorType(0:internal,1:external)=-1
SetTiltSensorType=FALSE
TiltSensorType(0:internal,1:external)=-1
SetProcessingMode=TRUE
BandwidthType(0:Wide,1:Narrow)=0
ADCPTimeBetweenEnsemblesSel=0
ADCPTimeBetweenEnsembles=0

catarina_OS150_NBT_01_with_atitude.ini

[Version Info]
VmDasVersion=Version 1.44
Option Table Version=1
[Expert only options]
SaveOnlyChangedOptions=TRUE
TurnedOffBeam=0
PashrImuFlagUseNormalInterpretation=TRUE
[ADCP Port Setup]
AdcpComPortName=COM4
AdcpComBaudRate=9600
AdcpComParity=NOPARITY
AdcpComStopBits=1
AdcpComDataBits=8
AdcpConfigFilename=C:\DATA\CATARINA\cfg_files\OS150_BB_NBT_01.txt
TimeoutNoRespCmd=1000
TimeoutHaveCharCmd=100
TimeoutNoRespSlowCmd=10000
TimeoutHaveCharSlowCmd=10000
TimeoutNoRespBreak=3000
TimeoutHaveCharBreak=2000
TimeoutNoEns=0
[NMEA Port Setup]
NMEANavComEnable=TRUE
NmeaNavComPortName=COM1
NmeaNavComBaudRate=4800
NmeaNavComParity=NOPARITY
NmeaNavComStopBits=1
NmeaNavComDataBits=8
NMEARPHComEnable=TRUE
NmeaRPHComPortName=COM3
NmeaRPHComBaudRate=9600
NmeaRPHComParity=NOPARITY
NmeaRPHComStopBits=1
NmeaRPHComDataBits=8
NMEA3ComEnable=FALSE
Nmea3ComPortName=None
Nmea3ComBaudRate=4800
Nmea3ComParity=NOPARITY
Nmea3ComStopBits=1
Nmea3ComDataBits=8
[NMEA Comm window]
NoDataTimeout(ms)=10000
AutoOpen=TRUE
NumNmeaDisplayedOnErrRecovery=10
[Serial Port for Binary Ensemble Data Output]
BinaryEnsembleOutputComEnable=FALSE
BinaryEnsembleOutputComPortName=None
BinaryEnsembleOutputComBaudRate=9600
BinaryEnsembleOutputComParity=NOPARITY
BinaryEnsembleOutputComStopBits=1
BinaryEnsembleOutputComDataBits=8
BinaryEnsembleOutputDataType(0:none;1:enr;2:enx;3:sta;4:lta)=0
BinaryEnsembleOutputRefVelType(0:none;1:Bottom;2:Mean)=0
BinaryEnsembleOutputStartBin=1
BinaryEnsembleOutputEndBin=4
BinaryEnsembleOutputMeanStartBin=1
BinaryEnsembleOutputMeanEndBin=4
BinaryEnsembleOutputLeader(0:no;1:yes)=TRUE
BinaryEnsembleOutputBottomTrack(0:no;1:yes)=TRUE
BinaryEnsembleOutputNavigation(0:no;1:yes)=TRUE
BinaryEnsembleOutputVelocity(0:no;1:yes)=TRUE
BinaryEnsembleOutputIntensity(0:no;1:yes)=TRUE
BinaryEnsembleOutputCorrelation(0:no;1:yes)=TRUE
BinaryEnsembleOutputPercentGood(0:no;1:yes)=TRUE
BinaryEnsembleOutputStatus(0:no;1:yes)=TRUE
[Serial Port for ASCII Ensemble Data Output]
AsciiEnsembleOutputComEnable=FALSE
AsciiEnsembleOutputComPortName=None
AsciiEnsembleOutputComBaudRate=9600
AsciiEnsembleOutputComParity=NOPARITY
AsciiEnsembleOutputComStopBits=1
AsciiEnsembleOutputComDataBits=8
AsciiEnsembleOutputDataType(0:none;1:enr;2:enx;3:sta;4:lta)=0

AsciiEnsembleOutputRefVelType(0:none;1:Bottom;2:Mean)=0
AsciiEnsembleOutputStartBin=1
AsciiEnsembleOutputEndBin=4
AsciiEnsembleOutputStoreToDisk(0:no;1:yes)=FALSE
AsciiEnsembleOutMeanStartBin=1
AsciiEnsembleOutputMeanEndBin=4
AsciiEnsembleOutputLeader(0:no;1:yes)=TRUE
AsciiEnsembleOutputBottomTrack(0:no;1:yes)=TRUE
AsciiEnsembleOutputNavigation(0:no;1:yes)=TRUE
AsciiEnsembleOutputVelocity(0:no;1:yes)=TRUE
AsciiEnsembleOutputIntensity(0:no;1:yes)=TRUE
AsciiEnsembleOutputCorrelation(0:no,1:yes)=TRUE
AsciiEnsembleOutputPercentGood(0:no;1:yes)=TRUE
AsciiEnsembleOutputStatus(0:no;1:yes)=TRUE
[Serial Port for Speed Log Output]
SpeedLogComEnable=FALSE
Speed Log ComPortName=None
Speed Log ComBaudRate=9600
Speed Log ComParity=NOPARITY
Speed Log ComStopBits=1
Speed Log ComDataBits=8
SpeedLogDataSource=STA
SpeedLogWLSource=WP
SpeedLogWLStartBin=3
SpeedLogWLEndBin=5
[IP Port for Binary Ensemble Data Output]
BinaryEnsembleOutputNetEnable=FALSE
BinaryEnsembleOutputIPPortNumber=5433
[IP Port for ASCII Ensemble Data Output]
AsciiEnsembleOutputNetEnable=FALSE
AsciiEnsembleOutputIPPortNumber=5433
[IP Port for Speed Log Output]
SpeedLogNetEnable=FALSE
SpeedLogHostName/IPAddress=5434
[Fake Data Options]
AdcpSimInAirEnable=FALSE
AdcpFakeDataEnable=FALSE
AdcpFakeDataFilename=SimAdcp.enr
FakeDataTimeBetweenEnsembles=2
NMEAFakeDataEnable=FALSE
NMEAFakeDataFilename=SimNav.nmr
[File Name Components]
EnableDualRecordDir=FALSE
FileRecordPath=C:\DATA\CATARINA\
FileRecordBackupPath=D:\
DeploymentName=catarina_os150
DeploymentNumber=30
MaximumFileSize=10
[Bottom Track Data Screening Options]
BTAmpScreenEnable=FALSE
BTCorScreenEnable=FALSE
BTErrScreenEnable=FALSE
BTVertScreenEnable=FALSE
BTFishScreenEnable=FALSE
BTPctGoodScreenEnable=FALSE
BTAmplitudeThreshold=30
BTCorrelationThreshold=220
BTErrorVelThreshold=1000
BTVerticalVelThreshold=1000
BTFishThreshold=50
BTPctGoodThreshold=50
[Water Track Data Screening Options]
WTAmpScreenEnable=FALSE
WTCorScreenEnable=FALSE
WTErrScreenEnable=FALSE
WTVertScreenEnable=FALSE
WTFishScreenEnable=FALSE
WTPctGoodScreenEnable=FALSE
WTAmplitudeThreshold=30
WTCorrelationThreshold=180
WTErrorVelThreshold=1000
WTVerticalVelThreshold=1000
WTFishThreshold=50
WTPctGoodThreshold=50
[Profile Data Screening Options]
PRAmpScreenEnable=FALSE
PRCorScreenEnable=FALSE
PRErrScreenEnable=FALSE
PRVertScreenEnable=FALSE
PRFishScreenEnable=FALSE
PRPctGoodScreenEnable=FALSE
PRMarkBadBelowBottom=FALSE
PRAmplitudeThreshold=30
PRCorrelationThreshold=180
PRErrorVelThreshold=1000
PRVerticalVelThreshold=1000
PRFishThreshold=50
PRPctGoodThreshold=50
[2nd Band Profile Data Screening Options]
PRAmpScreenEnable=FALSE
PRCorScreenEnable=FALSE
PRErrScreenEnable=FALSE
PRVertScreenEnable=FALSE
PRFishScreenEnable=FALSE
PRPctGoodScreenEnable=FALSE
PRAmplitudeThreshold=30
PRCorrelationThreshold=180
PRErrorVelThreshold=1000
PRVerticalVelThreshold=1000
PRFishThreshold=50
PRPctGoodThreshold=50
[Transformation Options]
XformToEarth=TRUE
Allow3Beam=TRUE
BinMap=TRUE
BeamAngleSrc(0:auto,1:man)=0
ManualBeamAngle=30
HeadingSource(0:adcp,1:navHDT,2:navHDG,3:navPRDID,4:manual)=5
NMEAPortForHeadingSource=2
ManualHeading=0
TiltSource(0:adcp,1:nav,2:man)=3
NMEAPortForTiltSource=2
ManualPitch=0
ManualRoll=0
SensorConfigSrc(0:PRfixed,1:Pfixed,2:auto)=2
ConcavitySource(0:convex,1:concave,2:auto)=2
UpDownSource(0:dn,1:up,2:auto)=2
EnableHeadingCorrections=FALSE
SinCorrectionAmplitudeCoefficient=0
SinCorrectionPhaseCoefficient=0
MagneticOffsetEV=0

BackupMagneticOffsetEV=0
AlignmentOffsetEA=46.88
EnableVelocityScaling=FALSE
VelocityScaleFactorForBTVelocities(unitless)=1
VelocityScaleFactorForProfileAndWTVelocities(unitless)=1
EnableTiltAlignmentErrorCorrection=TRUE
TiltAlignmentHeadingCorr(deg)=0
EAOptionSource=TRUE
TiltAlignmentPitchCorr(deg)=0
TiltAlignmentRollCorr(deg)=0
[2nd Band Transformation Options]
EnableVelocityScaling=FALSE
VelocityScaleFactorForProfileVelocities(unitless)=1
[Backup HPR NMEA Source Options]
EnableBackupHeadingSource=TRUE
BackupHeadingSource(0:adcp,1:navHDT,2:navHDG,3:navPRDID,4:manual,5:PASHR,6:PASHR,ATT,7:PASHR,AT2)=1
NMEAPortForBackupHeadingSource=1
BackupManualHeading=0
EnableBackupTiltSource=FALSE
BackupTiltSource(0:adcp,1:nav,2:man,3:PASHR,4:PASHR,ATT,5:PASHR,AT2)=0
NMEAPortForBackupTiltSource=-1
BackupManualPitch=0
BackupManualRoll=0
[Ship Pos Vel NMEA Source Options]
EnableGGASource=TRUE
NmeaPortForGGASource=1
EnableGGABackupSource=TRUE
NmeaPortForGGABackupSource=2
EnableVTGSource=TRUE
NmeaPortForVTGSource=2
EnableTVGBackupSource=TRUE
NmeaPortForVTGBackupSource=1
[Averaging Options]
AvgMethod(0:time,1:dist)=0
FirstAvgTime=120
SecondAvgTime=300
FirstAvgDistance=10
SecondAvgDistance=1000
EnableRefLayerAvg=TRUE
RefLayerStartBin=3
RefLayerEndBin=10
[Reference Velocity Options]
RefVelSelect(0:none,1:BT,2:WT,3:LYR,4:NDP,5:NAP,6:NSPD)=3
VelRefLayerStartBin=3
VelRefLayerEndBin=5
RefVelUnitVel(0:mm/s,1:m/s,2:knots,3:ft/s)=1
RefVelUnitDepth(0:m,1:cm,2:ft)=0
[User Exit Options]
UserWinAdcpEnable=FALSE
UserWinAdcpPath=C:\Program Files\RD Instruments\WinAdcp\WinAdcp.exe
UserWinAdcpUpdateInterval(sec)=10
UserWinAdcpFileType(0:enr,1:enx,2:sta,3:lta)=3
UserAdcpScreening=FALSE
UserNavScreening=FALSE
UserTransform=FALSE
[Shiptrack Options]
ShipTrack1Source(0:Nav;1:BT;2:WT;3:Layer)=0
ShipTrack2Source(0:Nav;1:BT;2:WT;3:Layer)=3
ShipTrack1RedStickEnable=TRUE
ShipTrack1GreenStickEnable=FALSE
ShipTrack1BlueStickEnable=TRUE
ShipTrack2RedStickEnable=TRUE
ShipTrack2GreenStickEnable=FALSE
ShipTrack2BlueStickEnable=TRUE
ShipTrack1RedBin=2
ShipTrack1GreenBin=2
ShipTrack1BlueBin=10
ShipTrack2RedBin=2
ShipTrack2GreenBin=2
ShipTrack2BlueBin=10
ShipTrack1DisplaySelect(0:Lat/Lon;1:Distance)=0
ShipTrack2DisplaySelect(0:Lat/Lon;1:Distance)=0
ShipTrack1WaterLayerStartBin=3
ShipTrack1WaterLayerEndBin=5
ShipTrack2WaterLayerStartBin=3
ShipTrack2WaterLayerEndBin=5
ShipTrackDistanceUnit=0
[Narrow Band Shiptrack Options]
RadioBtnSelForShipPosition1DataType=0
RadioBtnSelForShipPosition2DataType=0
ShipTrack1RedStickEnable=FALSE
ShipTrack1GreenStickEnable=FALSE
ShipTrack1BlueStickEnable=FALSE
ShipTrack2RedStickEnable=FALSE
ShipTrack2GreenStickEnable=FALSE
ShipTrack2BlueStickEnable=FALSE
ShipTrack1RedBin=1
ShipTrack1GreenBin=2
ShipTrack1BlueBin=3
ShipTrack2RedBin=1
ShipTrack2GreenBin=2
ShipTrack2BlueBin=3
[ADCP Setup Options]
SetProfileParameters=FALSE
NumberOfBins=100
BinSize(meters)=8
BlankDistance(meters)=8
TransducerDepth(meters)=0
SetBTEnable(0:SendBPCmd,1:Don'tSendBPCmd)=FALSE
ADCPSetupMethod(0:Options,1:CommandFile)=1
BtmTrkEnable(0:SendBP0,1:SendBP1)=1
MaxRange(meters)=2000
SetHdgSensorType=FALSE
HdgSensorType(0:internal,1:external)=-1
SetTiltSensorType=FALSE
TiltSensorType(0:internal,1:external)=-1
SetProcessingMode=FALSE
BandwidthType(0:Wide,1:Narrow)=-1
ADCPTimeBetweenEnsemblesSel=0
ADCPTimeBetweenEnsembles=0

ANNEX II

Samples collected (√) by variable in each station and depth.

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
0	1	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	2	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	3	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	4	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	5	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	6	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	7	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	8	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	9	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	10	1134	1146	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
0	11	1134	1146	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
0	12	1134	1146	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
0	13	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	14	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	15	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	16	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	17	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	18	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	19	1134	1146	x	√	x	√	√	x	x	√	√	√	√	x	x	x	x
0	20	1134	1146	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
0	21	1134	1146	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
0	22	1134	1146	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
0	23	1134	1146	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
0	24	1134	1146	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
1	1	143	145	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
1	2	143	145	x	√	x	√	x	x	x	x	x	x	x	√	x	x	x
1	3	143	145	x	√	√	√	x	x	x	x	x	x	x	x	x	x	x
1	4	143	145	x	√	x	√	x	x	x	x	x	x	x	x	x	x	x
1	5	143	145	x	√	x	√	x	x	x	x	x	x	x	x	x	x	x
1	6	143	145	x	√	x	√	x	x	x	x	x	x	x	x	x	x	x
1	7	99	100	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
1	8	99	100	x	√	x	√	x	x	x	x	x	x	x	√	x	x	x
1	9	99	100	x	√	√	√	x	x	x	x	x	x	x	x	x	x	x
1	10	99	100	x	√	x	√	x	x	x	x	x	x	x	x	x	x	x
1	11	99	100	x	√	x	√	x	x	x	x	x	x	x	x	x	x	x
1	12	99	99	x	√	x	√	x	x	x	x	x	x	x	x	x	x	x
1	13	44	44	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
1	14	44	44	x	√	x	√	x	x	x	x	x	x	x	√	x	x	x
1	15	44	44	x	√	√	√	x	x	x	x	x	x	x	x	x	x	x
1	16	44	44	x	√	x	√	x	x	x	x	x	x	x	x	x	x	x
1	17	44	44	x	√	x	√	x	x	x	x	x	x	x	x	x	x	x
1	18	44	44	x	√	x	√	x	x	x	x	x	x	x	x	x	x	x
1	19	4	4	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
1	20	4	4	x	√	x	√	x	x	x	x	x	x	x	√	x	x	x
1	21	4	4	x	√	x	√	x	x	x	x	x	x	x	x	x	x	x
1	22	4	4	x	√	x	√	x	x	x	x	x	x	x	x	x	x	x
1	23	4	4	x	√	x	√	x	x	x	x	x	x	x	x	x	x	x
1	24	4	4	x	√	x	√	x	x	x	x	x	x	x	x	x	x	x
2	1	369	372	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
2	2	369	372	x	√	√	x	x	x	x	x	x	x	x	√	x	x	x
2	3	369	372	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
2	4	293	296	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
2	5	293	296	x	√	√	x	x	x	x	x	x	x	x	x	x	x	x
2	6	293	296	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
2	7	199	200	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
2	8	199	200	√	√	x	x	x	x	x	x	x	x	x	x	x	x	x
2	9	199	200	x	√	√	x	x	x	x	x	x	x	x	x	x	x	x
2	10	149	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
2	11	149	150	x	√	√	x	x	x	x	x	x	x	x	x	x	x	x
2	12	149	150	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
2	13	100	101	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
2	14	100	101	x	√	√	x	x	x	x	x	x	x	x	x	x	x	x
2	15	100	101	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
2	16	60	60	x	√	x	√	x	x	x	x	√	√	√	x	x	x	x
2	17	60	60	x	√	√	x	x	x	x	x	x	x	x	x	x	x	x
2	18	60	60	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
2	19	5	5	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
2	20	5	5	x	√	√	x	x	x	x	x	x	x	x	x	x	x	x
2	21	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
2	22	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
2	23	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
2	24	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
3	1	803	811	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
3	2	803	811	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
3	3	694	701	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
3	4	694	701	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
3	5	596	601	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
3	6	596	601	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
3	7	496	500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
3	8	496	501	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
3	9	397	401	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
3	10	397	401	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
3	11	300	303	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
3	12	300	303	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
3	13	200	201	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
3	14	200	201	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
3	15	149	150	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
3	16	149	150	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
3	17	97	98	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
3	18	97	98	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
3	19	57	57	x	√	x	x	√	x	x	x	x	x	x	x	x	x	x
3	20	57	57	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
3	21	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
3	22	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
3	23	5	5	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
3	24	5	5	x	√	x	x	x	√	x	x	x	x	x	x	√	x	x
4	1	1316	1331	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
4	2	1316	1331	x	√	√	x	x	x	x	x	x	x	x	x	x	x	x
4	3	1188	1201	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
4	4	1188	1201	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
4	5	990	1001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
4	6	990	1001	x	√	√	x	x	x	x	x	x	x	x	x	x	x	x
4	7	892	901	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
4	8	792	799	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
4	9	792	799	x	√	√	x	x	x	x	x	x	x	x	x	x	x	x
4	10	694	701	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
4	11	594	600	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
4	12	497	501	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
4	13	496	501	x	√	√	x	x	x	x	x	x	x	x	x	x	x	x
4	14	397	401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
4	15	397	401	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
4	16	299	301	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
4	17	200	202	x	√	√	x	x	x	x	x	√	√	√	x	x	x	x
4	18	200	202	√	√	x	√	x	x	x	x	x	x	x	√	x	x	x
4	19	149	151	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
4	20	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
4	21	60	61	x	√	x	x	x	x	x	x	√	√	√	x	x	x	x
4	22	60	61	x	√	√	√	x	x	x	x	x	x	x	√	x	x	x
4	23	5	5	√	√	x	√	x	x	x	x	x	x	x	√	x	x	x
4	24	5	5	x	√	√	x	x	x	x	x	√	√	√	x	x	x	x
5	1	2437	2471	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
5	2	2437	2471	x	√	x	x	x	x	x	x	√	√	√	x	x	x	x
5	3	2338	2369	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
5	4	2338	2369	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
5	5	2221	2251	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
5	6	1973	1998	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
5	7	1762	1783	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
5	8	1575	1594	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
5	9	1385	1400	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
5	10	1146	1158	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
5	11	1146	1158	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
5	12	988	999	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
5	13	890	899	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
5	14	792	800	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
5	15	692	698	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
5	16	594	600	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
5	17	495	499	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
5	18	398	401	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
5	19	297	300	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
5	20	199	201	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
5	21	150	152	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
5	22	100	101	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
5	23	62	63	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
5	24	6	6	x	√	x	√	x	√	x	√	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
6	1	3404	3458	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
6	2	3251	3302	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
6	3	2956	3000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
6	4	2712	2751	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
6	5	2467	2501	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
6	6	2221	2250	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
6	7	1976	2001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
6	8	1779	1801	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
6	9	1582	1601	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
6	10	1385	1401	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
6	11	1187	1200	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
6	12	990	1001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
6	13	892	901	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
6	14	793	801	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
6	15	694	701	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
6	16	595	601	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
6	17	496	501	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
6	18	397	401	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
6	19	298	301	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
6	20	199	201	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
6	21	150	151	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
6	22	100	101	x	√	√	√	x	x	√	x	√	√	√	√	x	√	x
6	23	65	66	x	√	√	√	x	x	√	x	√	√	√	√	x	√	x
6	24	5	5	√	√	√	√	x	√	√	x	√	√	√	√	√	√	x
7	1	3519	3576	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
7	2	3203	3252	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
7	3	2956	3001	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
7	4	2711	2750	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
7	5	2467	2501	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
7	6	2220	2250	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
7	7	1975	2000	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
7	8	1777	1799	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
7	9	1581	1600	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
7	10	1385	1400	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
7	11	1206	1219	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
7	12	989	999	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
7	13	891	900	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
7	14	790	798	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
7	15	694	700	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
7	16	595	600	x	x	x	√	√	x	√	√	√	√	√	√	x	x	x
7	17	495	500	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
7	18	396	400	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
7	19	296	299	x	√	x	√	x	x	√	√	√	x	√	√	x	x	x
7	20	198	199	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
7	21	148	150	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
7	22	100	101	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
7	23	39	39	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
7	24	5	5	x	√	x	√	√	√	√	√	√	√	√	√	√	x	x
8	1	3882	3948	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	2	3445	3501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	3	3200	3250	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
8	4	2956	3001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	5	2467	2501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	6	2221	2251	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
8	7	1975	2000	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
8	8	1779	1800	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	9	1583	1601	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
8	10	1335	1350	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	11	1188	1201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	12	1089	1101	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
8	13	990	1000	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
8	14	891	901	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	15	793	801	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
8	16	694	701	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
8	17	595	601	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	18	496	501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	19	397	401	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	20	298	301	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
8	21	199	200	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	22	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	23	45	46	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
8	24	5	5	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
9	1	4360	4439	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
9	2	3930	3998	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
9	3	3444	3499	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
9	4	2955	2999	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
9	5	2466	2500	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
9	6	2221	2250	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
9	7	1975	2000	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
9	8	1778	1800	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
9	9	1581	1600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
9	10	1334	1349	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
9	11	1184	1197	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
9	12	1089	1101	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
9	13	990	1000	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
9	14	892	901	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
9	15	793	801	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
9	16	695	701	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
9	17	595	601	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
9	18	496	501	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
9	19	396	400	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
9	20	298	300	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
9	21	198	200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
9	22	98	99	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
9	23	57	57	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
9	24	4	4	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
10	1	4840	4934	√	√	x	x	x	x	x	x	x	x	x	x	x	x	x
10	2	4417	4498	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	3	3934	4002	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	4	2956	3001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	5	2470	2504	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
10	6	1976	2001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	7	1779	1801	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
10	8	1582	1601	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	9	1484	1501	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
10	10	1385	1400	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	11	1188	1201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	12	1089	1101	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
10	13	991	1001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
10	14	891	900	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	15	792	800	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
10	16	695	701	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
10	17	595	600	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	18	496	501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	19	397	400	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	20	298	300	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
10	21	199	201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	22	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	23	58	58	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
10	24	5	5	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
11	1	5085	5187	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
11	2	4418	4499	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
11	3	3932	4000	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
11	4	3445	3501	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
11	5	3199	3249	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
11	6	2955	2999	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
11	7	2467	2501	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
11	8	2221	2250	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
11	9	1975	2000	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
11	10	1779	1801	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
11	11	1582	1601	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
11	12	1384	1399	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
11	13	1190	1203	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
11	14	990	1000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
11	15	890	899	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
11	16	794	802	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
11	17	594	600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
11	18	494	499	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
11	19	398	402	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
11	20	298	300	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
11	21	198	200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
11	22	98	99	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
11	23	53	53	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
11	24	5	5	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x
12	1	5200	5305	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
12	2	4905	5001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
12	3	4420	4501	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
12	4	3933	4001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
12	5	3445	3501	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
12	6	2957	3001	√	√	x	x	x	x	x	x	√	√	√	x	x	x	x
12	7	2467	2501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
12	8	2221	2251	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
12	9	1975	2001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
12	10	1779	1800	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
12	11	1583	1601	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
12	12	1385	1401	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
12	13	1237	1250	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
12	14	991	1001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
12	15	793	801	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
12	16	694	701	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
12	17	595	601	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
12	18	497	501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
12	19	398	401	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
12	20	298	301	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
12	21	198	200	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
12	22	100	101	x	√	√	√	x	x	√	x	√	√	√	√	x	√	x
12	23	45	45	x	√	√	√	x	x	√	x	√	√	√	√	x	√	x
12	24	5	6	√	√	√	√	x	x	√	x	√	√	√	√	x	√	x
13	1	5246	5352	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
13	2	4904	5000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
13	3	4418	4499	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
13	4	3933	4001	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
13	5	3444	3500	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
13	6	2956	3000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
13	7	2466	2500	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
13	8	2221	2250	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
13	9	1976	2001	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
13	10	1776	1798	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
13	11	1581	1600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
13	12	1335	1350	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
13	13	1187	1200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
13	14	990	1000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
13	15	792	800	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
13	16	693	700	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
13	17	595	601	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
13	18	495	500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
13	19	396	400	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
13	20	297	300	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
13	21	198	200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
13	22	98	99	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
13	23	59	60	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
13	24	5	5	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
14	1	5291	5399	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
14	2	4905	5001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	3	4419	4501	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	4	3932	4000	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
14	5	3446	3501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	6	2957	3001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
14	7	2466	2500	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	8	2221	2251	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
14	9	1975	2000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	10	1779	1800	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
14	11	1582	1601	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	12	1385	1400	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
14	13	1187	1200	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
14	14	991	1001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	15	793	801	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	16	694	701	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	17	595	600	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
14	18	495	499	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	19	395	399	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
14	20	297	300	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	21	198	200	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	22	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	23	38	39	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
14	24	5	5	√	√	√	√	x	√	x	x	√	√	√	√	√	x	x
15	1	5324	5433	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
15	2	4906	5002	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
15	3	4417	4499	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
15	4	3932	4000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
15	5	3444	3500	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
15	6	2956	3001	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
15	7	2466	2500	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
15	8	2222	2252	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
15	9	1972	1997	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
15	10	1781	1803	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
15	11	1582	1601	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
15	12	1384	1400	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
15	13	1188	1201	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
15	14	990	1000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
15	15	791	799	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
15	16	693	700	x	x	x	√	√	x	x	√	√	√	√	√	x	x	x
15	17	594	600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
15	18	495	499	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
15	19	397	400	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
15	20	297	300	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
15	21	198	200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
15	22	99	100	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
15	23	60	61	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
15	24	5	5	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x
16	1	5334	5444	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	2	4903	4999	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
16	3	4418	4500	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	4	3932	4000	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
16	5	3445	3501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	6	2956	3001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
16	7	2466	2500	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	8	2221	2250	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
16	9	1976	2001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	10	1778	1800	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
16	11	1582	1600	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	12	1384	1400	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
16	13	1188	1201	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
16	14	1059	1070	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	15	793	801	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	16	693	700	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	17	596	601	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
16	18	496	501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	19	396	400	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
16	20	298	301	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	21	198	200	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	22	98	99	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	23	44	44	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
16	24	6	6	√	√	√	√	x	√	x	x	√	√	√	√	√	x	x
17	1	5330	5440	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
17	2	4904	5000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
17	3	4419	4501	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
17	4	3934	4002	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
17	5	3444	3500	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
17	6	2955	3000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
17	7	2467	2501	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
17	8	2221	2251	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
17	9	1975	2000	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
17	10	1779	1801	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
17	11	1581	1600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
17	12	1385	1401	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
17	13	1188	1201	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
17	14	991	1001	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
17	15	793	801	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
17	16	694	701	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
17	17	595	601	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
17	18	496	500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
17	19	397	401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
17	20	298	301	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
17	21	199	201	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
17	22	99	100	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
17	23	36	36	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
17	24	5	6	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
18	1	5323	5433	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	2	4904	5001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
18	3	4418	4500	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	4	3932	4000	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
18	5	3444	3500	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	6	2956	3001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
18	7	2466	2501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	8	2220	2250	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
18	9	1974	2000	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	10	1779	1801	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
18	11	1582	1601	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	12	1384	1400	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
18	13	1189	1202	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
18	14	987	997	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	15	792	800	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	16	695	702	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	17	593	599	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
18	18	497	501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	19	397	400	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
18	20	298	300	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	21	197	199	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	22	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	23	46	46	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
18	24	5	5	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
19	1	5318	5428	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
19	2	4904	5001	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
19	3	4419	4501	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
19	4	3932	4000	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
19	5	3445	3501	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
19	6	2956	3001	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
19	7	2466	2501	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
19	8	2221	2250	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
19	9	1975	2000	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
19	10	1778	1800	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
19	11	1582	1601	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
19	12	1385	1401	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
19	13	1188	1201	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
19	14	990	1000	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
19	15	793	801	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
19	16	694	701	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
19	17	595	600	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
19	18	496	501	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
19	19	397	401	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
19	20	298	301	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
19	21	199	200	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
19	22	100	101	x	√	x	√	√	x	√	√	√	√	√	√	x	√	x
19	23	46	46	x	√	x	√	x	x	√	√	√	√	√	√	x	√	x
19	24	6	6	x	√	x	√	√	√	√	√	√	√	√	√	√	√	x
20	1	5291	5401	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	2	4903	5000	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
20	3	4418	4500	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	4	3932	4000	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
20	5	3445	3501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	6	2954	2999	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
20	7	2464	2499	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	8	2212	2242	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
20	9	1973	1998	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	10	1777	1799	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
20	11	1582	1601	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	12	1385	1401	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
20	13	1185	1198	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
20	14	987	998	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	15	792	800	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	16	590	596	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	17	494	499	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
20	18	494	499	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	19	398	401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
20	20	297	299	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	21	197	199	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	22	97	98	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	23	43	43	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
20	24	5	5	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
21	1	4970	5069	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
21	2	4902	4999	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
21	3	4420	4502	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
21	4	3932	4000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
21	5	3442	3498	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
21	6	2955	3000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
21	7	2464	2499	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
21	8	2219	2249	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
21	9	1977	2003	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
21	10	1779	1801	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
21	11	1584	1603	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
21	12	1386	1402	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
21	13	1187	1200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
21	14	990	1001	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
21	15	790	798	x	√	x	x	x	x	x	x	x	x	x	√	x	x	x
21	16	694	701	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
21	17	594	600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
21	18	497	502	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
21	19	398	401	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
21	20	297	299	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
21	21	198	200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
21	22	102	103	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
21	23	41	41	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
21	24	11	11	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
22	1	4193	4269	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	2	3932	4001	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
22	3	3445	3501	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	4	2955	3000	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
22	5	2466	2500	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	6	2220	2250	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
22	7	1975	2001	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	8	1779	1801	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	9	1580	1599	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
22	10	1385	1401	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	11	1189	1203	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
22	12	1086	1098	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
22	13	989	1000	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	14	892	901	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
22	15	789	797	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	16	694	701	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	17	595	601	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
22	18	496	501	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	19	396	399	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
22	20	298	301	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	21	197	199	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	22	99	100	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	23	42	42	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
22	24	5	5	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
23	1	5115	5218	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
23	2	4904	5001	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
23	3	4418	4500	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
23	4	3932	4001	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
23	5	3444	3501	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
23	6	2956	3001	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
23	7	2465	2500	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
23	8	2219	2249	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
23	9	1974	2000	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
23	10	1777	1799	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
23	11	1580	1599	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
23	12	1384	1400	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
23	13	1188	1201	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
23	14	988	998	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
23	15	792	800	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
23	16	694	701	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
23	17	593	599	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
23	18	494	499	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
23	19	396	400	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
23	20	299	302	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
23	21	198	200	x	√	x	x	x	x	x	x	x	x	x	√	x	x	x
23	22	99	100	x	√	x	√	√	x	√	√	√	√	√	√	x	√	x
23	23	39	40	x	√	x	√	x	x	√	√	√	√	√	√	x	√	x
23	24	7	7	x	√	x	√	√	√	√	√	√	√	√	√	√	√	x
24	1	4161	4236	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	2	3932	4001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
24	3	3444	3501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	4	2956	3001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
24	5	2465	2500	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	6	2220	2250	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
24	7	1974	2000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	8	1778	1801	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
24	9	1582	1601	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	10	1384	1400	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
24	11	1187	1201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	12	1088	1100	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
24	13	991	1001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	14	892	901	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
24	15	793	801	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	16	693	700	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	17	594	600	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
24	18	496	501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	19	397	401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
24	20	298	301	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	21	199	201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	22	99	100	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	23	45	45	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
24	24	5	5	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
25	1	3992	4062	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
25	2	3444	3500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
25	3	3200	3251	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
25	4	2956	3001	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
25	5	2467	2502	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
25	6	2218	2249	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
25	7	1976	2002	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
25	8	1778	1800	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
25	9	1583	1602	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
25	10	1385	1401	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
25	11	1188	1202	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
25	12	1085	1097	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
25	13	990	1001	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
25	14	926	935	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
25	15	793	801	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
25	16	694	701	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
25	17	595	600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
25	18	494	499	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
25	19	395	399	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
25	20	297	300	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
25	21	197	199	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
25	22	97	98	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
25	23	35	35	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
25	24	6	6	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
26	1	3754	3819	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
26	2	3444	3500	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
26	3	2955	3000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
26	4	2710	2750	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
26	5	2466	2501	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
26	6	2220	2250	√	x	x	x	x	x	x	x	√	√	√	x	x	x	x
26	7	1974	2000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
26	8	1779	1801	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
26	9	1577	1596	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
26	10	1382	1398	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
26	11	1186	1199	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
26	12	1089	1101	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
26	13	989	1000	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
26	14	891	901	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
26	15	793	801	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
26	16	694	701	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
26	17	592	598	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
26	18	497	501	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
26	19	397	400	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
26	20	298	301	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
26	21	196	198	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
26	22	98	98	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
26	23	38	38	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
26	24	6	6	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
27	1	4905	5003	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
27	2	4420	4503	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
27	3	3930	4000	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
27	4	3442	3499	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
27	5	3195	3246	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
27	6	2952	2997	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
27	7	2465	2500	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
27	8	2215	2245	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
27	9	1969	1995	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
27	10	1777	1799	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
27	11	1580	1599	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
27	12	1384	1400	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
27	13	1187	1201	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
27	14	1019	1030	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
27	15	792	800	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
27	16	694	701	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
27	17	596	602	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
27	18	497	502	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
27	19	397	401	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
27	20	298	301	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
27	21	200	201	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
27	22	99	100	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
27	23	36	36	x	√	x	√	x	x	x	√	√	√	√	√	x	x	√
27	24	5	5	x	√	x	√	x	√	x	√	√	√	√	√	√	x	x
28	1	4812	4907	√	√	√	√	x	x	x	x	√	√	√	x	x	x	x
28	2	4416	4499	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
28	3	3932	4001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
28	4	3444	3501	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
28	5	3198	3249	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
28	6	2953	2999	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
28	7	2466	2501	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
28	8	2221	2251	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
28	9	1974	2000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
28	10	1778	1801	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
28	11	1578	1598	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
28	12	1383	1399	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
28	13	1185	1198	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
28	14	988	999	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
28	15	891	901	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
28	16	792	800	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
28	17	594	600	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
28	18	496	501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
28	19	396	400	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
28	20	297	299	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
28	21	198	199	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
28	22	99	100	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
28	23	22	22	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
28	24	7	7	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
29	1	4590	4678	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
29	2	4417	4500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
29	3	3930	3999	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
29	4	3443	3500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
29	5	3199	3250	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
29	6	2955	3000	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
29	7	2465	2500	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
29	8	2219	2250	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
29	9	1974	2000	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
29	10	1778	1800	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
29	11	1582	1601	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
29	12	1384	1401	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
29	13	1187	1201	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
29	14	990	1001	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
29	15	891	901	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
29	16	791	799	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
29	17	594	600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
29	18	495	500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
29	19	397	401	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
29	20	299	302	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
29	21	199	200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
29	22	99	100	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
29	23	25	26	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
29	24	5	5	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
30	1	4555	4642	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	2	4317	4397	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	3	3929	3999	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	4	3443	3500	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	5	3197	3248	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	6	2954	2999	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	7	2466	2501	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	8	2216	2246	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	9	1974	2000	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	10	1770	1793	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	11	1577	1596	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	12	1385	1401	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	13	1185	1199	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	14	989	1000	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	15	890	899	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	16	792	800	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	17	590	596	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	18	495	500	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	19	377	380	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	20	299	302	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	21	200	202	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	22	101	102	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	23	46	46	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
30	24	5	5	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
31	1	4507	4593	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
31	2	3925	3995	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
31	3	3444	3501	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
31	4	3199	3250	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
31	5	2954	3000	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
31	6	2710	2751	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
31	7	2463	2499	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
31	8	2221	2251	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
31	9	1973	1999	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
31	10	1778	1800	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
31	11	1580	1600	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
31	12	1384	1401	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
31	13	1187	1201	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
31	14	988	999	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
31	15	890	900	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
31	16	791	800	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
31	17	592	598	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
31	18	496	501	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
31	19	395	399	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
31	20	299	302	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
31	21	197	199	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
31	22	101	102	x	√	x	√	√	x	√	√	√	√	√	√	x	√	x
31	23	39	40	x	√	x	√	x	x	√	√	√	√	√	√	x	√	x
31	24	6	6	x	√	x	√	√	√	√	√	√	√	√	√	√	√	x
32	1	4594	4683	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	2	3930	4000	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
32	3	3443	3501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	4	3200	3251	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
32	5	2954	3000	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	6	2709	2749	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
32	7	2465	2500	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	8	2220	2251	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	9	1974	2000	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
32	10	1777	1800	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	11	1581	1600	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
32	12	1384	1401	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	13	1187	1201	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
32	14	990	1001	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	15	891	900	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
32	16	793	801	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	17	595	601	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
32	18	496	501	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	19	397	401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
32	20	298	300	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	21	198	200	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	22	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	23	30	30	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
32	24	6	6	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
33	1	4497	4583	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	2	3931	4001	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	3	3441	3499	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	4	3199	3250	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	5	2950	2995	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
33	6	2709	2749	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	7	2466	2502	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	8	2221	2251	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	9	1975	2001	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	10	1778	1801	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	11	1581	1601	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	12	1383	1400	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	13	1188	1201	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	14	989	999	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	15	877	886	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	16	794	802	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	17	594	600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	18	496	501	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	19	398	401	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	20	298	301	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	21	199	201	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
33	22	100	101	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	23	33	34	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
33	24	5	5	x	√	x	√	x	√	x	√	√	√	√	√	√	x	x
34	1	4486	4572	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	2	3931	4001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
34	3	3442	3500	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	4	3199	3250	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	5	2954	3000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	6	2710	2751	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	7	2466	2502	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
34	8	2219	2250	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	9	1975	2001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
34	10	1778	1801	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	11	1582	1601	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
34	12	1383	1400	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	13	1188	1201	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
34	14	989	1000	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	15	891	900	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
34	16	792	801	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	17	596	602	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
34	18	496	501	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	19	397	401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
34	20	298	301	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	21	201	203	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
34	22	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	23	37	38	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
34	24	6	6	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
35	1	4499	4585	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
35	2	3932	4003	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
35	3	3445	3502	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
35	4	3196	3248	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
35	5	2955	3001	x	x	x	√	x	x	x	√	√	√	√	√	x	x	x
35	6	2711	2751	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
35	7	2464	2500	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
35	8	2220	2251	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
35	9	1976	2002	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
35	10	1777	1800	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
35	11	1581	1601	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
35	12	1384	1400	x	x	x	√	√	x	x	√	√	√	√	√	x	x	x
35	13	1188	1202	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
35	14	991	1002	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
35	15	891	900	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
35	16	791	800	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
35	17	594	600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
35	18	495	500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
35	19	398	402	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
35	20	297	300	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
35	21	198	200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
35	22	99	100	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
35	23	22	22	x	√	x	√	x	x	x	√	√	√	√	√	x	x	√
35	24	5	5	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x
36	1	4338	4420	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
36	2	3928	3999	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	3	3686	3750	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
36	4	3442	3500	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	5	2954	3001	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	6	2709	2750	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
36	7	2460	2496	√	x	x	x	x	x	x	x	√	√	√	x	x	x	x
36	8	2219	2250	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	9	1974	2000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	10	1776	1799	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
36	11	1581	1600	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	12	1383	1400	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
36	13	1187	1201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	14	990	1001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	15	890	899	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
36	16	791	799	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	17	594	600	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
36	18	497	502	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	19	397	401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
36	20	298	301	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	21	199	201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	22	99	100	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	23	31	31	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
36	24	8	8	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
37	1	4441	4526	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
37	2	3931	4001	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
37	3	3686	3750	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
37	4	3444	3502	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
37	5	2955	3001	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
37	6	2709	2750	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
37	7	2465	2501	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
37	8	2219	2250	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
37	9	1974	2001	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
37	10	1778	1801	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
37	11	1580	1600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
37	12	1384	1400	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
37	13	1188	1201	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
37	14	990	1001	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
37	15	891	901	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
37	16	793	801	x	x	x	√	√	x	x	√	√	√	√	√	x	x	x
37	17	595	601	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
37	18	495	500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
37	19	397	401	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
37	20	298	301	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
37	21	199	201	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
37	22	99	100	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
37	23	32	32	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
37	24	6	6	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
38	1	4323	4405	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	2	3929	4000	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	3	3686	3750	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	4	3443	3501	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	5	2954	3001	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	6	2710	2751	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	7	2466	2502	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	8	2219	2251	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	9	1974	2001	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	10	1779	1802	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	11	1581	1601	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	12	1385	1402	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	13	1188	1202	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	14	990	1001	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	15	891	900	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	16	793	801	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	17	595	601	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	18	497	502	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	19	399	403	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	20	298	301	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	21	200	202	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	22	101	102	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	23	33	34	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
38	24	10	10	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	✓	x	x
39	1	4057	4132	x	✓	x	✓	x	x	✓	✓	✓	✓	✓	✓	x	x	x
39	2	3683	3747	x	✓	x	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x	x
39	3	3445	3504	x	✓	x	✓	x	x	✓	✓	✓	✓	✓	✓	x	x	x
39	4	3197	3249	x	✓	x	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x	x
39	5	2954	3001	x	✓	x	✓	x	x	✓	✓	✓	✓	✓	✓	x	x	x
39	6	2711	2752	x	✓	x	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x	x
39	7	2464	2500	x	✓	x	✓	x	x	✓	✓	✓	✓	✓	✓	x	x	x
39	8	2221	2252	x	✓	x	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x	x
39	9	1971	1998	x	✓	x	✓	x	x	✓	✓	✓	✓	✓	✓	x	x	x
39	10	1779	1802	x	✓	x	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x	x
39	11	1580	1600	x	✓	x	x	x	x	x	x	x	x	x	x	x	x	x
39	12	1384	1401	x	✓	x	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x	x
39	13	1187	1201	x	✓	x	✓	x	x	✓	✓	✓	✓	✓	✓	x	x	x
39	14	989	1000	x	✓	x	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x	x
39	15	889	899	x	✓	x	x	x	x	x	x	x	x	x	x	x	x	x
39	16	793	801	x	✓	x	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x	x
39	17	595	601	x	✓	x	✓	x	x	✓	✓	✓	✓	✓	✓	x	x	x
39	18	493	498	x	✓	x	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x	x
39	19	397	401	x	✓	x	✓	x	x	✓	✓	✓	✓	✓	✓	x	x	x
39	20	298	301	x	✓	x	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x	x
39	21	202	204	x	✓	x	✓	x	x	✓	✓	✓	✓	✓	✓	x	x	x
39	22	101	102	x	✓	x	✓	✓	x	✓	✓	✓	✓	✓	✓	x	✓	x
39	23	51	51	x	✓	x	✓	x	x	✓	✓	✓	✓	✓	✓	x	✓	✓
39	24	10	10	x	✓	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x
40	1	4326	4408	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	2	3928	3999	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	3	3685	3750	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	4	3441	3500	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	5	2954	3001	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	6	2708	2749	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	7	2462	2498	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	8	2218	2249	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	9	1972	1999	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	10	1776	1800	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	11	1580	1600	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	12	1384	1401	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	13	1185	1199	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	14	987	998	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	15	886	896	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	16	790	799	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	17	594	600	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	18	495	500	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	19	395	399	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	20	296	299	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	21	198	200	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	22	97	98	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	23	39	39	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
40	24	10	10	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	✓	x	x
41	1	4189	4268	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
41	2	3930	4001	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
41	3	3688	3752	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
41	4	3443	3501	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
41	5	2954	3000	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
41	6	2708	2750	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
41	7	2465	2501	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
41	8	2221	2253	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
41	9	1974	2001	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
41	10	1778	1801	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
41	11	1581	1601	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
41	12	1384	1401	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
41	13	1187	1201	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
41	14	990	1001	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
41	15	892	901	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
41	16	791	800	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
41	17	594	600	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
41	18	498	503	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
41	19	398	402	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
41	20	298	301	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
41	21	199	201	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
41	22	99	100	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
41	23	28	28	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
41	24	6	7	x	✓	x	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x
42	1	3981	4054	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	2	3685	3750	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	3	3443	3501	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	4	3198	3250	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	5	2955	3002	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	6	2712	2754	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	7	2466	2502	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	8	2220	2251	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	9	1973	1999	x	✓	x	x	x	x	x	x	x	x	x	x	x	x	x
42	10	1775	1798	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	11	1581	1602	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	12	1385	1402	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	13	1183	1197	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	14	990	1001	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	15	883	893	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	16	794	803	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	17	596	602	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	18	497	502	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	19	397	401	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	20	297	300	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	21	200	202	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	22	99	100	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
42	23	50	50	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	✓
42	24	5	5	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	✓	x	x
43	1	3445	3504	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
43	2	3198	3251	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
43	3	2953	3000	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
43	4	2708	2749	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
43	5	2464	2500	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
43	6	2219	2250	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
43	7	1973	2000	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
43	8	1776	1799	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
43	9	1579	1600	x	✓	x	x	x	x	x	x	x	x	x	x	x	x	x
43	10	1383	1399	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
43	11	1185	1199	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
43	12	1087	1100	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
43	13	988	1000	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
43	14	890	900	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
43	15	790	798	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
43	16	692	699	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
43	17	593	599	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
43	18	495	500	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
43	19	396	400	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
43	20	296	299	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
43	21	199	200	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
43	22	99	100	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
43	23	39	39	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
43	24	10	10	x	✓	x	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x
44	1	3900	3971	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	2	3682	3747	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	3	3444	3503	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	4	3198	3251	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	5	2955	3002	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	6	2709	2751	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	7	2464	2501	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	8	2220	2252	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	9	1972	1999	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	10	1777	1801	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	11	1581	1601	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	12	1384	1401	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	13	1187	1202	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	14	989	1001	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	15	891	901	✓	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	16	793	802	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	17	594	600	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	18	495	500	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	19	398	402	x	✓	x	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	20	298	301	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	21	199	201	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	22	100	101	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	23	40	40	x	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	x	x	x
44	24	6	6	✓	✓	✓	✓	x	x	x	x	✓	✓	✓	✓	✓	x	x
45	1	3256	3310	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
45	2	2954	3002	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
45	3	2709	2751	x	✓	x	✓	x	x	✓	✓	x	x	x	✓	x	x	x
45	4	2709	2751	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
45	5	2465	2501	x	✓	x	✓	x	x	x	✓	x	x	x	✓	x	x	x
45	6	2220	2252	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
45	7	1973	2000	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
45	8	1775	1799	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
45	9	1578	1599	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
45	10	1383	1400	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
45	11	1185	1199	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
45	12	1087	1100	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
45	13	988	1000	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
45	14	889	899	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
45	15	791	800	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
45	16	595	601	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
45	17	496	501	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
45	18	397	401	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
45	19	297	300	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
45	20	198	200	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
45	21	149	150	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
45	22	99	100	x	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	x	x	x
45	23	30	30	x	✓	x	✓	x	x	x	✓	✓	✓	✓	✓	x	x	x
45	24	8	9	x	✓	x	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
46	1	3842	3912	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	2	3442	3501	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
46	3	3198	3251	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	4	2953	3001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	5	2708	2750	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
46	6	2460	2496	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	7	2216	2248	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
46	8	1966	1993	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	9	1774	1797	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
46	10	1586	1607	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	11	1384	1401	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
46	12	1187	1201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	13	1084	1097	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
46	14	986	997	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	15	892	902	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
46	16	793	802	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	17	594	600	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
46	18	499	504	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	19	398	402	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
46	20	300	303	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	21	201	203	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	22	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	23	47	48	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
46	24	5	5	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
47	1	3887	3958	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
47	2	3686	3751	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
47	3	3441	3500	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
47	4	2954	3001	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
47	5	2708	2750	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
47	6	2464	2501	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
47	7	2217	2249	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
47	8	1972	1999	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
47	9	1775	1799	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
47	10	1580	1600	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
47	11	1382	1399	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
47	12	1186	1200	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
47	13	1087	1100	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
47	14	989	1000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
47	15	890	900	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
47	16	791	800	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
47	17	593	600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
47	18	494	500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
47	19	395	399	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
47	20	297	300	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
47	21	198	200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
47	22	100	101	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
47	23	34	34	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
47	24	8	8	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x
48	1	3580	3643	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
48	2	3442	3502	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
48	3	3192	3246	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
48	4	2953	3000	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
48	5	2709	2751	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
48	6	2465	2502	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
48	7	2220	2252	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
48	8	1973	2001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
48	9	1779	1803	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
48	10	1582	1602	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
48	11	1383	1400	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
48	12	1186	1201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
48	13	1081	1093	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
48	14	990	1001	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
48	15	890	901	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
48	16	793	802	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
48	17	596	603	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
48	18	496	501	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
48	19	398	402	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
48	20	298	301	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
48	21	199	201	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
48	22	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
48	23	51	51	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
48	24	5	5	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
49	1	3600	3664	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
49	2	3197	3250	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
49	3	2953	3000	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
49	4	2708	2750	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
49	5	2463	2500	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
49	6	2218	2250	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
49	7	1974	2002	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
49	8	1777	1801	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
49	9	1581	1601	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
49	10	1383	1401	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
49	11	1186	1201	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
49	12	1087	1100	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
49	13	988	1000	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
49	14	890	900	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
49	15	791	800	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
49	16	692	700	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
49	17	593	600	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
49	18	495	500	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
49	19	397	401	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
49	20	297	300	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
49	21	198	200	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
49	22	99	100	x	√	x	√	√	x	√	√	√	√	√	√	x	√	x
49	23	31	31	x	√	x	√	x	x	√	√	√	√	√	√	x	√	x
49	24	6	6	x	√	x	√	√	√	√	√	√	√	√	√	√	√	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
50	1	3508	3570	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
50	2	3199	3253	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
50	3	2954	3002	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
50	4	2708	2750	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
50	5	2465	2502	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
50	6	2219	2251	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
50	7	1973	2001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
50	8	1777	1801	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
50	9	1580	1601	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
50	10	1384	1401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
50	11	1186	1201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
50	12	1089	1102	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
50	13	990	1002	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
50	14	892	902	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
50	15	792	801	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
50	16	694	701	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
50	17	594	601	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
50	18	495	500	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
50	19	398	402	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
50	20	297	300	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
50	21	199	201	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
50	22	101	102	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
50	23	51	51	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
50	24	5	5	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
51	1	3621	3686	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
51	2	3442	3501	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
51	3	3197	3251	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
51	4	2952	3000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
51	5	2708	2750	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
51	6	2463	2500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
51	7	2218	2250	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
51	8	1973	2000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
51	9	1777	1801	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
51	10	1579	1600	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
51	11	1382	1400	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
51	12	1186	1200	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
51	13	1088	1101	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
51	14	989	1001	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
51	15	891	901	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
51	16	790	799	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
51	17	589	595	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
51	18	495	500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
51	19	395	399	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
51	20	299	302	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
51	21	201	203	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
51	22	104	105	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
51	23	52	52	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
51	24	9	9	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x
52	1	2435	2472	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
52	2	2435	2472	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
52	3	2218	2250	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
52	4	1971	1999	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
52	5	1777	1801	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
52	6	1580	1601	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
52	7	1385	1403	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
52	8	1187	1201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
52	9	1088	1101	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
52	10	988	1000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
52	11	888	899	x	√	x	x	x	x	x	x	x	x	x	√	x	x	x
52	12	789	798	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
52	13	694	701	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
52	14	591	597	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
52	15	494	499	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
52	16	397	401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
52	17	298	301	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
52	18	199	201	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
52	19	149	151	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
52	20	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
52	21	50	51	x	√	√	√	x	x	x	x	√	√	√	√	x	x	√
52	22	4	5	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
52	23	4	5	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
52	24	4	5	x	√	x	x	x	x	x	x	x	x	x	x	√	x	x
53	1	3589	3653	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
53	2	3196	3250	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
53	3	3196	3250	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
53	4	2952	3000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
53	5	2707	2750	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
53	6	2463	2500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
53	7	2217	2249	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
53	8	1971	1998	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
53	9	1776	1800	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
53	10	1579	1600	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
53	11	1382	1400	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
53	12	1185	1199	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
53	13	988	999	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
53	14	889	899	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
53	15	791	800	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
53	16	593	599	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
53	17	494	499	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
53	18	396	400	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
53	19	296	299	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
53	20	198	200	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
53	21	100	100	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
53	22	40	40	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
53	23	7	7	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
53	24	7	8	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
54	1	3334	3391	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
54	2	2953	3002	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
54	3	2710	2752	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
54	4	2710	2753	x	√	x	x	x	x	x	x	√	√	√	√	x	x	x
54	5	2464	2501	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
54	6	2217	2250	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
54	7	1973	2001	√	√	√	x	x	x	x	x	√	√	√	√	x	x	x
54	8	1973	2001	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
54	9	1776	1800	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
54	10	1579	1600	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
54	11	1383	1401	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
54	12	1185	1199	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
54	13	990	1001	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
54	14	887	898	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
54	15	791	800	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
54	16	594	601	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
54	17	491	496	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
54	18	396	401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
54	19	298	301	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
54	20	199	201	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
54	21	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
54	22	35	36	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
54	23	6	6	√	√	x	x	x	x	x	x	√	√	√	√	x	x	x
54	24	6	6	x	√	√	√	x	x	x	x	√	√	√	√	√	x	x
55	1	2866	2913	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
55	2	2463	2500	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
55	3	2217	2250	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
55	4	1971	1999	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
55	5	1971	1999	x	x	x	√	x	x	√	√	√	√	√	√	x	x	x
55	6	1775	1800	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
55	7	1578	1599	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
55	8	1381	1398	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
55	9	1185	1200	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
55	10	988	1000	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
55	11	890	900	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
55	12	791	800	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
55	13	692	700	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
55	14	593	600	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
55	15	495	500	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
55	16	396	400	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
55	17	297	300	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
55	18	198	200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
55	19	149	150	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
55	20	99	100	x	√	x	√	√	x	√	√	√	√	√	√	x	√	x
55	21	30	30	x	√	x	√	x	x	√	√	√	√	√	√	x	√	x
55	22	6	6	x	√	x	√	√	√	√	√	√	√	√	√	√	√	x
55	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
55	24	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
56	1	2727	2770	x	√	√	√	x	x	x	x	√	√	√	√	√	x	x
56	2	2460	2498	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
56	3	2183	2215	√	√	x	√	x	x	x	x	√	√	√	√	√	x	x
56	4	1975	2003	x	√	√	√	x	x	x	x	√	√	√	√	√	x	x
56	5	1777	1801	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
56	6	1777	1801	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
56	7	1581	1602	√	√	√	x	x	x	x	x	√	√	√	√	√	x	x
56	8	1382	1400	√	√	x	√	x	x	x	x	√	√	√	√	√	x	x
56	9	1187	1202	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
56	10	989	1001	x	√	√	√	x	x	x	x	√	√	√	√	√	x	x
56	11	890	900	√	√	x	√	x	x	x	x	√	√	√	√	√	x	x
56	12	791	800	x	√	√	√	x	x	x	x	√	√	√	√	√	x	x
56	13	693	701	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
56	14	594	600	√	√	x	√	x	x	x	x	√	√	√	√	√	x	x
56	15	495	500	x	√	√	√	x	x	x	x	√	√	√	√	√	x	x
56	16	400	404	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
56	17	298	301	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
56	18	199	201	x	√	√	√	x	x	x	x	√	√	√	√	√	x	x
56	19	120	121	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
56	20	100	101	x	√	√	√	x	x	x	x	√	√	√	√	√	x	x
56	21	50	51	x	√	√	√	x	x	x	x	√	√	√	√	√	x	√
56	22	5	5	√	√	√	x	x	x	x	x	x	x	x	x	√	x	x
56	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
56	24	5	6	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
57	1	2701	2744	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	2	2462	2500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
57	3	2218	2250	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	4	1972	2000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
57	5	1776	1801	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	6	1578	1599	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
57	7	1578	1599	x	√	x	x	x	x	x	x	√	√	√	√	x	x	x
57	8	1383	1400	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	9	1185	1200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	10	987	999	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
57	11	889	900	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	12	790	799	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	13	692	700	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	14	593	600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	15	495	500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
57	16	396	400	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	17	297	300	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	18	197	199	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	19	149	150	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	20	99	100	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
57	21	49	49	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
57	22	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
57	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
57	24	6	6	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x
58	1	2734	2778	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
58	2	2463	2501	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
58	3	2217	2250	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
58	4	1971	2000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
58	5	1776	1801	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
58	6	1581	1602	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
58	7	1383	1401	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
58	8	1383	1401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
58	9	1186	1201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
58	10	989	1001	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
58	11	888	899	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
58	12	790	799	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
58	13	692	700	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
58	14	595	602	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
58	15	496	502	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
58	16	397	401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
58	17	297	300	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
58	18	198	201	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
58	19	149	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
58	20	99	100	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
58	21	50	50	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
58	22	6	6	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
58	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
58	24	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
59	1	2596	2637	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
59	2	2463	2500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
59	3	2217	2250	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
59	4	1972	2000	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
59	5	1776	1800	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
59	6	1579	1600	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
59	7	1383	1401	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
59	8	1186	1201	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
59	9	1186	1201	x	√	x	x	x	x	x	x	√	√	√	√	x	x	x
59	10	988	1000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
59	11	890	901	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
59	12	791	800	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
59	13	692	700	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
59	14	594	601	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
59	15	495	501	x	√	x	√	√	x	x	x	√	√	√	√	x	x	x
59	16	396	401	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
59	17	297	300	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
59	18	198	200	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
59	19	149	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
59	20	99	100	x	√	x	√	√	x	√	√	√	√	√	√	x	√	x
59	21	35	35	x	√	x	√	x	x	√	√	√	√	√	√	x	√	x
59	22	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
59	23	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
59	24	7	7	x	√	x	√	√	√	√	√	√	√	√	√	√	√	x
60	1	2448	2485	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
60	2	2215	2248	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
60	3	1971	1999	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
60	4	1779	1803	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
60	5	1581	1602	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
60	6	1385	1403	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
60	7	1186	1201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
60	8	988	1000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
60	9	890	900	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
60	10	889	900	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
60	11	791	800	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
60	12	692	700	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
60	13	596	602	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
60	14	495	501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
60	15	398	402	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
60	16	300	304	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
60	17	198	200	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
60	18	149	151	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
60	19	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
60	20	50	50	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
60	21	5	6	√	√	√	x	x	x	x	x	√	√	√	√	x	x	x
60	22	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
60	23	5	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
60	24	5	5	x	√	x	√	x	x	x	x	x	x	x	x	√	x	x
61	1	2120	2151	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
61	2	1972	2001	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
61	3	1776	1801	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
61	4	1579	1600	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
61	5	1384	1402	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
61	6	1187	1202	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
61	7	990	1002	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
61	8	891	902	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
61	9	792	801	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
61	10	692	700	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
61	11	693	700	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
61	12	594	600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
61	13	496	501	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
61	14	398	402	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
61	15	299	302	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
61	16	200	202	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
61	17	150	151	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
61	18	100	101	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
61	19	35	36	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
61	20	14	15	x	√	x	√	x	x	x	√	√	√	√	√	x	x	√
61	21	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
61	22	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
61	23	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
61	24	5	5	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
62	1	2209	2242	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
62	2	1954	1982	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
62	3	1775	1800	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
62	4	1578	1599	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
62	5	1372	1389	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
62	6	1185	1200	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
62	7	987	999	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
62	8	889	900	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
62	9	790	799	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
62	10	692	700	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
62	11	591	598	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
62	12	591	598	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
62	13	592	598	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
62	14	494	500	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
62	15	395	399	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
62	16	295	298	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
62	17	198	200	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
62	18	149	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
62	19	97	98	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
62	20	49	49	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
62	21	49	49	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
62	22	48	49	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
62	23	11	11	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
62	24	11	11	x	√	√	√	x	x	x	x	√	√	√	√	√	x	x
63	1	2163	2195	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
63	2	1973	2001	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
63	3	1778	1803	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
63	4	1581	1602	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
63	5	1385	1403	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
63	6	1188	1203	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
63	7	989	1001	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
63	8	889	900	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
63	9	792	801	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
63	10	690	698	x	√	x	x	x	x	x	x	√	√	√	√	x	x	x
63	11	594	601	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
63	12	495	501	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
63	13	495	500	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
63	14	398	402	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
63	15	300	303	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
63	16	199	201	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
63	17	151	152	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
63	18	99	100	x	√	x	√	√	x	√	√	√	√	√	√	x	√	x
63	19	50	51	x	√	x	√	x	x	√	√	√	√	√	√	x	√	x
63	20	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
63	21	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
63	22	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
63	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
63	24	6	6	x	√	x	√	√	√	√	√	√	√	√	√	√	√	x
64	1	1569	1590	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
64	2	1481	1501	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
64	3	1382	1400	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
64	4	1186	1200	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
64	5	988	1000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
64	6	891	902	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
64	7	792	801	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
64	8	692	700	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
64	9	594	600	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
64	10	495	500	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
64	11	397	401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
64	12	297	300	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
64	13	200	202	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
64	14	200	202	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
64	15	149	151	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
64	16	99	100	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
64	17	30	30	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
64	18	6	6	√	√	x	x	x	x	x	x	x	x	x	x	x	x	x
64	19	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
64	20	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
64	21	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
64	22	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
64	23	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
64	24	7	7	x	√	√	√	x	x	x	x	√	√	√	√	√	x	x
65	1	1429	1448	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
65	2	1381	1399	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
65	3	1185	1200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
65	4	988	1000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
65	5	890	900	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
65	6	791	800	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
65	7	692	700	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
65	8	593	599	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
65	9	495	500	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
65	10	394	399	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
65	11	295	298	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
65	12	198	200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
65	13	148	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
65	14	99	100	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
65	15	50	50	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
65	16	9	10	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
65	17	9	9	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
65	18	9	10	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
65	19	10	10	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
65	20	10	10	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
65	21	10	10	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
65	22	10	10	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
65	23	9	10	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
65	24	10	10	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x
66	1	1322	1339	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
66	2	1322	1339	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
66	3	1186	1201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
66	4	990	1002	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
66	5	890	901	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
66	6	792	802	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
66	7	692	700	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
66	8	594	601	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
66	9	495	501	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
66	10	396	401	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
66	11	299	302	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
66	12	199	201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
66	13	150	151	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
66	14	99	100	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
66	15	51	51	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
66	16	5	6	√	√	x	x	x	x	x	x	x	x	x	x	x	x	x
66	17	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
66	18	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
66	19	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
66	20	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
66	21	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
66	22	5	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
66	23	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
66	24	5	6	x	√	√	√	x	x	x	x	√	√	√	√	√	x	x
67	1	1654	1676	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
67	2	1578	1599	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
67	3	1578	1599	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
67	4	1382	1400	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
67	5	1185	1200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
67	6	988	1000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
67	7	890	901	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
67	8	791	800	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
67	9	693	701	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
67	10	594	601	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
67	11	495	500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
67	12	494	500	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
67	13	396	400	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
67	14	297	300	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
67	15	199	201	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
67	16	148	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
67	17	99	100	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
67	18	26	26	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
67	19	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
67	20	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
67	21	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
67	22	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
67	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
67	24	6	6	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
68	1	1868	1895	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
68	2	1818	1844	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
68	3	1770	1795	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
68	4	1579	1600	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
68	5	1383	1401	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
68	6	1184	1199	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
68	7	1184	1199	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
68	8	988	1000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
68	9	889	899	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
68	10	889	899	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
68	11	791	800	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
68	12	691	699	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
68	13	594	601	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
68	14	594	601	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
68	15	493	498	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
68	16	395	399	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
68	17	297	300	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
68	18	297	300	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
68	19	198	200	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
68	20	149	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
68	21	99	100	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
68	22	29	30	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
68	23	8	8	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
68	24	8	8	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
69	1	2262	2296	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
69	2	2217	2251	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
69	3	2174	2206	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
69	4	1971	2000	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
69	5	1778	1803	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
69	6	1579	1600	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
69	7	1384	1402	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
69	8	1384	1402	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
69	9	1186	1201	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
69	10	988	1000	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
69	11	988	1000	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
69	12	890	901	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
69	13	792	801	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
69	14	693	701	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
69	15	595	602	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
69	16	496	501	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
69	17	398	402	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
69	18	298	301	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
69	19	199	201	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
69	20	149	151	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
69	21	100	101	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
69	22	21	21	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
69	23	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
69	24	5	5	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
70	1	2262	2297	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
70	2	2217	2251	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
70	3	2169	2201	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
70	4	1972	2000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
70	5	1777	1801	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
70	6	1579	1600	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
70	7	1382	1400	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
70	8	1382	1400	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
70	9	1186	1201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
70	10	988	1000	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
70	11	890	900	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
70	12	890	900	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
70	13	792	801	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
70	14	693	701	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
70	15	594	601	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
70	16	496	501	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
70	17	397	402	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
70	18	297	301	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
70	19	199	201	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
70	20	149	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
70	21	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
70	22	33	33	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
70	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
70	24	6	6	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
71	1	2474	2513	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
71	2	2426	2464	x	√	x	x	x	x	x	x	x	x	x	√	x	x	x
71	3	2375	2411	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
71	4	2217	2250	x	√	x	√	x	x	√	√	√	√	√	x	x	x	x
71	5	1973	2001	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
71	6	1774	1799	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
71	7	1578	1599	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
71	8	1382	1400	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
71	9	1185	1200	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
71	10	988	1000	x	√	x	√	√	x	√	√	√	√	√	√	x	x	x
71	11	888	898	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
71	12	791	800	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
71	13	691	699	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
71	14	593	600	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
71	15	495	500	x	√	x	√	√	x	x	x	√	√	√	√	x	x	x
71	16	395	399	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
71	17	296	299	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
71	18	197	199	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
71	19	147	149	x	√	x	√	x	x	√	√	√	√	√	√	x	x	x
71	20	98	99	x	√	x	√	√	x	√	√	√	√	√	√	x	√	x
71	21	39	39	x	√	x	√	x	x	√	x	√	√	√	√	x	√	x
71	22	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
71	23	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
71	24	7	7	x	√	x	√	√	√	√	√	√	√	√	√	√	√	x
72	1	2913	2961	√	√	√	√	x	√	x	x	√	√	√	√	√	x	x
72	2	2863	2910	x	√	x	√	x	√	x	x	√	√	√	√	√	x	x
72	3	2815	2861	x	√	x	√	x	√	x	x	√	√	√	√	√	x	x
72	4	2707	2750	√	√	x	√	x	√	x	x	√	√	√	√	√	x	x
72	5	2463	2501	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
72	6	2218	2251	√	√	√	√	x	√	x	x	√	√	√	√	√	x	x
72	7	1973	2001	√	√	√	√	x	√	x	x	√	√	√	√	√	x	x
72	8	1773	1797	x	√	x	√	x	√	x	x	√	√	√	√	√	x	x
72	9	1583	1604	√	√	√	√	x	√	x	x	√	√	√	√	√	x	x
72	10	1385	1403	√	√	x	√	x	√	x	x	√	√	√	√	√	x	x
72	11	1186	1200	√	√	√	√	x	√	x	x	√	√	√	√	√	x	x
72	12	991	1003	x	√	√	√	x	√	x	x	√	√	√	√	√	x	x
72	13	793	802	√	√	√	√	x	√	x	x	√	√	√	√	√	x	x
72	14	694	702	x	√	x	√	x	√	x	x	√	√	√	√	√	x	x
72	15	595	602	√	√	x	√	x	√	x	x	√	√	√	√	√	x	x
72	16	499	504	x	√	√	√	x	√	x	x	√	√	√	√	√	x	x
72	17	397	402	x	√	x	√	x	√	x	x	√	√	√	√	√	x	x
72	18	299	303	√	√	√	√	x	√	x	x	√	√	√	√	√	x	x
72	19	201	203	x	√	√	√	x	√	x	x	√	√	√	√	√	x	x
72	20	149	151	x	√	x	√	x	√	x	x	√	√	√	√	√	x	x
72	21	101	102	x	√	√	√	x	√	x	x	√	√	√	√	√	x	x
72	22	51	51	x	√	√	√	x	√	x	x	√	√	√	√	√	x	x
72	23	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
72	24	5	5	√	√	√	√	x	√	x	x	√	√	√	√	√	x	x
73	1	3084	3137	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
73	2	3034	3085	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
73	3	2985	3035	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
73	4	2707	2750	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
73	5	2462	2500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
73	6	2218	2251	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
73	7	1971	1999	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
73	8	1774	1799	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
73	9	1563	1584	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
73	10	1381	1400	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
73	11	1185	1200	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
73	12	988	1000	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
73	13	889	900	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
73	14	791	800	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
73	15	691	698	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
73	16	593	600	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
73	17	494	500	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
73	18	396	400	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
73	19	297	300	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
73	20	198	201	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
73	21	148	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
73	22	99	100	x	√	x	√	√	x	x	√	√	√	√	√	x	x	x
73	23	50	50	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
73	24	9	9	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x
74	1	3078	3131	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
74	2	3029	3081	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
74	3	2981	3031	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
74	4	2705	2749	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
74	5	2462	2500	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
74	6	2216	2249	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
74	7	1973	2001	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
74	8	1777	1802	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
74	9	1579	1600	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
74	10	1383	1401	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
74	11	1184	1199	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
74	12	989	1001	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
74	13	890	901	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
74	14	790	800	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
74	15	693	701	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
74	16	596	602	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
74	17	497	502	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
74	18	395	400	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
74	19	295	298	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
74	20	198	201	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
74	21	148	149	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
74	22	95	96	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
74	23	37	38	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
74	24	5	5	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
75	1	3101	3154	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
75	2	3053	3105	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
75	3	3005	3055	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
75	4	2951	3001	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
75	5	2707	2751	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
75	6	2462	2500	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
75	7	2217	2250	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
75	8	1972	2001	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
75	9	1775	1800	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
75	10	1579	1601	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
75	11	1382	1400	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
75	12	1185	1200	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
75	13	989	1001	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
75	14	890	900	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
75	15	791	800	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
75	16	692	700	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
75	17	593	600	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
75	18	495	501	x	√	x	√	√	x	x	x	√	√	√	√	√	x	x
75	19	396	401	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
75	20	297	300	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
75	21	199	201	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
75	22	100	101	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
75	23	45	45	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
75	24	6	6	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x
76	1	3099	3152	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
76	2	3050	3102	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
76	3	3000	3050	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
76	4	2949	2998	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
76	5	2704	2748	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
76	6	2462	2500	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
76	7	2217	2250	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
76	8	1971	2000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
76	9	1775	1800	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
76	10	1578	1600	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
76	11	1382	1400	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
76	12	1185	1200	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
76	13	987	999	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
76	14	889	900	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
76	15	790	799	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
76	16	690	698	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
76	17	593	600	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
76	18	494	499	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
76	19	396	401	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
76	20	297	300	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
76	21	197	199	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
76	22	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
76	23	50	50	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
76	24	8	8	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
77	1	3025	3076	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
77	2	2975	3025	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
77	3	2927	2976	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
77	4	2707	2751	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
77	5	2462	2500	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
77	6	2217	2251	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
77	7	1972	2000	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
77	8	1776	1801	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
77	9	1579	1601	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
77	10	1382	1400	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
77	11	1186	1201	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
77	12	988	1000	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
77	13	890	901	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
77	14	792	802	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
77	15	692	700	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
77	16	594	601	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
77	17	496	502	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
77	18	396	401	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
77	19	297	300	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
77	20	199	201	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
77	21	149	150	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
77	22	99	100	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
77	23	40	40	x	√	x	√	x	x	x	x	√	√	√	√	√	x	√
77	24	6	6	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
78	1	2912	2960	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
78	2	2861	2908	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
78	3	2815	2861	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
78	4	2706	2750	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
78	5	2462	2500	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
78	6	2217	2250	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
78	7	1971	2000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
78	8	1775	1800	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
78	9	1578	1600	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
78	10	1381	1399	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
78	11	1185	1200	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
78	12	988	1000	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
78	13	890	900	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
78	14	791	800	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
78	15	692	700	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
78	16	594	600	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
78	17	495	500	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
78	18	396	400	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
78	19	297	300	√	√	√	x	x	x	x	x	x	x	x	x	x	x	x
78	20	198	200	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
78	21	148	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
78	22	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
78	23	49	50	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
78	24	7	7	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
79	1	2777	2823	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
79	2	2727	2771	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
79	3	2706	2749	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
79	4	2462	2501	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
79	5	2219	2252	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
79	6	1933	1961	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
79	7	1776	1801	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
79	8	1580	1601	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
79	9	1386	1404	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
79	10	1185	1200	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
79	11	989	1001	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
79	12	888	899	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
79	13	791	801	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
79	14	693	701	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
79	15	595	602	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
79	16	495	501	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
79	17	397	401	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
79	18	297	300	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
79	19	201	203	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
79	20	149	150	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
79	21	96	97	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
79	22	50	50	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
79	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
79	24	6	6	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x
80	1	2645	2687	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
80	2	2595	2636	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
80	3	2545	2585	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
80	4	2462	2501	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
80	5	2218	2251	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
80	6	1972	2001	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
80	7	1776	1801	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
80	8	1579	1601	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
80	9	1383	1402	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
80	10	1187	1202	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
80	11	989	1001	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
80	12	890	900	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
80	13	792	801	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
80	14	692	700	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
80	15	594	600	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
80	16	495	500	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
80	17	396	400	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
80	18	296	300	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
80	19	198	200	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
80	20	148	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
80	21	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
80	22	30	30	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
80	23	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
80	24	7	7	√	√	√	x	x	x	x	x	√	√	√	√	√	x	x
81	1	2256	2290	x	√	x	√	√	x	√	√	√	√	√	√	√	x	x
81	2	2207	2240	x	√	x	√	x	x	√	√	√	√	√	√	√	x	x
81	3	2158	2191	x	√	x	√	x	x	√	√	√	√	√	√	√	x	x
81	4	1972	2001	x	√	x	√	√	x	√	√	√	√	√	√	√	x	x
81	5	1775	1800	x	√	x	√	x	x	√	√	√	√	√	√	√	x	x
81	6	1580	1601	x	√	x	√	x	x	√	√	√	√	√	√	√	x	x
81	7	1383	1401	x	√	x	√	√	x	√	√	√	√	√	√	√	x	x
81	8	1186	1201	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
81	9	988	1000	x	√	x	√	x	x	√	√	√	√	√	√	√	x	x
81	10	887	898	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
81	11	792	801	x	√	x	√	x	x	√	√	√	√	√	√	√	x	x
81	12	693	701	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
81	13	593	600	x	√	x	√	√	x	√	√	√	√	√	√	√	x	x
81	14	495	500	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
81	15	395	399	x	√	x	√	x	x	√	√	√	√	√	√	√	x	x
81	16	298	301	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
81	17	198	200	x	√	x	√	x	x	√	√	√	√	√	√	√	x	x
81	18	148	150	x	√	x	√	x	x	√	√	√	√	√	√	√	x	x
81	19	97	98	x	√	x	√	x	x	√	√	√	√	√	√	√	√	x
81	20	37	37	x	√	x	√	x	x	x	x	√	√	√	√	√	√	x
81	21	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
81	22	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
81	23	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
81	24	5	5	x	√	x	√	√	√	√	√	√	√	√	√	√	√	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
82	1	2020	2049	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
82	2	1972	2001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
82	3	1923	1951	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
82	4	1776	1801	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
82	5	1579	1600	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
82	6	1383	1401	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
82	7	1185	1200	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
82	8	1185	1200	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
82	9	989	1001	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
82	10	989	1001	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
82	11	791	801	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
82	12	791	801	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
82	13	693	701	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
82	14	693	701	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
82	15	693	701	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
82	16	594	600	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
82	17	495	500	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
82	18	396	400	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
82	19	297	300	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
82	20	198	201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
82	21	149	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
82	22	99	100	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
82	23	21	21	x	√	√	√	x	x	x	x	√	√	√	√	x	x	√
82	24	5	5	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
83	1	1832	1857	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
83	2	1780	1805	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
83	3	1730	1754	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
83	4	1579	1600	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
83	5	1383	1401	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
83	6	1185	1200	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
83	7	1185	1200	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
83	8	988	1000	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
83	9	988	1000	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
83	10	890	901	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
83	11	890	901	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
83	12	791	800	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
83	13	791	800	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
83	14	693	701	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
83	15	693	701	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
83	16	594	601	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
83	17	495	500	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
83	18	397	401	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
83	19	297	301	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
83	20	199	201	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
83	21	149	150	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
83	22	99	100	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
83	23	31	31	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
83	24	5	5	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
84	1	1707	1730	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
84	2	1657	1680	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
84	3	1609	1631	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
84	4	1383	1401	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
84	5	1185	1200	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
84	6	1185	1200	√	√	x	x	x	x	x	x	x	x	x	x	x	x	x
84	7	989	1001	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
84	8	989	1002	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
84	9	890	901	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
84	10	890	901	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
84	11	792	801	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
84	12	792	801	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
84	13	694	702	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
84	14	694	702	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
84	15	596	602	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
84	16	596	602	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
84	17	496	502	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
84	18	397	402	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
84	19	298	301	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
84	20	199	201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
84	21	149	151	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
84	22	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
84	23	31	31	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
84	24	5	5	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
85	1	1193	1208	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
85	2	1137	1151	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
85	3	1087	1101	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
85	4	988	1000	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
85	5	889	900	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
85	6	889	900	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
85	7	792	801	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
85	8	792	801	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
85	9	693	701	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
85	10	693	701	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
85	11	594	601	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
85	12	594	601	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
85	13	496	501	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
85	14	496	501	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
85	15	397	401	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
85	16	397	401	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
85	17	298	301	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
85	18	200	202	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
85	19	200	202	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
85	20	149	150	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
85	21	100	101	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
85	22	22	22	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
85	23	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
85	24	7	7	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
86	1	887	897	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
86	2	887	897	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
86	3	791	801	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
86	4	791	801	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
86	5	692	700	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
86	6	692	700	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
86	7	594	601	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
86	8	594	601	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
86	9	495	501	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
86	10	495	501	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
86	11	396	401	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
86	12	396	401	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
86	13	298	301	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
86	14	298	301	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
86	15	199	201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
86	16	200	202	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
86	17	149	151	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
86	18	149	151	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
86	19	100	101	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
86	20	100	101	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
86	21	21	21	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
86	22	21	22	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
86	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
86	24	6	6	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
87	1	570	576	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
87	2	396	400	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
87	3	297	300	x	√	x	√	√	x	x	x	√	√	√	√	√	x	x
87	4	198	201	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
87	5	149	150	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
87	6	96	97	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
87	7	41	41	x	√	x	√	x	x	x	x	√	√	√	√	√	x	x
87	8	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	9	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	10	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	11	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	12	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	13	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	14	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	15	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	16	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	17	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	18	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	19	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	20	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	21	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	22	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
87	23	7	7	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
87	24	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	1	291	294	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
88	2	198	200	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
88	3	149	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
88	4	99	100	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
88	5	51	51	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
88	6	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	7	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	8	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	9	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	10	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	11	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	12	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	13	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	14	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	15	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	16	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	17	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	18	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	19	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	20	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	21	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	22	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
88	24	6	6	√	√	√	√	x	√	x	x	√	√	√	√	√	x	x
89	1	215	217	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
89	2	149	150	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
89	3	99	100	x	√	x	√	√	x	x	√	√	√	√	√	√	x	x
89	4	40	41	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
89	5	6	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	6	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	7	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	8	6	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	9	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	10	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	11	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	12	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	13	6	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	14	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	15	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	16	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	17	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	18	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	19	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	20	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	21	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	22	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	23	7	7	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
89	24	7	7	x	√	x	√	√	√	x	√	√	√	√	√	√	x	x
90	1	151	153	x	√	√	√	√	x	x	√	√	√	√	√	√	x	x
90	2	151	153	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	3	100	101	x	√	√	√	√	x	x	√	√	√	√	√	√	x	x
90	4	100	101	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	5	39	39	x	√	√	√	x	x	x	√	√	√	√	√	√	x	√
90	6	39	39	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	7	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	8	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	9	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	10	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	11	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	12	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	13	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	14	5	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	15	5	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	16	5	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	17	5	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	18	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	19	5	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	20	5	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	21	5	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	22	5	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
90	24	6	6	x	√	√	√	√	x	x	√	√	√	√	√	√	x	x
91	1	155	157	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
91	2	155	157	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	3	99	100	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
91	4	99	100	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	5	30	30	x	√	x	√	x	x	x	x	x	x	x	√	x	x	x
91	6	30	30	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	7	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	8	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	9	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	10	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	11	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	12	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	13	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	14	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	15	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	16	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	17	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	18	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	19	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	20	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	21	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	22	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	23	5	5	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
91	24	5	5	x	√	x	√	x	x	x	√	x	x	x	√	√	x	x
92	1	175	177	x	√	√	√	x	x	x	x	x	x	x	√	√	x	x
92	2	175	177	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	3	99	100	x	√	√	√	x	x	x	x	x	x	x	√	√	x	x
92	4	99	100	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	5	30	30	x	√	√	√	x	x	x	x	x	x	x	√	√	x	x
92	6	30	30	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	7	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	8	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	9	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	10	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	11	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	12	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	13	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	14	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	15	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	16	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	17	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	18	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	19	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	20	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	21	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	22	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
92	24	6	6	x	√	√	√	x	x	x	x	x	x	x	√	√	x	x
93	1	172	173	x	√	x	√	√	x	x	√	x	x	x	√	x	x	x
93	2	172	173	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	3	149	151	x	√	x	√	x	x	x	x	x	x	x	√	x	x	x
93	4	149	151	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	5	100	101	x	√	x	√	√	x	x	√	x	x	x	√	x	x	x
93	6	100	101	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	7	22	22	x	√	x	√	x	x	x	x	x	x	x	√	x	x	x
93	8	22	22	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	9	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	10	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	11	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	12	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	13	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	14	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	15	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	16	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	17	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	18	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	19	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	20	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	21	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	22	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
93	24	6	6	x	√	x	x	√	x	x	√	x	x	x	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
94	1	174	176	x	√	√	√	x	x	x	x	x	x	x	√	x	x	x
94	2	174	176	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	3	99	101	x	√	√	√	x	x	x	x	x	x	x	√	x	x	x
94	4	99	100	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	5	24	24	x	√	√	√	x	x	x	x	x	x	x	√	x	x	x
94	6	24	24	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	7	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	8	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	9	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	10	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	11	5	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	12	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	13	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	14	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	15	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	16	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	17	5	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	18	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	19	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	20	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	21	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	22	5	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
94	24	6	6	x	√	√	√	x	x	x	x	x	x	x	√	√	x	x
95	1	187	189	x	√	x	√	√	x	x	√	x	x	x	√	x	x	x
95	2	187	189	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	3	149	150	x	√	x	√	x	x	x	x	x	x	x	√	x	x	x
95	4	149	150	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	5	99	100	x	√	x	√	√	x	x	√	x	x	x	√	x	x	x
95	6	99	100	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	7	50	50	x	√	x	√	x	x	x	x	x	x	x	√	x	x	x
95	8	50	50	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	9	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	10	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	11	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	12	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	13	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	14	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	15	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	16	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	17	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	18	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	19	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	20	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	21	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	22	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	23	6	6	x	√	x	x	x	x	x	x	x	x	x	x	x	x	x
95	24	6	6	x	√	x	√	√	x	x	√	x	x	x	√	√	x	x
101	1	120	121	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
101	2	120	121	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	3	99	100	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
101	4	99	100	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	5	80	81	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
101	6	80	81	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	7	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	8	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	9	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	10	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	11	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	12	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	13	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	14	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	15	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	16	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	17	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	18	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	19	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	20	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	21	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	22	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	23	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
101	24	6	6	x	√	x	√	x	x	x	√	√	√	√	√	√	x	x
102	1	120	121	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
102	2	99	100	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
102	3	49	50	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
102	24	6	7	x	√	√	√	x	x	x	x	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
103	1	479	484	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
103	2	396	400	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
103	3	298	301	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
103	4	298	301	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	5	199	201	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
103	6	199	201	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	7	150	152	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
103	8	150	152	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	9	100	101	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
103	10	100	101	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	11	50	51	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
103	12	50	51	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	13	5	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	14	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	15	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	16	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	17	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	18	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	19	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	20	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	21	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	22	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	23	6	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
103	24	6	6	√	√	x	√	x	x	x	√	√	√	√	√	√	x	x
104	1	1024	1037	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
104	2	1024	1037	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
104	3	891	901	√	x	x	√	x	x	x	x	√	√	√	√	x	x	x
104	4	891	901	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
104	5	791	800	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
104	6	791	800	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
104	7	693	701	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
104	8	693	701	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
104	9	596	602	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
104	10	596	602	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
104	11	396	401	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
104	12	396	401	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
104	13	298	301	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
104	14	298	301	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
104	15	200	202	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
104	16	200	202	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
104	17	149	151	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
104	18	149	151	x	x	√	x	x	x	x	x	x	x	x	x	x	x	x
104	19	100	101	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
104	20	100	101	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
104	21	51	52	x	√	x	√	x	x	x	x	x	x	x	√	x	x	x
104	22	51	52	x	x	√	x	x	x	x	x	√	√	√	x	x	x	x
104	23	5	5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
104	24	5	5	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x
105	1	1620	1643	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
105	2	1382	1400	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
105	3	1186	1201	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
105	4	989	1001	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
105	5	989	1001	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
105	6	890	900	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
105	7	890	900	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
105	8	791	801	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
105	9	791	801	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
105	10	693	701	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
105	11	693	701	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
105	12	594	601	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
105	13	594	601	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
105	14	396	400	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
105	15	396	400	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
105	16	297	300	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
105	17	297	300	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
105	18	199	201	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
105	19	149	151	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
105	20	100	101	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
105	21	100	101	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
105	22	26	26	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
105	23	26	26	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
105	24	5	6	x	√	x	√	x	x	x	√	√	√	√	√	x	x	x
106	1	2461	2499	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
106	2	2217	2250	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
106	3	1972	2000	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
106	4	1775	1800	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
106	5	1775	1800	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
106	6	1577	1598	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
106	7	1577	1598	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
106	8	1380	1398	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
106	9	1380	1398	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
106	10	1185	1200	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
106	11	1185	1200	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
106	12	988	1000	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
106	13	890	900	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
106	14	790	800	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
106	15	692	700	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
106	16	593	600	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
106	17	495	500	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
106	18	396	400	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
106	19	297	300	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
106	20	198	201	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
106	21	148	150	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
106	22	100	101	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
106	23	30	30	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
106	24	8	8	√	√	√	√	x	x	x	x	√	√	√	√	√	x	x

ST	BTL	DEPTH (m)	CTD prs (dbar)	CFC	O_2 Winkler	N_2O/CH_4	pH	CT	DIC-PARIS	CO_3^{2-}	AT	$Si(OH)_4$	NO_3^-	PO_4^{3-}	SALNTY	$^{18}O/^{13}C$	Cocoliths	Chlorophyll
107	1	3002	3052	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
107	2	3002	3052	x	x	x	x	x	x	x	x	x	x	x	√	x	x	x
107	3	2951	3000	√	√	x	√	x	x	x	√	√	√	√	x	x	x	x
107	4	2707	2750	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
107	5	2461	2499	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
107	6	2217	2250	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
107	7	1972	2000	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
107	8	1776	1801	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
107	9	1579	1600	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
107	10	1383	1401	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
107	11	1187	1202	√	x	x	x	x	x	x	x	x	x	x	x	x	x	x
107	12	989	1001	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
107	13	891	901	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
107	14	791	800	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
107	15	692	700	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
107	16	593	600	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
107	17	496	501	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
107	18	396	400	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
107	19	297	300	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
107	20	200	202	√	√	x	√	x	x	x	√	√	√	√	√	x	x	x
107	21	99	100	√	√	x	√	x	x	√	√	√	√	√	√	x	√	x
107	22	50	50	x	√	x	√	x	x	√	x	√	√	√	√	x	√	x
107	23	5	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
107	24	5	5	√	√	x	√	x	x	√	√	√	√	√	√	x	√	x
108	1	3686	3752	√	√	√	√	x	x	x	√	√	√	√	√	x	x	x
108	2	3441	3500	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
108	3	3197	3251	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
108	4	2953	3001	√	√	√	√	x	x	x	√	√	√	√	√	x	x	x
108	5	2709	2751	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
108	6	2464	2501	√	√	√	√	x	x	x	√	√	√	√	√	x	x	x
108	7	2218	2251	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
108	8	1973	2001	√	√	√	√	x	x	x	√	√	√	√	√	x	x	x
108	9	1777	1801	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
108	10	1578	1599	√	√	√	√	x	x	x	√	√	√	√	√	x	x	x
108	11	1385	1402	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
108	12	1187	1201	√	x	√	√	x	x	x	√	√	√	√	√	x	x	x
108	13	990	1001	x	√	x	√	x	x	x	x	√	√	√	√	x	x	x
108	14	891	901	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
108	15	792	801	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
108	16	692	700	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
108	17	594	601	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
108	18	495	501	x	√	√	√	x	x	x	√	√	√	√	√	x	x	x
108	19	397	401	√	√	x	√	x	x	x	x	√	√	√	√	x	x	x
108	20	298	301	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
108	21	199	201	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
108	22	99	100	√	√	√	√	x	x	x	x	√	√	√	√	x	x	x
108	23	50	51	x	√	√	√	x	x	x	x	√	√	√	√	x	x	x
108	24	5	5	√	√	√	√	x	x	x	√	√	√	√	√	x	x	x

CATARINA Cruise

LEG 2- PALEOACID

North Atlantic

(St. Johns-Vigo)

24 July-12 August 2012

Chief Scientist: Guillermo Francés

1. INTRODUCTION

Module II of CATARINA Project is addressed to the past atmospheric CO_2 concentrations in the production and preservation of $CaCO_3$ in the North Atlantic as well as the potential impact of future ocean acidification in calcareous organisms (mainly foraminifera). Variations in atmospheric pCO_2 throughout the Pleistocene might have caused changes in the calcification of these organisms (Barker and Elderfield, 2002; Moy et al., 2009; Kuroyanagi et al., 2009), the carbonate preservation (Cremer et al., 2007) and the signature of foraminiferal-based proxies (Spero et al., 1997; Elderfield et al., 2006). Separating the effect of variable calcification and preservation rates is essential for a more accurate paleoceanographic and paleoclimatic interpretation. To achieve this broad objective, two activities have been previewed framed in Module II:

Activity II.2: Acidification impacts at centennial time scales.
Activity II.3: North Atlantic Paleoceanographic and Paleoclimatic reconstructions at millennial time scale.

Tasks planned in these activities consist of diverse sedimentary and micropaleontological analyses addressed to elucidating past North Atlantic surface and bottom water-masses dynamics and the impact of Pleistocene climate changes at different time scales (millennial and submillennial) in $CaCO_3$ preservation.

2. OBJECTIVE

The Leg 2 of CATARINA cruise aims to retrieve surface and subsurface sedimentary samples from the bottom of the North Atlantic at around 3000-4000 m depth in several areas currently bathed by different components of the North Atlantic Deep Water (NADW), as the Labrador Sea Water (LSW), Denmark Strait Overflow Water (DSOW) Iceland-Scotland Overflow Water (ISOW) and North-East Atlantic Deep Water (NEADW).

Neighbor areas of Gibbs Fracture Zone (GFZ), the main deep passage between the West and East North Atlantic basins are considered priority places to obtain samples.

3. PARTICIPANTS

The following table provides the participants in the LEG 2 of cruise CATARINA:

NAME	Sex	Nationality	Organism	Task
Francés Pedraz, Guillermo	H	Spanish	UVIGO	Chief Scientists
Nombela Castaño, Miguel A.	H	Spanish	UVIGO	Deck operations. Sedimentol.
Alejo Flores, Irene	M	Spanish	UVIGO	Data coordinator. Sedimentol.
Pérez Alucea, Marta	M	Spanish	UVIGO	Cores description and logging
Mena Rodriguez, Anxo	H	Spanish	UVIGO	Physical properties & operations
Medina Otero, Andrés	H	Spanish	UVIGO	Sampling
Estrada Llàcer, Ferran	H	Spanish	CSIC-ICM	Echosound-Seismic survey
Caínzos Díaz, Verónica	M	Spanish	UVIGO	Sampling
Palacios Castillo, Lucía	M	Spanish	UVIGO	Sampling
Triguero Enguídanos, Eira	M	Spanish	UVIGO	Sampling
García Ibañez, Mª Isabel	M	Spanish	CSIC-IIM	CTD-oxygen
Grande Miranda, Alberto	H	Spanish	UVIGO	CTD and C_T
Galindo Lorente, Maxim	H	Spanish	UB	CTD and nutrients
Casal Casal, Ricardo	H	Spanish	CSIC-UTM	Chief Technicians
Paredes Alonso, Manuel	H	Spanish	CSIC-UTM	Seismic Technician
Vallo Rodríguez, Javier	H	Spanish	CSIC-UTM	CTD and LADCP
Aloy Callejas, Miguel Ángel	H	Spanish	CSIC-UTM	Dredge Technician
Hernández Jiménez, Alberto	H	Spanish	CSIC-UTM	Computer Technician

4. FIELDWORK

The same routine has carried out in the six selected sites. It comprises the following operations in this order:

A. ACOUSTIC SURVEY of the site by means of Muti-Beam Echo Sounding system (Atlas Hydrosweep DS) and Parasound sub-bottom profiler (Atlas Parasound P-35) in order to obtain a detailed bathymetry and the subsurface layering of sediments. The particular place for sampling was selected according the information obtained by these devices.

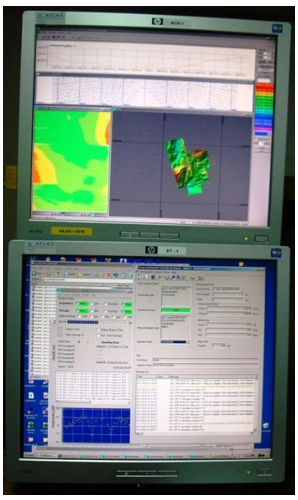
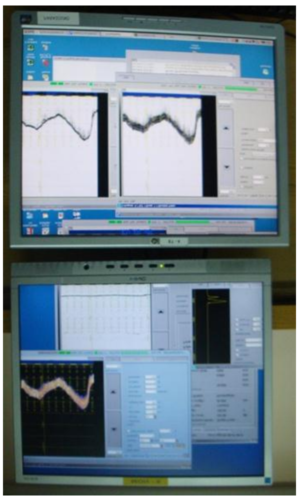


Fig. 1: *CONTROL SCREENS OF ACUSTIC DEVICES (ACUSTIC LAB)*

Atlas Hydrosweep DS (left)

Atlas Parasound P-35 (right)



B. CTD and LADCP: In order to complement the information obtained during the previous leg, a characterization of water column has been carried out in every sampling site.

At around 24 samples of water have been taken in every site at different levels, mainly near the bottom, at the thermocline and at ~50 m depth.

Near-bottom current direction and velocity as well as water properties will be used together with surface sediments features.

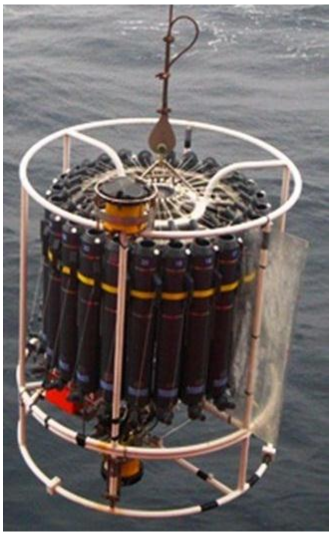


Fig. 2: *CTD & LADCP*

C. SAMPLING OF SURFACE SEDIMENT using a box-corer.

Recovered box core was sub-sampled using 4 PVC tubes (foraminifera, sedimentology, geochemistry and chronology). Three tubes were sampled every 1 cm. Foraminifera samples (first tube) was stained with Rose of Bengal to distinguish alive and dead specimens.

1-cm samples from second and third tubes were stored in plastic bags properly labeled (see later, samples nomenclature).
The fourth tube was labeled and cold stored as archive.

Fig. 3: *Box-corer*

Fig. 4: *one open section of a piston core*

D. SAMPLING OF SEDIMENTARY RECORD: Sub-surface sediments were recovered by means of the Piston-corer from bottoms at less than 4000 mwd. The use of piston-corer was determined by the length of wire available. Deeper bottoms were sampled by means of conventional Gravity-corer.

Piston-corer and Gravity-cores was equipped with lances of 7.5 m and 5 m length, respectively.

Trigger cores, piston cores and gravity cores were cut in sections of 100 cm length (excepting the last section) and numbered from the top to the bottom. Sections were longitudinally split on board. One half of each section was properly labeled and cold stored after the measurement of physical properties, X-ray images and lithological and sedimentary description. The second half was sampled every 1 cm. The obtained subsamples were stored in plastic bags properly labeled.

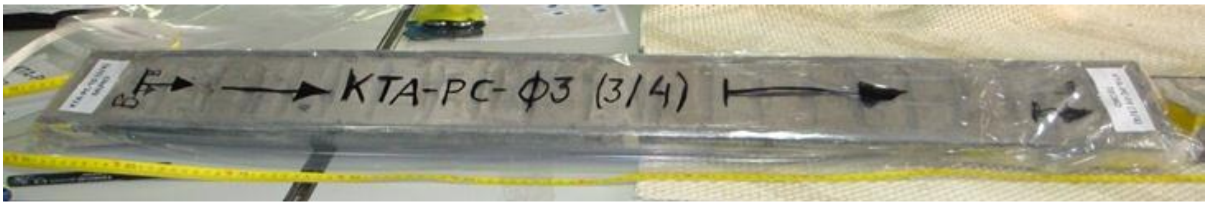
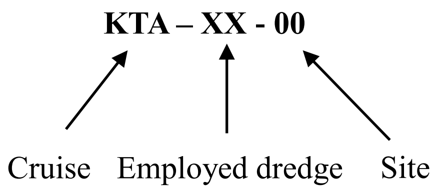


Fig. 5: *Section 3 of piston core retrieved from Site KTA-03 showing how sections are labeled.*

E. NOMENCLATURE OF SAMPLES:

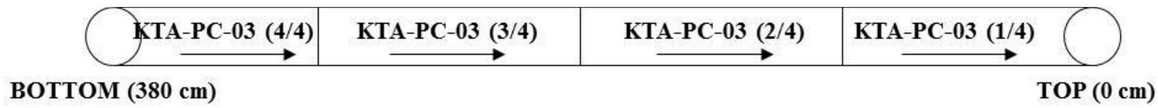
Samples have been labeled according the following protocol:



The abbreviation KTA denotes the name of the cruise. The next two letters refer to the used dredge, being BC: Box-corer; PC: Piston-corer; TG: Trigger-corer; GC: Gravity-corer. The last two numbers designate the Site, from 01 to 06, in order of recovering. Water samples follow a similar notation, whit the abbreviation AQ instead that of dredge.

Subsamples (1 cm thick) from box-cores are identified also by their basal centimeter, counting from the top to the bottom and a letter referring to the tube used for sampling (A: foraminifera; B: Sedimentology; C: Geochemistry). E.g. KTA-BC-04-14C.

Sections (100 cm length, excepting the last section) obtained from Piston/Trigger/Gravity-cores were numbered from the top to the bottom. E.g. KTA-PC-03 (3/4) means that piston core from site 03 has four sections and this one is the third section, spanning from 200 cm to 300 cm.



The head of arrows marked on PVC tubes always point at the core-top. Besides, the name of each section is written also towards the core-top.

Subsamples (1 cm thick) obtained from Piston/Trigger/Gravity-cores was numbered from the top to the bottom using the basal centimeter. Four subsamples have been obtained from each level and they can be identified by a capital letter (A: foraminifera; B: grain size; C: geochemistry; D: other analyses). E.g. KTA-PC-03-256A is the 255-256 cm interval from piston core retrieved in Site 03, which will be employed for foraminifera analyses. For a better control, plastic bags containing the subsamples have been also labeled with a number of four digits. The firs digit represents the Site (1 to 5) and the last three digits means the interval in centimeters. E. g. the bag numbered with 3256A contains the sample KTA-PC-03-256A.

F. PHYSICAL PROPERTIES:

Once the sections have been split longitudinally, one half was scanned by means of Geotek Core Scanner in order to obtain high resolution digital pictures and the values of density, magnetic susceptibility, fractal porosity and resistivity every 0.5 cm.

X-ray images have been also obtained for a better identification of facies recorded in the cores.

Fig. 6: *Geotek Core Scanner*

5. ANALYSIS AND PRELIMINARY RESULTS

Sampling operations have been performed in six sites (Figs. 7 and 8; KTA-01 to KTA-06). All previewed operations have been carried out successfully in sites KTA-02, KTA-03 and KTA-05. The only site where no samples were recuperated was KTA-06, surely because the quality of sediments avoids the penetration of conventional Gravity-corer. Four attempts were done in two points and no samples were recovered. Giving the depth of site KTA-06 (5241-5325 m) using of Piston-corer was no possible because the winch employed for this device currently has only around 4200 m of wire.

Only a gravity core has been obtained from Site KTA-01 because the Piston-corer broke down and the new Box-corer did not work properly. Taking into account that several hours were required to fix both dredged, only the Gravity-corer was used with the aim of saving time.

No surface samples were obtained from Site KTA-04. In this case the wire tangled up to the spade of the Box-corer avoiding the proper closure. Nevertheless, a piston-core and a gravity core have been recovered.

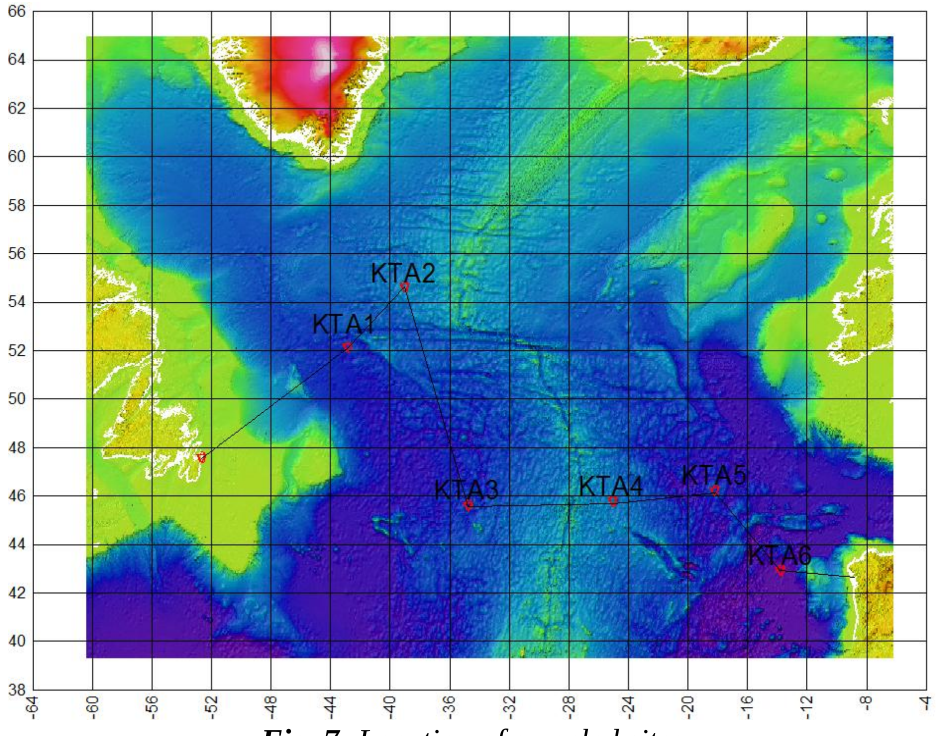


Fig. 7: *Location of sampled sites*

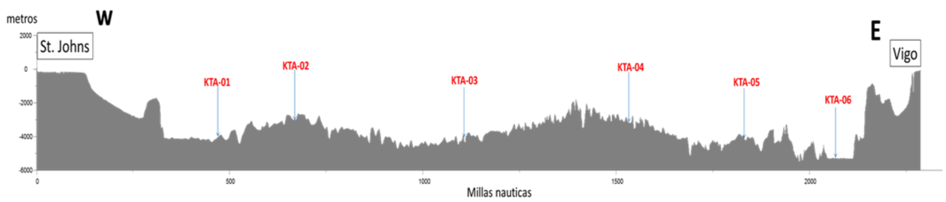


Fig. 8: *Bathymetric profile across the sampled sites*

Data about sites and operations carried out are summarized on the next Table:

TABLE SUMMARISING POSITION OF SITES, OPERATIONS PERFORMED AND EMPLOYED TIMES

DATE	SITE	COORDINATES		OPERATION	DEPTH (m)	START TIME (GMT)	END TIME (GMT)	EMPLOYED TIME (h:min)	COMMENTS
		LAT.	LONG.						
27/07/2012	**KTA-01**			Acoustic survey		09:40	05:59	15:21	Length of lines: 42.47 NM; Covering: 282 km^2
27/07/2012	KTA-AQ-01	52.10633	-42.86128	CTD	4031	16:23	19:38	3:15	OK
27/07/2012	KTA-BC-01	52.10623	-42.86128	BOX CORER	4031	19:49	23:00	3:11	Void. Triggered in the water column
28/07/2012	KTA-PC-01	52.10623	-42.86128	PISTON CORER	4031	00:10	00:45	0:35	Breakdown and wire damaged
28/07/2012	KTA-CG-01	52.10639	-42.86128	GRAVITY CORER	4031	00:53	03:35	2:42	Recovering: 4.64 m
28/07/2012	KTA-BC-01B	52.10639	-42.86119	BOX CORER	4031	03:42	07:13	4:31	Void. Trigger malfunction.
					TOTAL TIME FOR SITE KTA-01			**29:35**	
29/07/2012	**KTA-02**			Acoustic survey		07:35	12:53	5.18	Length of lines: 41.64 NM; Covering: 256 km^2
29/07/2012	KTA-AQ-02	54.58257	-39.12555	CTD	3002	13:00	15:30	2:30	OK
29/07/2012	KTA-BC-02	54.58265	-39.1256	BOX CORER	3002	15:52	17:59	2:07	Void. Trigger malfunction. Shackle too heavy?
29/07/2012	KTA-PC-02	54.58272	-39.1254	PISTON CORER	3002	18:06	20:28	2:22	OK. Trigger core: 1.83 m; Piston core: 3.13 m
29/07/2012	KTA-BC-02B	54.58273	-39.1255	BOX CORER	3002	20:30	22:55	2:25	Shackle changed. OK. Recovering: 40 cm
					TOTAL TIME FOR SITE KTA-02			**14:42**	
01/08/2012	**KTA-03**			Acoustic survey		18:21	01:56	6:34	Length of lines: 45.60 NM; Covering: 136 km^2
02/08/2012	KTA-AQ-03	45.43977	-34.5521	CTD	4015	3:05	06:22	3:17	OK
02/08/2012	KTA-BC-03	45.43985	-34.552226	BOX CORER	4015	6:30	09:38	3:08	OK. Recovering: 27-32 cm
02/08/2012	KTA-PC-03	45.43986	-34.552226	PISTON CORER	4015	9:53	13:30	3:37	OK. Trigger core: 1.23 m; Piston core: 3.33 m
					TOTAL TIME FOR SITE KTA-03			**17:16**	
04/08/2012	**KTA-04**			Acoustic survey		11:49	18:00	6:11	Length of lines: 41.54 NM; Covering: 211 km^2
04/08/2012	KTA-AQ-04	45.76765	-25.038565	CTD	3110	19:26	22:00	2:34	OK
04/08/2012	KTA-BC-04	45.76665	-25.0386	BOX CORER	3110	22:06	00:33	2:27	Void. Dredge did not reach the bottom.
05/08/2012	KTA-BC-04	45.76665	-25.0386	BOX CORER	3110	0:35	02:50	2:15	Void. Wire tangled up to the spade of the box-corer
05/08/2012	KTA-PC-04	45.7665	-25.03859	PISTON CORER	3110	2:54	05:13	2:19	OK. Trigger core: 1.67 m; Piston core: 3.22 m
					TOTAL TIME FOR SITE KTA-04			**15:46**	

DATE	SITE	COORDINATES		OPERATION	DEPTH (m)	START TIME (GMT)	END TIME (GMT)	EMPLOYED TIME (h:min)	COMMENTS
		LAT.	LONG.						
06/08/2012	**KTA-05**			Acoustic survey		11:43	18:00	6:17	Length of lines: 37.625 NM; Covering: 559.5 km^2
06/08/2012	KTA-AQ-05	46.1864	-18.3143	CTD	3940	18:15	21:26	3:11	OK
06/08/2012	KTA-BC-05	46.18602	-18.31378	BOX CORER	3938	21:28	00:35	3:07	OK. Partially washed. Recovering: 10-13 cm
07/08/2012	KTA-PC-05	46.18593	-18.31385	PISTON CORER	3939	0:36	03:20	2:44	PVC burst. Trigger core: 1.62 m; Piston core: 5.18 m
07/08/2012	KTA-GC-05	46.18595	-18.31385	GRAVITY CORER	3939	3:37	06:12	2:35	OK. Recovering: 3.47 m
					TOTAL TIME FOR SITE KTA-05			**17:54**	
09/08/2012	**KTA-06**			Acoustic Survey		9:23	17:50	8:27	Length of lines: 57.14 MN; Covering: 322 km^2
09/08/2012	KTA-AQ-06	43.03888	-14.05192	CTD	5285	19:30	23:40	4:10	OK
09/08/2012	KTA-BC-06	43.03888	-14.05192	BOX CORER	5240	23:45	03:15	3:30	Void. Wire tangled up to the spade of the box-corer
10/08/2012	KTA-GC-06	43.0389	-14.05196	GRAVITY CORER	5241	03:30	07:00	3:30	Void.
10/08/2012	KTA-GC-06	43.039015	-14.05197	GRAVITY CORER	5241	07:20	11:00	3:40	Void. Catcher damaged
10/08/2012	KTA-GC-06B	42.96925	-14.13621	GRAVITY CORER	5325	13:18	16:00	2:42	Void
10/08/2012	KTA-GC-06B	42.96925	-14.13621	GRAVITY CORER	5325	16:07	20:02	3:55	Void
					TOTAL TIME FOR SITE KTA-06			**29:54**	
							TOTAL TIME FOR OPERATIONS	**125 H, 07 MIN**	

5.1. SITE KTA-01

DATE/START OF OPERATIONS: 27th July, 2012 (09:40 h GMT)

DATE/END OF OPERATIONS: 27th July, 2012 (07:13 h GMT)

LATITUDE N: 52.10639 **LONGITUDE W: -42.86128** **DEPTH: 4031 m**

OPERATIONS:

- Acoustic survey (multi-beam and parasound)
  - 42.47 NM
  - 282 km^2
- CTD:KTA-AQ-01
- GRAVITY-CORER: KTA-GC-01
  - 4.64 m (5 Sections)
- PISTON-CORER: 1 failed attempt (break down of trigger core mechanism)
- BOX CORER: 2 failed attempts (trigger fitted improperly and probably the shackled was too heavy)

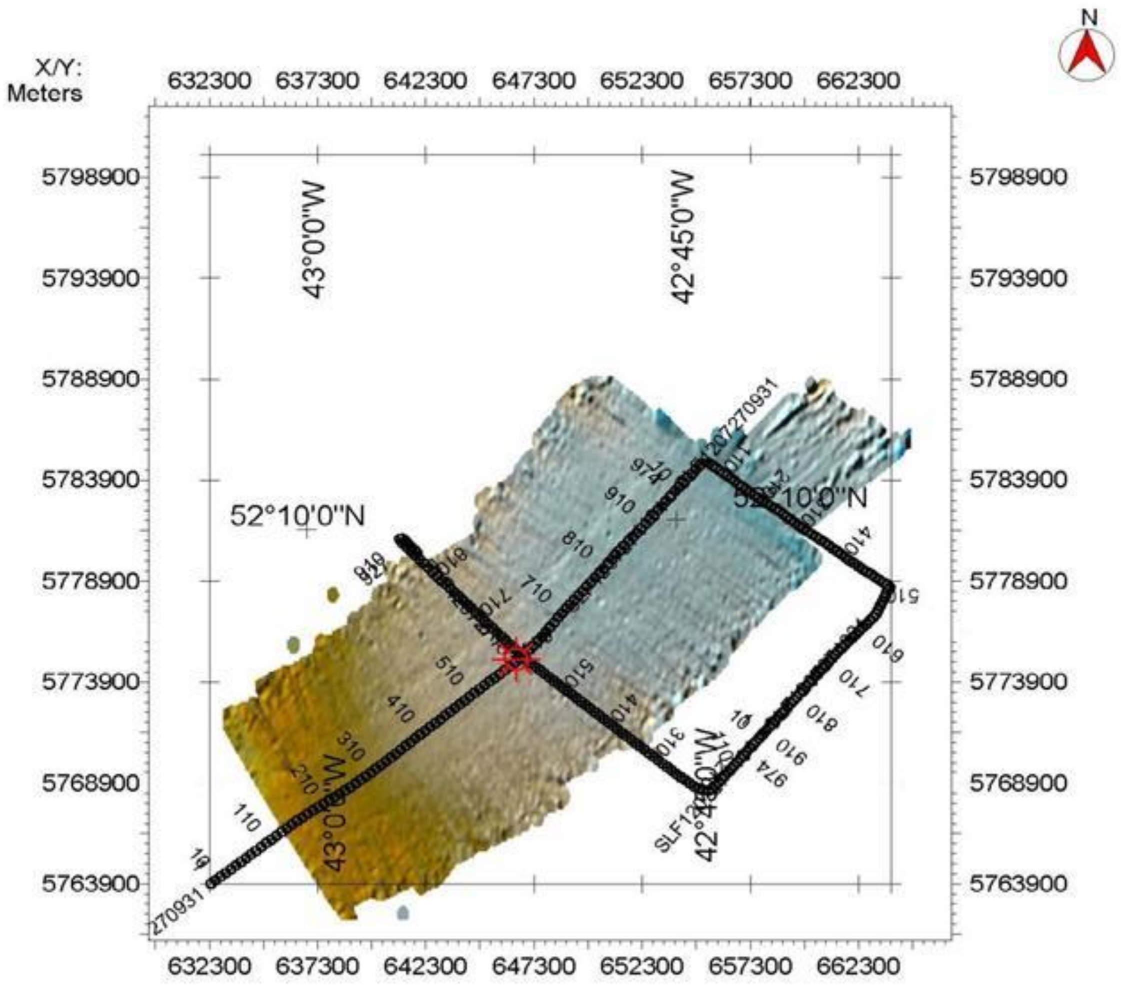


Fig. 9: Strategy of acoustic survey for Site KTA-01

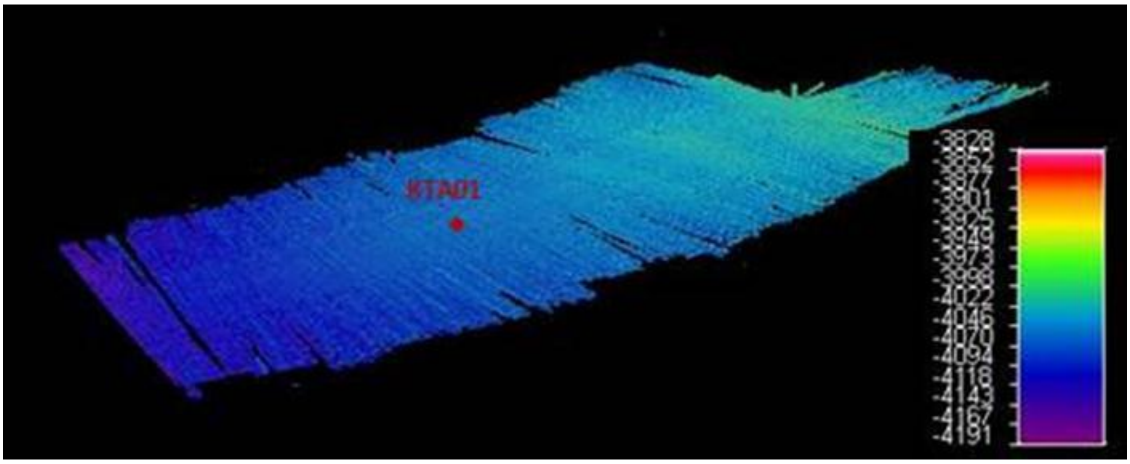


Fig. 10: *Multi-beam detailed bathymetry of Site KTA-01 (x10 vertical magnification). Red dot marks the selected place for sampling.*

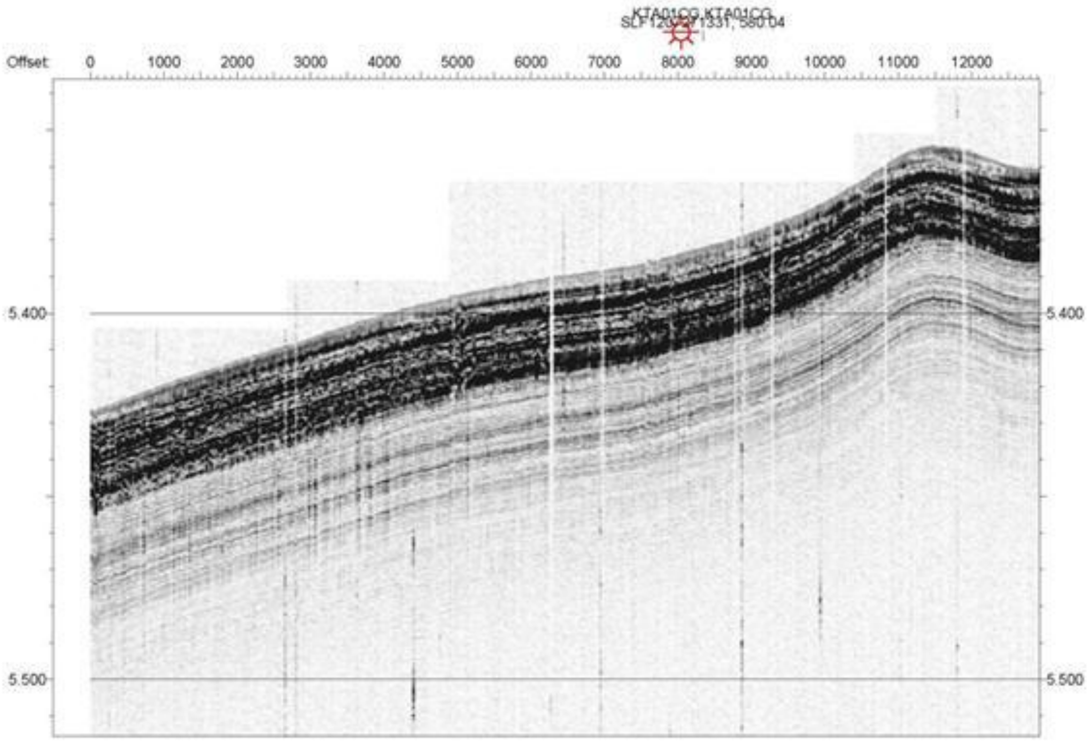


Fig. 11: *High-resolution acoustic profile (Parasound P-35) across Site KTA-01 (red dot)*

Samples obtained at this site consist on a Gravity-core 464 cm length (KTA-GC-01). The main sedimentary features of this core can be observed on the next figure.

Fig. 12: *Conventional and X-ray pictures of core KTA-GC-01*

5.2. SITE KTA-02

DATE/START OF OPERATIONS: 29th July, 2012 (07:35 h GMT)

DATE/END OF OPERATIONS: 29th July, 2012 (22:55 h GMT)

LATITUDE N: 54.582720 **LONGITUDE W:** -39.125400 **DEPTH:** 3002 m

OPERATIONS:

- Acoustic survey (multi-beam and parasound)
  - 41.64 NM
  - 256 km^2
- CTD:KTA-AQ-02
- BOX-CORER: KTA-BC-02
  - 40 cm length (3 sampled tubes; 1 tube for archive)
- PISTON-CORER: KTA-PC-02
  - 3.13 m (4 sections)
  - Trigger-core: 1.83 cm (2 sections) + core-catcher

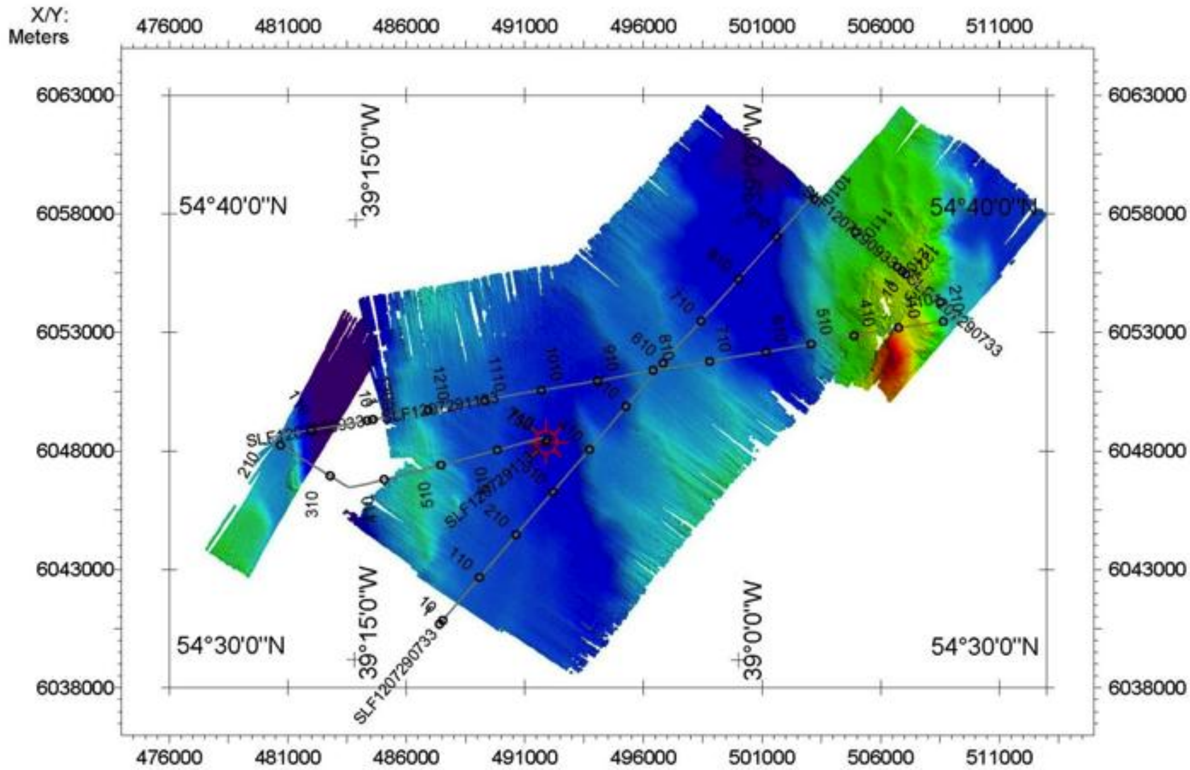


Fig. 13: *Strategy of acoustic survey for Site KTA-02*

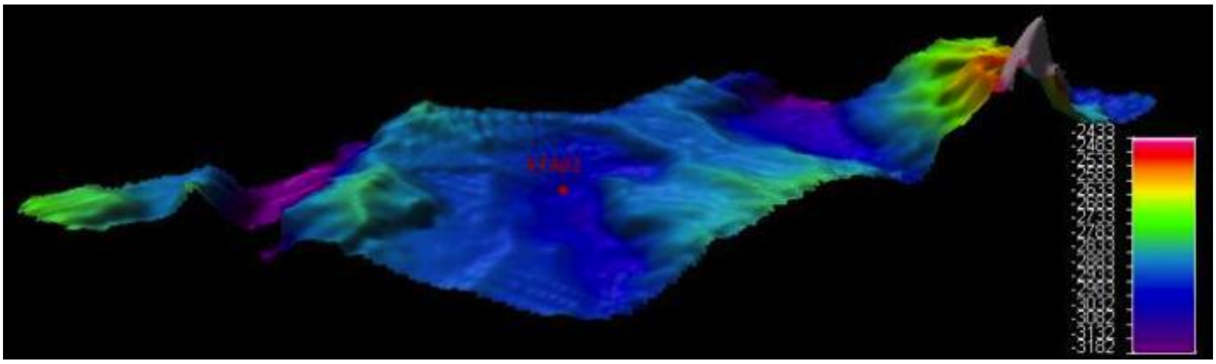


Fig. 14: *Multi-beam detailed bathymetry of Site KTA-02 (x10 vertical magnification). Red dot marks the selected place for sampling.*

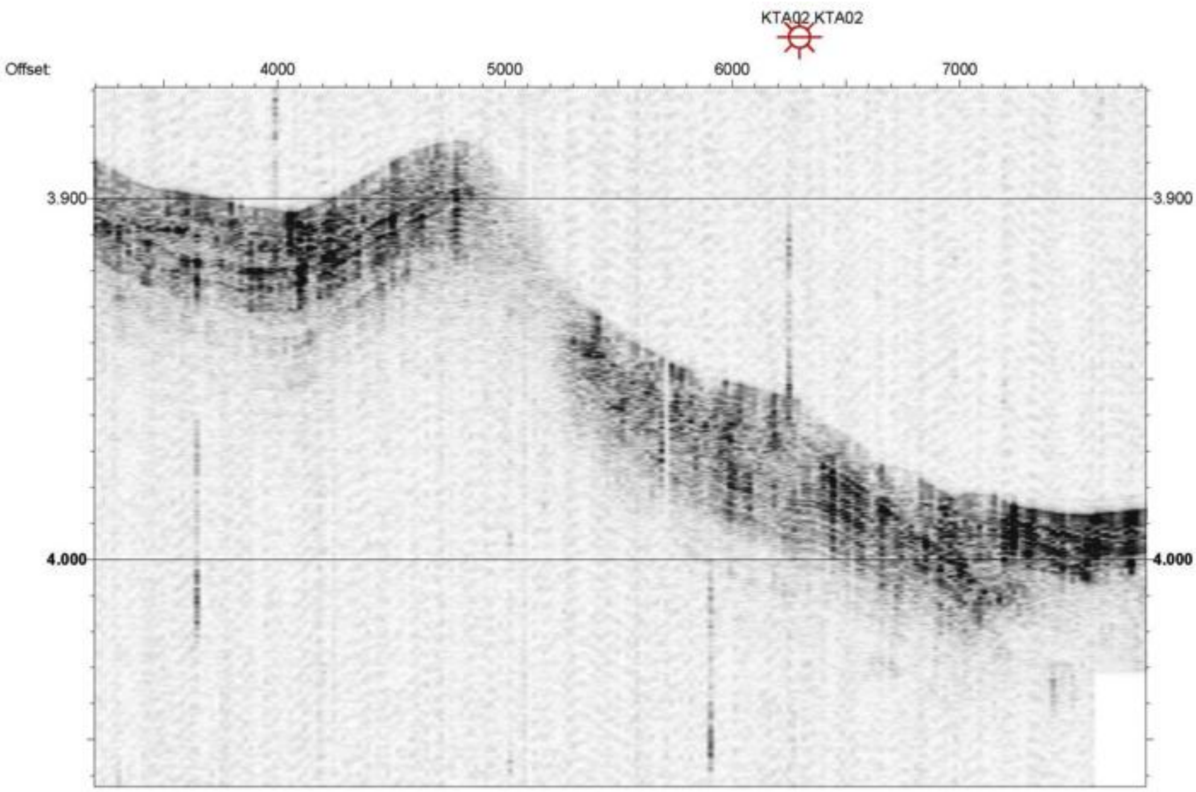


Fig. 15: *High-resolution acoustic profile (Parasound P-35) across Site KTA-02 (red dot)*

Samples obtained at this site consist of a Box-core 40 cm length (KTA-BC-02) and a Piston-core 313 cm length (KTA-PC-02) with the respective trigger-core (KTA-TG-02, 183 cm length). The main sedimentary features of the piston core can be observed on the next figure.

Fig. 16: *Conventional and X-ray pictures of core KTA-PC-02*

5.3. SITE KTA-03

DATE/START OF OPERATIONS: 1th August 2012 (18:21 h GMT)

DATE/END OF OPERATIONS: 2th August 2012 (13:30 h GMT)

LATITUDE N: 45.43986 **LONGITUDE W:** -34.552226 **DEPTH:** 4015 m

OPERATIONS:

- Acoustic survey (multi-beam and parasound)
  - 45.60 NM
  - 136 km^2
- CTD:KTA-AQ-03
- BOX-CORER: KTA-BC-03
  - 28 cm length (3 sampled tubes; 1 tube for archive)
- PISTON-CORER: KTA-PC-03
  - 3.46 m (4 sections)
  - Trigger-core: 1.23 cm (2 sections) + core-catcher

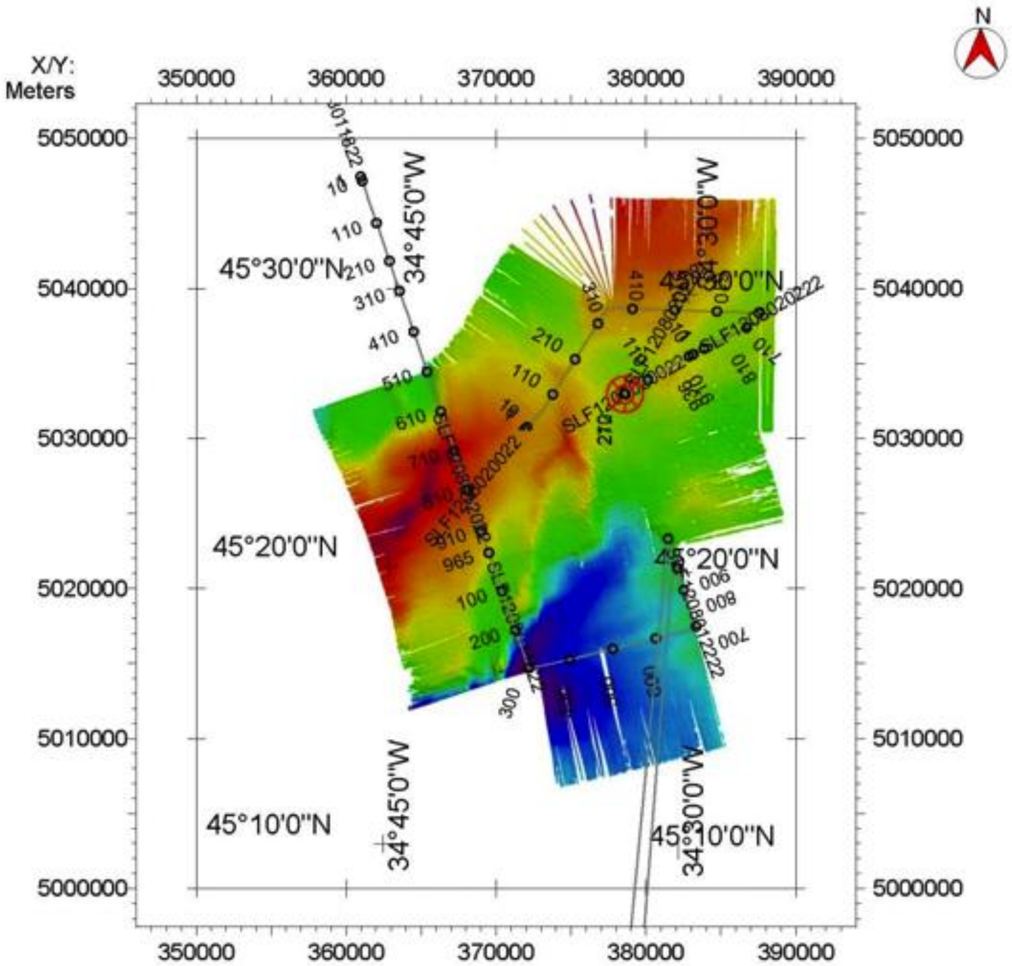


Fig. 17: *Strategy of acoustic survey for Site KTA-03*

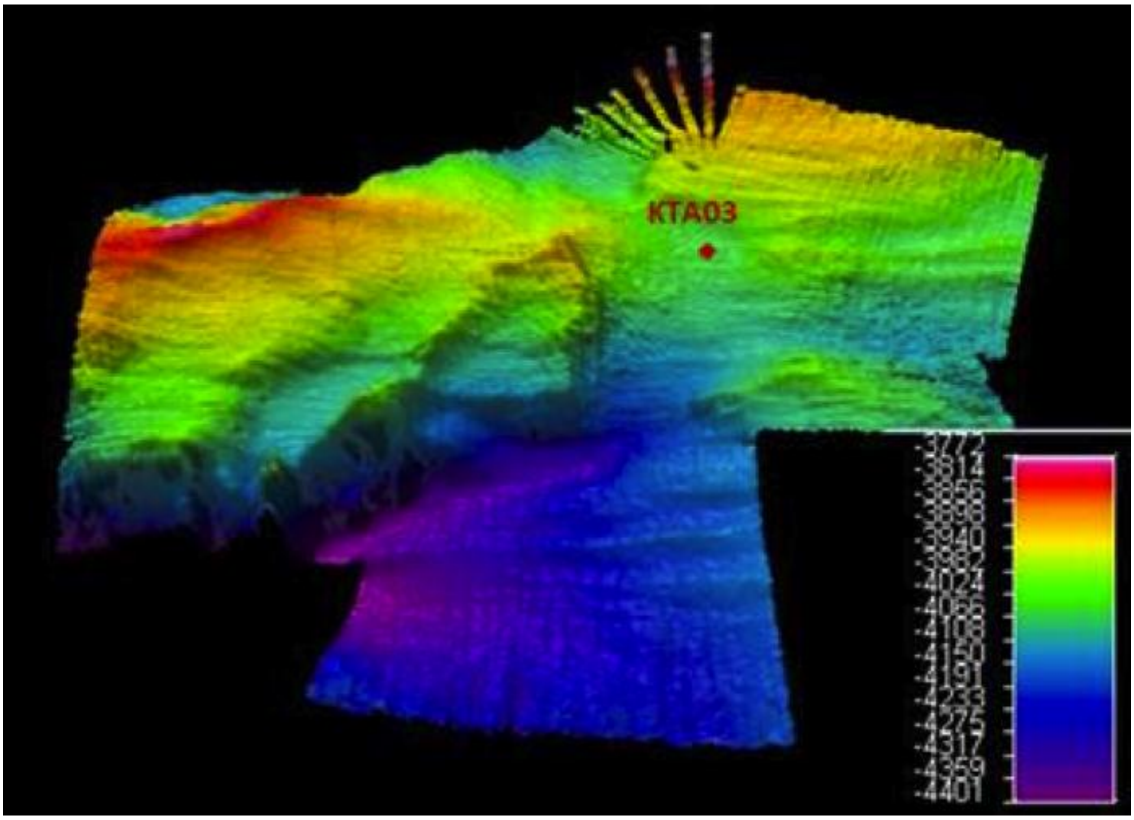


Fig. 18: *Multi-beam detailed bathymetry of Site KTA-03 (x10 vertical magnification). Red dot marks the selected place for sampling.*

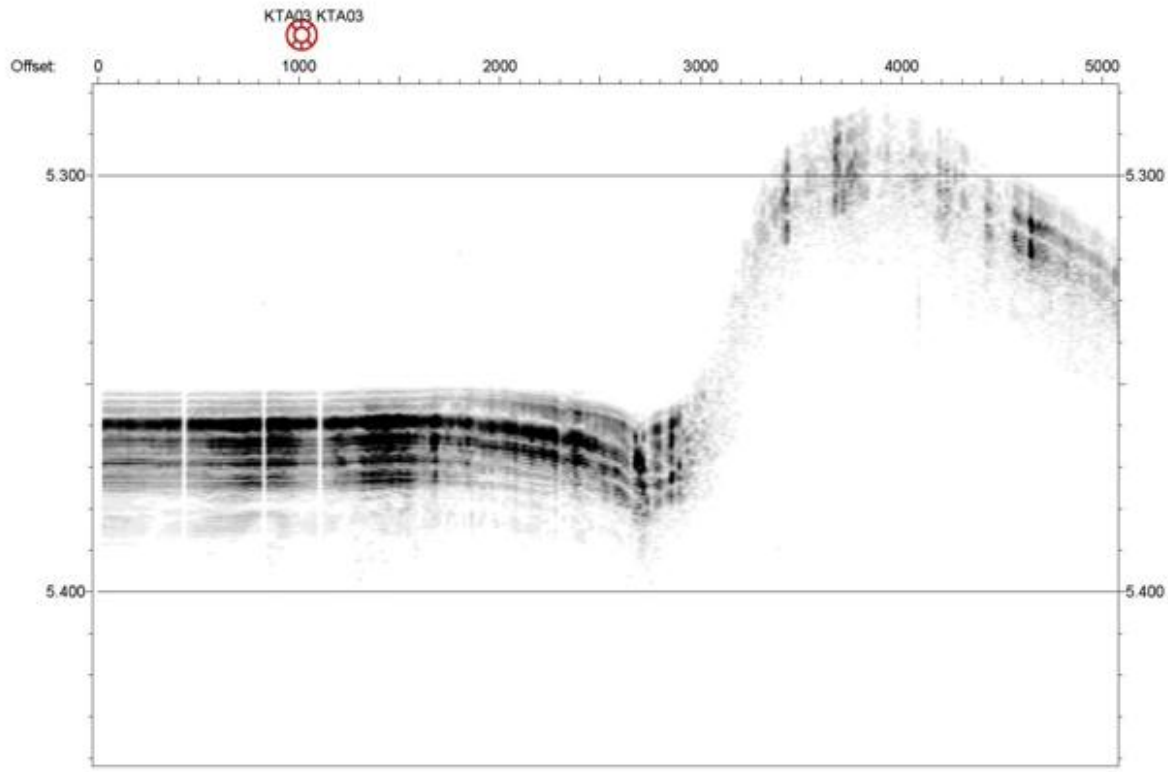


Fig. 19: *High-resolution acoustic profile (Parasound P-35) across Site KTA-03 (red dot)*

Fig. 20: *Conventional and X-ray pictures of core KTA-PC-03*

5.4. SITE KTA-04

DATE/START OF OPERATIONS: 4th August 2012 (11:49 h GMT)

DATE/END OF OPERATIONS: 5th August 2012 (05:13 h GMT)

LATITUDE N: 45.7665 **LONGITUDE W:** -25.03859 **DEPTH:** 3110 m

OPERATIONS:

- Acoustic survey (multi-beam and parasound)
  - 41.54 NM
  - 211 km^2
- CTD:KTA-AQ-04
- BOX-CORER: KTA-BC-04, No recovering after 2 attempts. The first one because the dredge did not arrive up to the bottom and the second one because the wire tangled up the spade of the box-corer.
- PISTON-CORER: KTA-PC-04
  - 3.22 m (4 sections)
  - Trigger-core: 1.67 cm (2 sections) + core-catcher

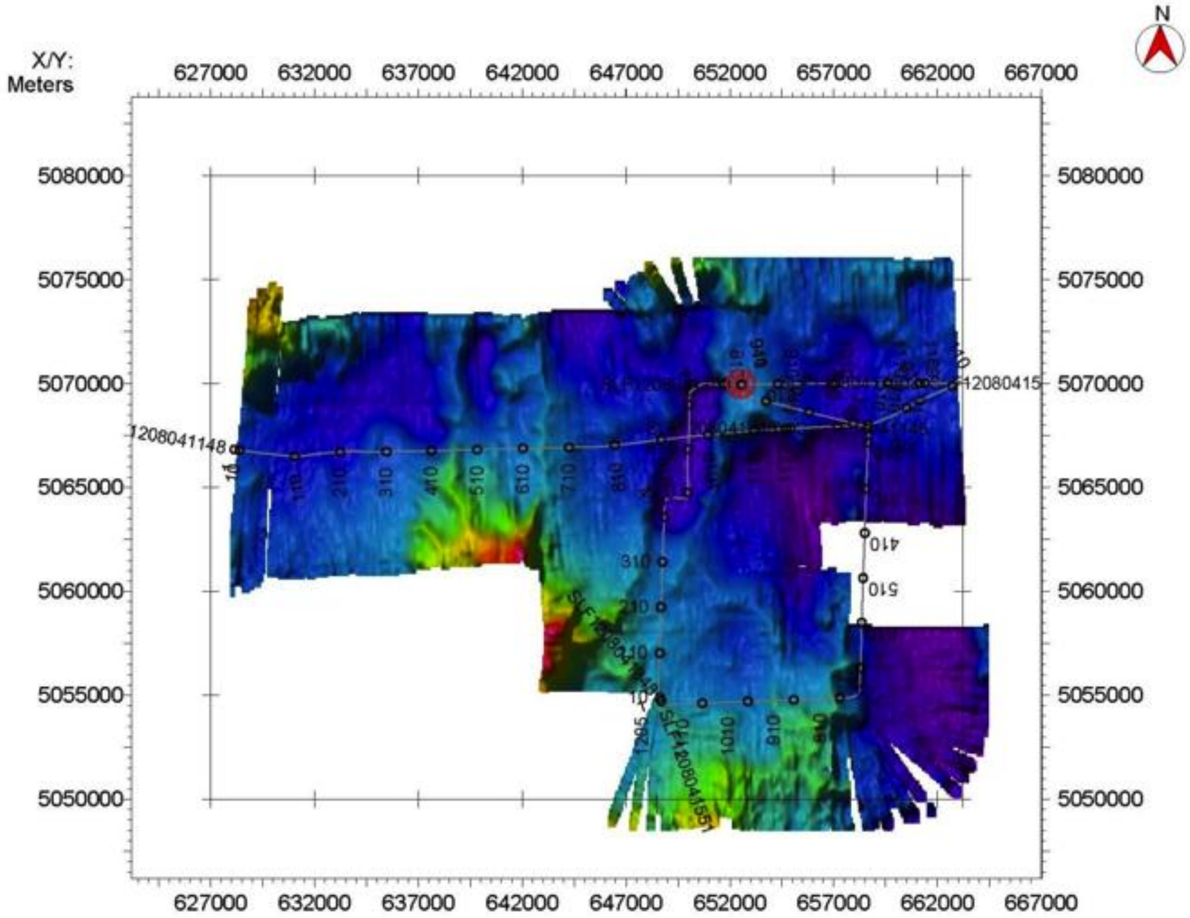


Fig. 21: *Strategy of acoustic survey for Site KTA-04*

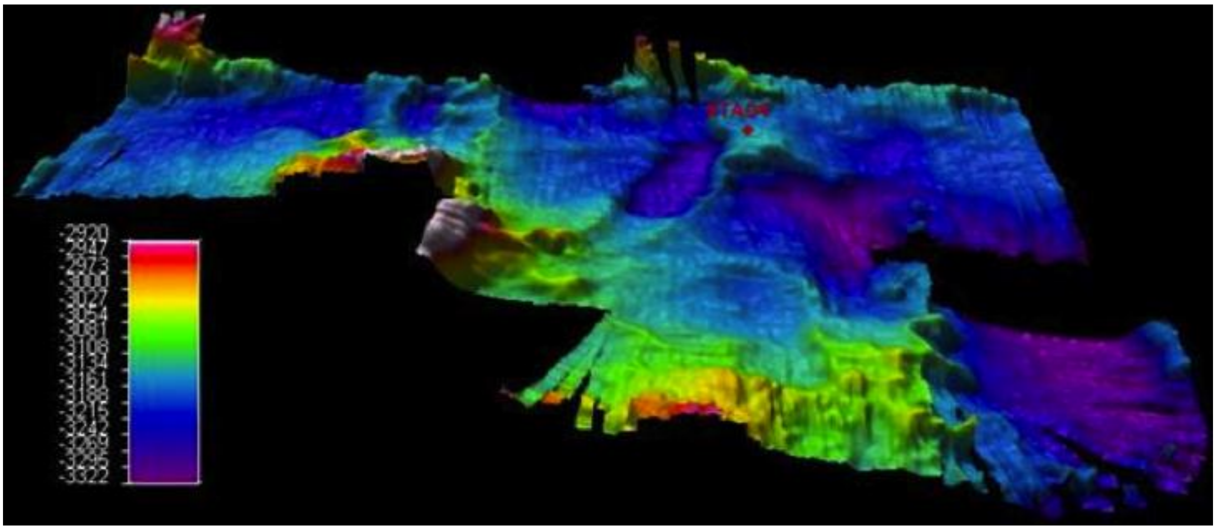


Fig. 22: *Multi-beam detailed bathymetry of Site KTA-04 (x10 vertical magnification). Red dot marks the selected place for sampling.*

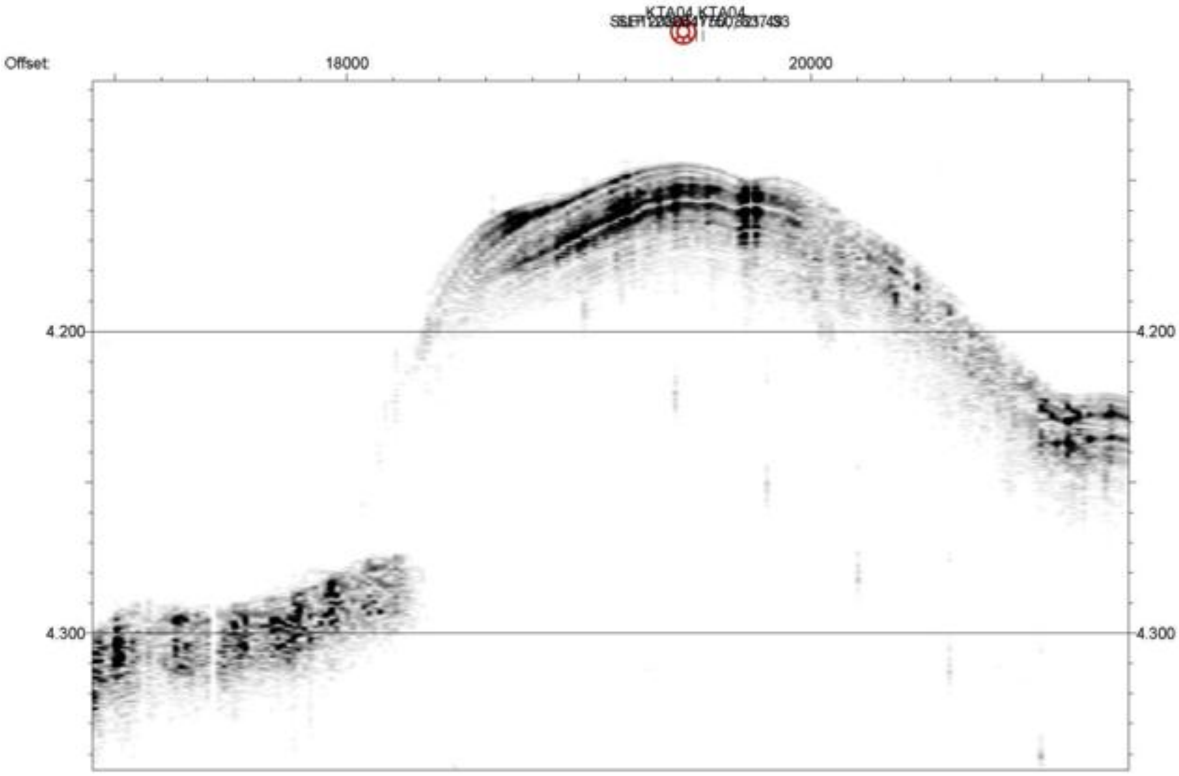


Fig. 23: *High-resolution acoustic profile (Parasound P-35) across Site KTA-04 (red dot)*

Fig. 24: *Conventional and X-ray pictures of core KTA-PC-04*

5.5. SITE KTA-05

DATE/START OF OPERATIONS: 6th August 2012 (11:43 h GMT)

DATE/END OF OPERATIONS: 7th August 2012 (06:12 h GMT)

LATITUDE N: 46.18595 **LONGITUDE W:** -18.31385 **DEPTH:** 3939 m

OPERATIONS:

- Acoustic survey (multi-beam and parasound)
  - 37.625 NM
  - 559.5 km^2
- CTD:KTA-AQ-05
- BOX-CORER: KTA-BC-05
  - 11 cm length (3 sampled tubes; 1 tube for archive)
- PISTON-CORER: KTA-PC-05
  - 5.18 m (3 sections). No sampling was done because PVC case was completely burst all of length. PVC was reinforced with adhesive strip with the aim of a better protection of recovered sediment.
  - Trigger core 162 cm length (2 sections)
- GRAVITY-CORER: KTA-GC-05
  - 347 cm length (4 sections)
  -

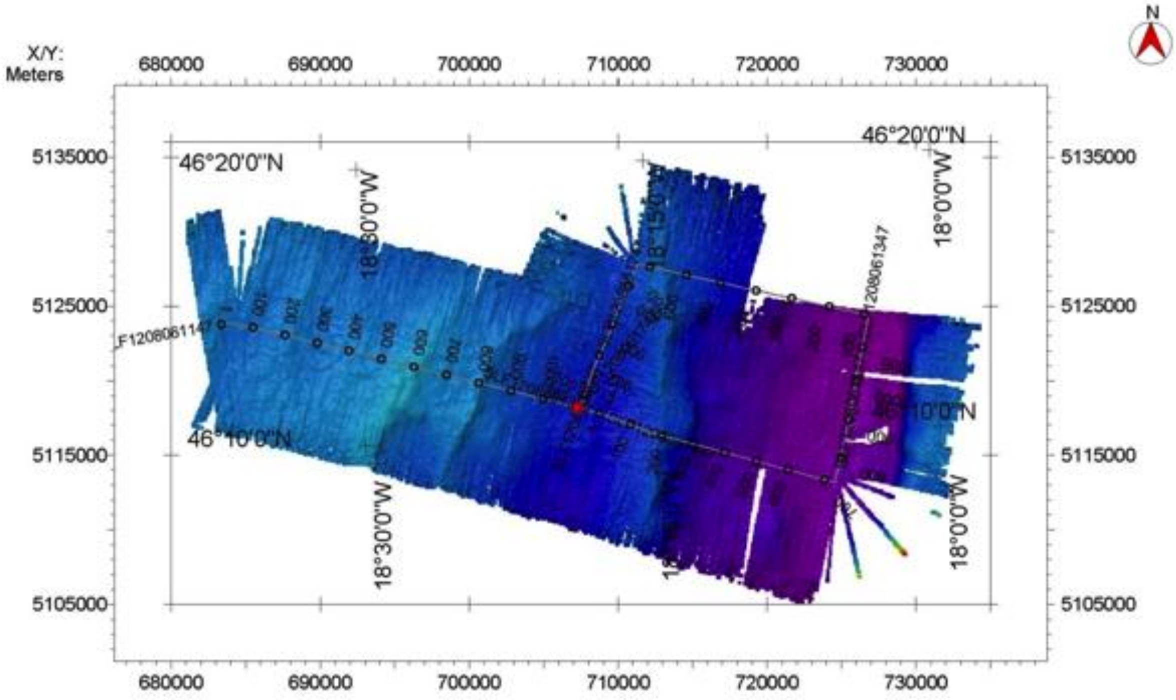


Fig. 25: *Strategy of acoustic survey for Site KTA-05*

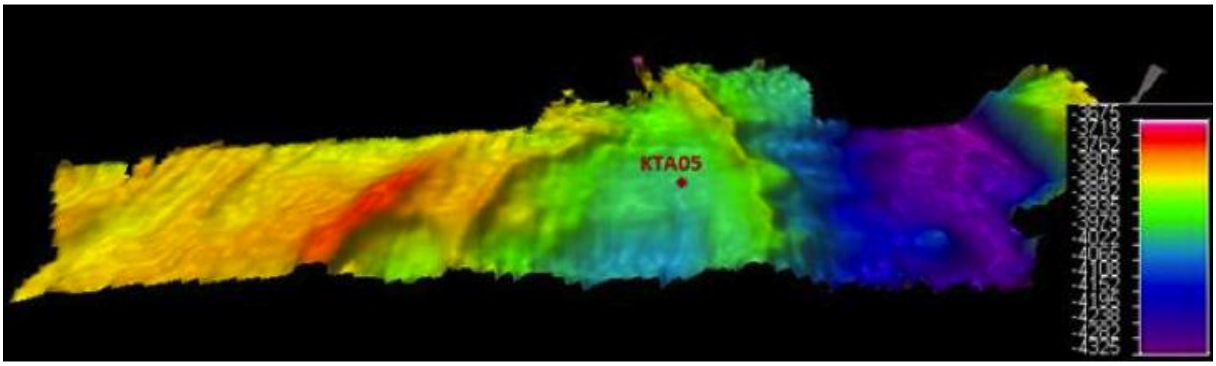


Fig. 26: *Multi-beam detailed bathymetry of Site KTA-05 (x10 vertical magnification). Red dot marks the selected place for sampling.*

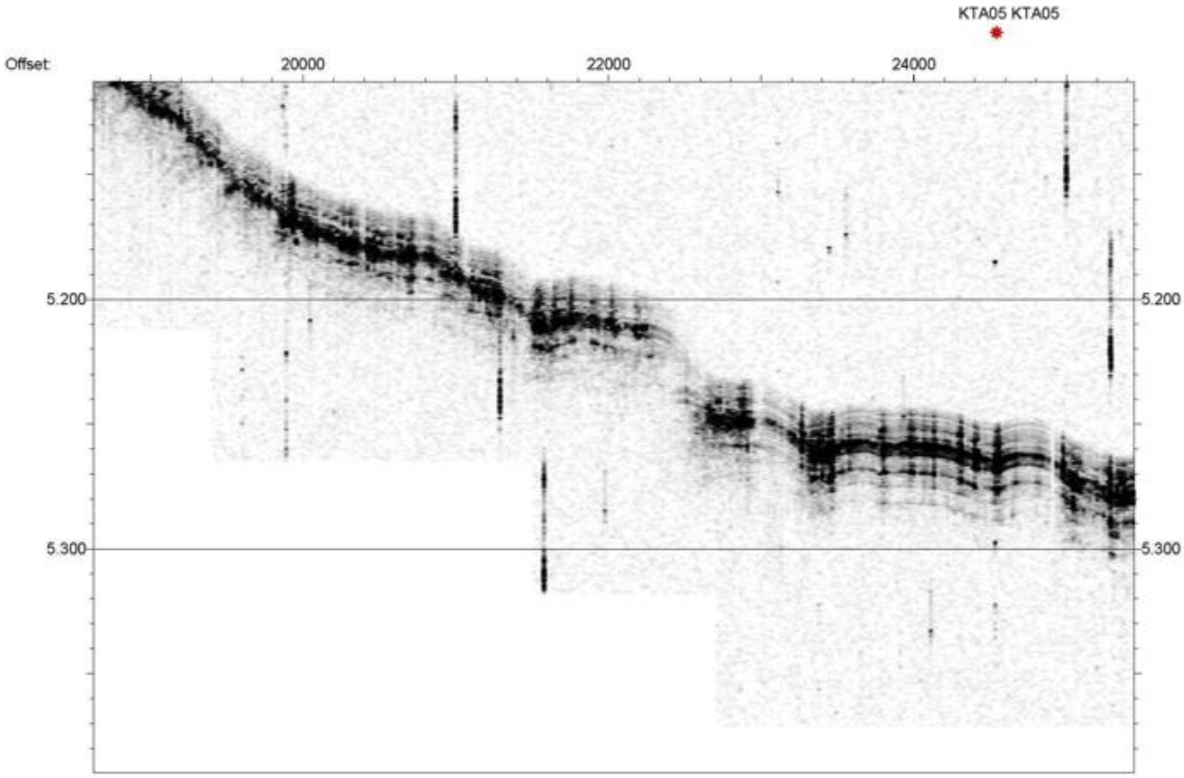


Fig. 27: *High-resolution acoustic profile (Parasound P-35) across Site KTA-05 (red dot)*

Fig. 28: *Conventional and X-ray pictures of core KTA-GC-05*

5.6. SITE KTA-06

DATE/START OF OPERATIONS: 9th August 2012 (09:23 h GMT)

DATE/END OF OPERATIONS: 10th August 2012 (20:02 h GMT)

LATITUDE N: 43.03888 **LONGITUDE W:** -14.05192 **DEPTH:** 5241 m

OPERATIONS:

- Acoustic survey (multi-beam and parasound)
  - 57.14 NM
  - 322 km^2
- CTD:KTA-AQ-05
- BOX-CORER: KTA-BC-06: No recovering because the wire tangled up the spade of the box-corer.
- GRAVITY-CORER: KTA-PC-06A: No recovering after 2 attempts. The corer did not penetrate into the sediment. We decided to change the place to another close point.

LATITUDE N: 42.96925 **LONGITUDE W:** -14.13621 **DEPTH:** 5235 m

- GRAVITY-CORER: KTA-PC-06B: No recovering after 2 attempts. The corer did not penetrate into the sediment.

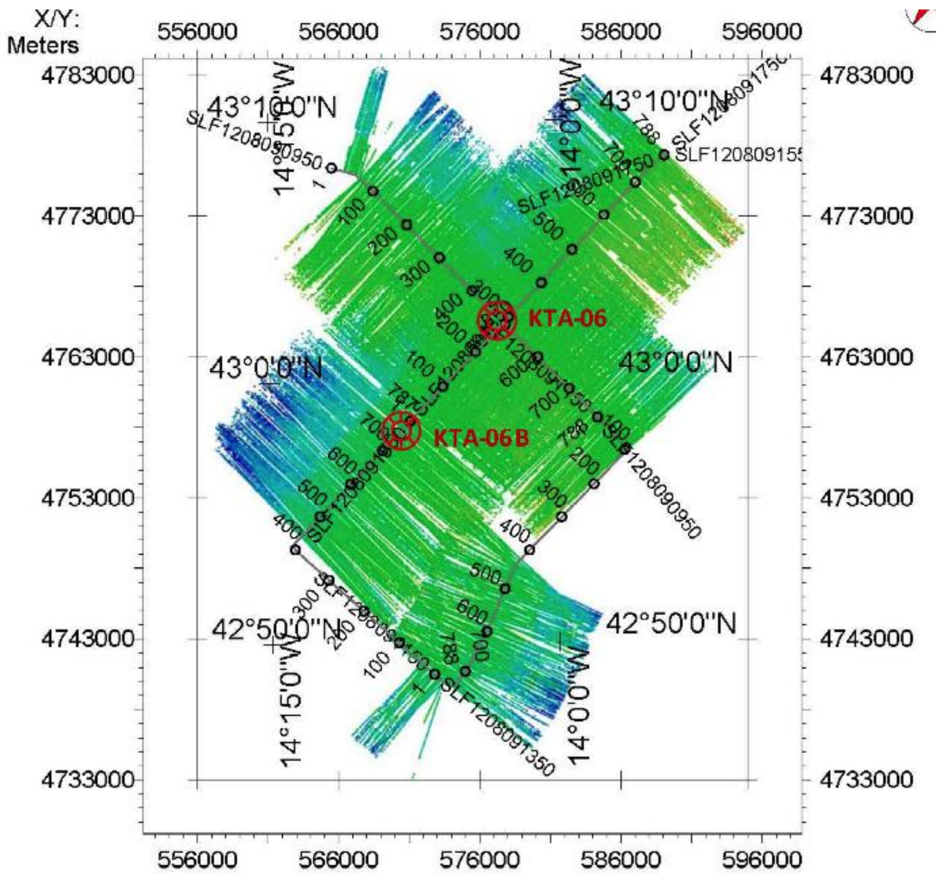


Fig. 29: *Strategy of acoustic survey for Site KTA-06*

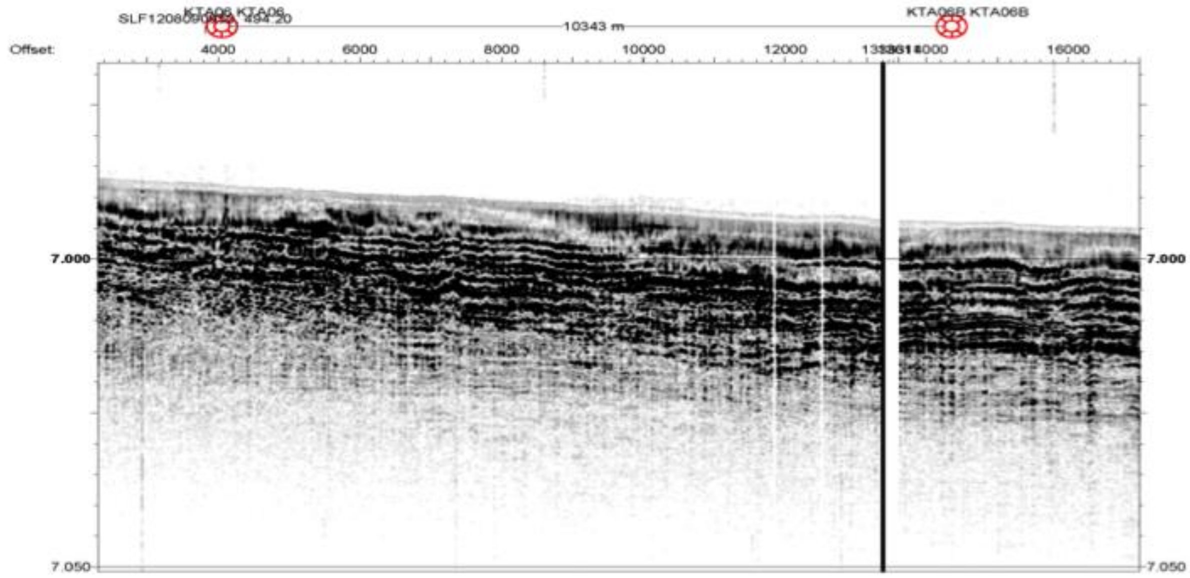


Fig. 30: *High-resolution acoustic profile (Parasound P-35) across Sites KTA-06A and KTA-06B (red dots)*

The cause because it has been impossible the recovering of the sedimentary record is not clear enough. In the four attempts the iron tube and the core catcher come back on deck stained by sediments. Probably, the type of sediments in this area (fine sand?) inhibited the penetration with the gravity corer.

6. FUNCTIONAL LIMITATIONS OF THE EQUIPMENTS

6.1.LENGTH OF WIRE IN THE WINCH FOR PISTON-CORE OPERATIONS.

The current length of iron wire available in the winch devoted to piston-corer operations is about 4200 m, limiting the maneuvers to bottoms shallower than 4000 m. This fact determines the choice of sites for sampling. Because of that it has been necessary the employing of conventional gravity-corer for deeper bottoms, but the penetration into the sediments and the recovering length are potentially lower.

For the aims of Leg 2 it would be desirable the sampling at depths of 4000-5000 m, where the influence of the AABW in the North Atlantic during glacial times was more intense. Considering the compromise between water-column depth and potential length of cores, bottoms between 3000-4000 m have been preferred for sampling.

6.2. MULTIBEAM (Atlas Hydrosweep DS) MALFUNCTIONS.

During the Paleoacid Cruise the multibeam echosounder Atlas Hydrosweep DS have presented several malfunctions resulting in data loss or poor quality data. Such errors occur when the seafloor is flat, without significant reliefs, or randomly in uneven surfaces.

Concerning to flat seafloor, we identify three malfunctions: a) random beams; b) vertical rotation and c) three bands.

a-Random beams

The random beams refers to the horizontal rotation of sounding respect to the vessel track (Fig. 1), resulting in data overlapping and ribbons without recovery. Apparently, this malfunction is not related to vessel course changes but to attitude errors.

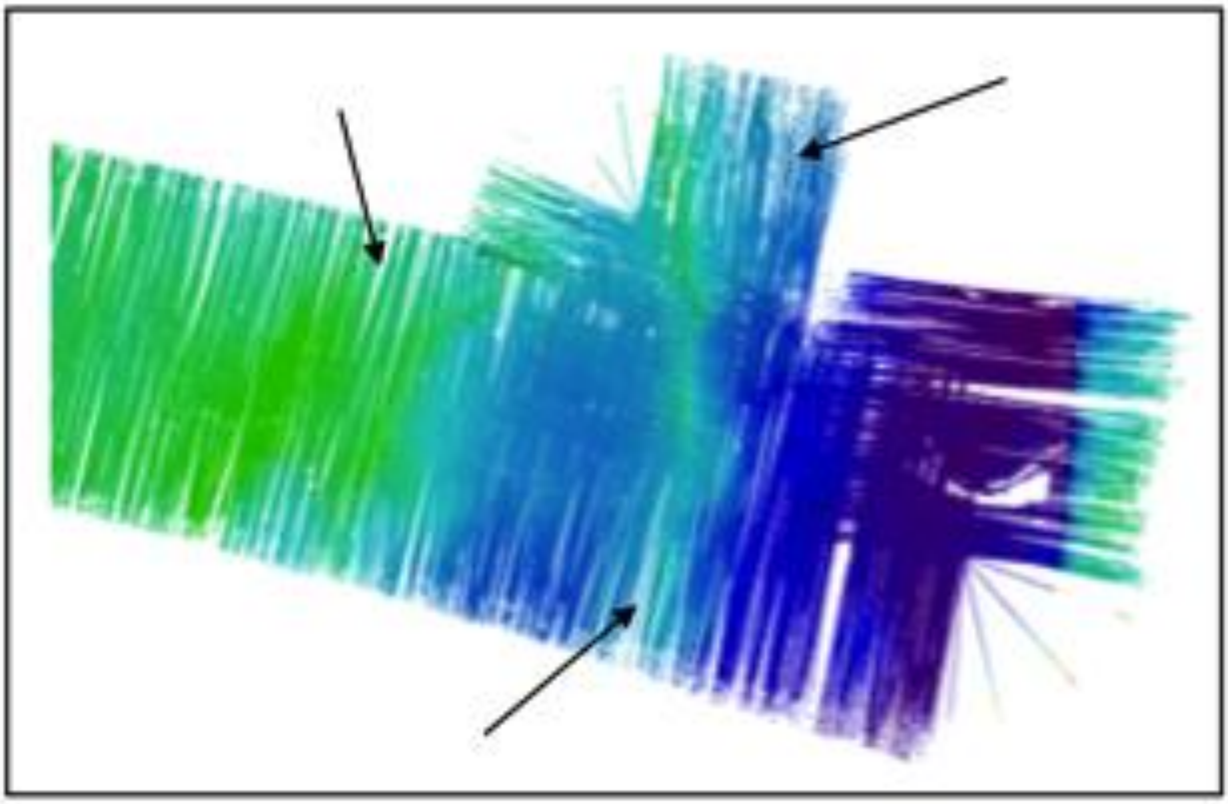


Fig. 31: *Multibeam data illustrating the random beam malfunction. Arrows indicate some examples of this error.*

b-Vertical rotation

In this case we observe vertical rotation of the beams perpendicularly respect to the vessel track, resulting in a “scissors” effect (Fig. 2). Probably this effect is as well related to attitude errors.

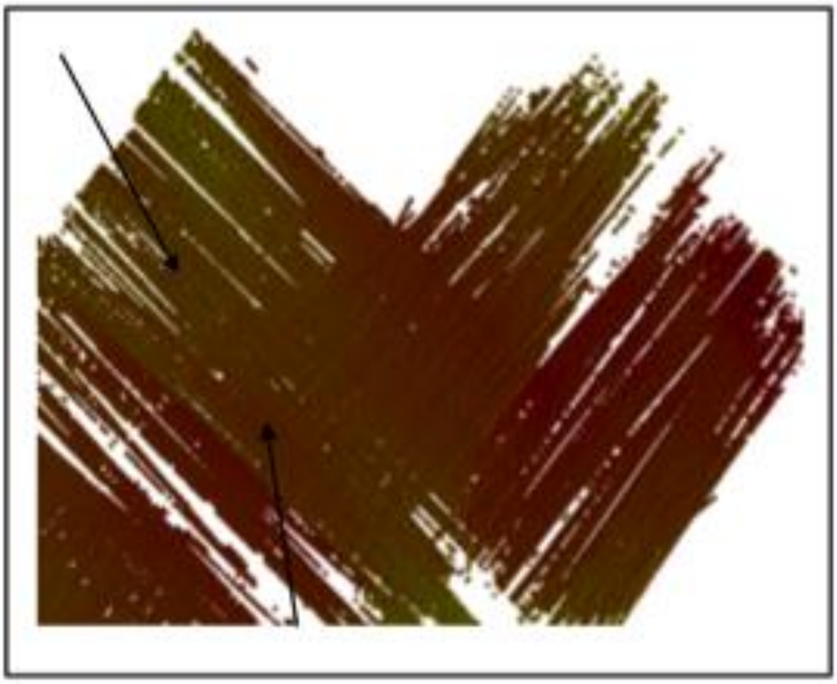


Fig. 32: *Multibeam data illustrating the vertical rotation malfunction. Arrows indicate some examples of this error.*

c- Three bands.

The three bands error occurs parallel to the ship track and is characterized by three parallel ribbons of different depth (Fig. 3). This malfunction seems to be related to electronic components or to algorithms applied to correct hardware-derived effects.

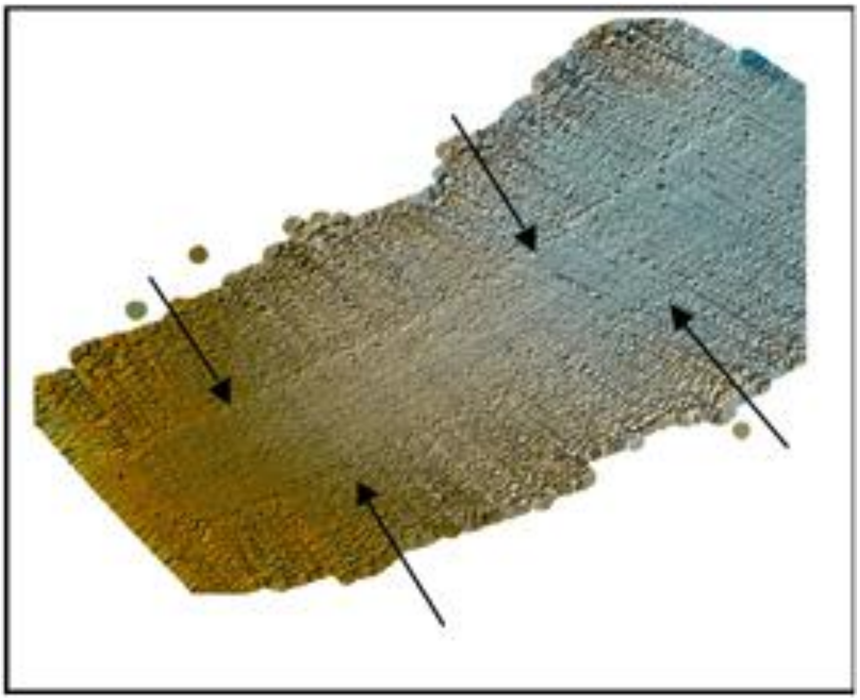
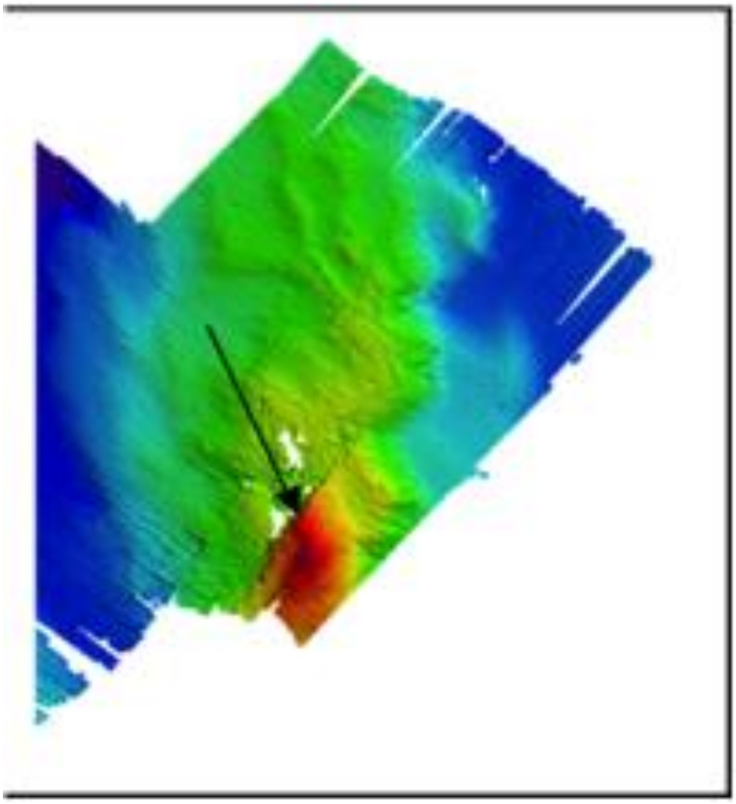


Fig. 33: *Multibeam data illustrating the three bands error. Arrows points out to each ribbon boundary.*



Concerning to uneven surfaces, we identify sudden changes in depth values resulting in unreal steep slopes (Fig. 4). This error occurs along several beams in an apparently good data record but at a given moment a sudden change in depth produce a new series of beams, again, apparently good data. We suggest this problem could be related to the acquisition software.

Figure 34: *Multibeam data illustrating sudden changes in depth values. Arrow points out to a steep slope related to this malfunction.*

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CATARINA Cruise

MISCELLANY

22 June – 12 August 2012

INTERNATIONALIZATION

Several collaborations not included in the CATARINA proposal were established in the frame of the cruise:

-GEOMAR, Helmholtz Centre for Ocean Research Kiel (Germany), in the frame of the European project INGOS to the intercalibration analysis of N_2O and CH_4.

-Institute for Marine and Atmospheric Research Utrecht (Netherlands), in the frame of the European project INGOS to measure atmospheric N_2O.

-University of London (United Kingdom), in the frame of the European project INGOS to measure atmospheric CH_4.

-University of Bremen (Germany), in the frame of the European project CARBOCHANGE. Two students were on board to taking samples for CFCs analysis.

-University Pierre et Marie Curie, LOCEAN, Paris (France). Samples were taken for the isotopes ^{18}O and ^{13}C, and for DIC in the frame of the European project CARBOCHANGE.

OUTREACH

15/06/2012: Talk about the CATARINA project and cruise given by Aida F. Rios on board BIO Sarmiento de Gamboa to the members of the Culture Area of Instituto Cervantes and journalists.

16/06/2012: News about the cruise in the newspapers FARO DE VIGO

16/06/2012: News about the cruise in the newspapers ATLÁNTICO DARIO.

22/06/2012: News about the cruise in the newspapers LA VOZ DE GALICIA

22/06/2012: News about the cruise in the web of CADENA SER (http://www.cadenaser.com/tecnologia/articulo/catarina-parte-vigo-groenlandia-estudiar-efectos-cambio-climatico/csrcsrpor/20120622csrcsrtec_1/Tes)

22/06/2012: News about the cruise in digital newspaper INDURSTRIAS PESQUERAS.COM (http://www.industriaspesqueras.com/noticias/ultima_hora/22609/el_sarmiento_de_gamboa_parte_hacia_groelandia_para_estudiar_el_cambio_climatico_y_la_acidificacion.html)

22/06/2012: News about the cruise in the newspapers ATLÁNTICO DIRARIO (http://www.atlantico.net/noticia/200305/vigo/zarpa/groenlandia/co2/mar/).

22/06/2012: News about the cruise in TVE.

22/06/2012: News about the cruise in ANTENA 3.

22/06/2012: News about the CATARINA cruise in the Delegation of CSIC in Galicia (http://www.facebook.com/pages/CSIC-Galicia/169277349785814).

22/06/2012: Interview about the cruise on CADENA SER in the Program 24 horas.

23/06/2012: News about the cruise in digital newspaper TERRA.NOTICIAS (http://noticias.terra.es/ciencia/cientificos-parten-el-martes-en-el-sarmiento-de-gamboa-para-investigar-el-funcionamiento-del-sistema-climatico,a1b81fc4ed4b8310VgnVCM10000098cceb0aRCRD.html).

23/06/2012: News about the cruise in the newspapers FARO DE VIGO.

23/06/2012: News about the cruise in the newspapers ATLÁNTICO DIARIO.

23/06/2012: News about the cruise in the newspapers LA VOZ DE GALICIA.

24/07/2012: News about the cruise in digital newspaper EUROPAPRESS.ES (http://www.europapress.es/sociedad/medio-ambiente-00647/noticia-cientificos-parten-martes-sarmiento-gamboa-investigar-funcionamiento-sistema-climatico-20120723191828.html).

24/07/12: News about the cruise in digital newspaper GaliciaHoxe.com (http://www.galiciahoxe.com/hemeroteca-web/gh/cientificos-parten-martes-no-sarmiento-gamboa-investigar-sistema-climatico/idEdicion-2012-07-23/idNoticia-757823/).

24/07/2012: News about the cruise in the newspapers EL CORREO GALLEGO.

24/07/2012: News about the cruise in the newspapers LA VOZ DE GALICIA.

24/07/2012: News about the cruise in the newspapers ATLÁNTICO DIARIO.

24/07/2012: News about the cruise in the newspapers FARO DE VIGO.

24/06/2012: Interview on RADIO VOZ.

26/07/2012: News about the cruise in the newspapers LA REGIÓN.

26/07/2012: Interview on CADENA SER (Galicia).

28/06/2012: Interview on RNE (Galicia)

28/06/2012: Interview on RNE (Españoles en la Mar).

29/06/2012: Interview on RADIO VIGO.

01/07/2012: Interview on RADIO VOZ.

02/07/2012: Interview on SI RADIO of Galicia

02/07/2012: Interview on CADENA SER (Madrid).

05/08/2012: News about the cruise in digital newspaper DUVI (http://duvi.uvigo.es/index.php?option=com_content&task=archivesection&id=0&Itemid=23.

09/07/2012: Interview on CADENA SER was included in the web page: http://www.cadenaser.com/tecnologia/articulo/ruta-groenlandia-evaluar-efectos-cambio-climatico/csrcsrpor/20120709csrcsrtec_1/Tes/?regenerate=true&preview=1&time=1341857449

10/07/2012: News about the cruise in digital newspaper DUVI (http://duvi.uvigo.es/index.php?option=com_content&task=view&id=6293&Itemid=23).

11/08/2012: News about the cruise in the newspapers FARO DE VIGO

11/08/2012: News about the cruise in the newspapers LA VOZ DE GALICIA

13/08/12: News about the cruise in the newspapers FARO DE VIGO

13/08/2012: Interview on RADIO VIGO.

13/08/12: Interview on Cadena RNE.

13/08/12: Interview on Cadena RADIO VIGO.

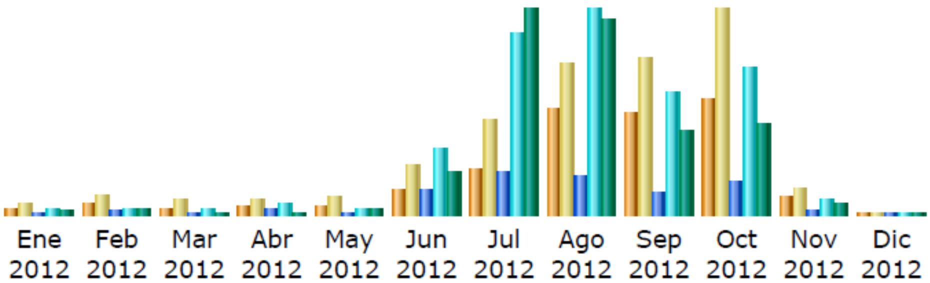
14/08/12: Interview on Cadena RADIO GALEGA.

18/08/12: Interview on ONDA CERO.

BIO Sarmiento de Gamboa in Greenland during CATARINA cruise will be cover in the Journal Thalassas of the University of Vigo, in January 2013.

A blog with information about the activities developed in the CATARINA cruise was alive during both Legs (http://catarina.iim.csic.es/blog). The following figure and table show the historical monthly CATARINA site where one can observe the increase of the visits from the beginning of the cruise and continued until October with high values with a significant decline in November. From June to October a total of 13,993 visits were recorded with 8226 visitors.

Historical monthly CATARINA web



Mes	Visitantes distintos	Número de visitas	Páginas	Solicitudes	Tráfico
Ene 2012	100	238	1204	3666	217.05 MB
Feb 2012	211	402	1812	4604	354.96 MB
Mar 2012	121	316	1306	3910	65.01 MB
Abr 2012	149	300	3638	7090	79.39 MB
May 2012	174	353	1422	4350	419.41 MB
Jun 2012	492	1037	18456	47820	2.67 GB
Jul 2012	924	2037	31298	134410	13.27 GB
Ago 2012	2240	3223	28376	152810	12.54 GB
Sep 2012	2138	3327	16640	90884	5.32 GB
Oct 2012	2432	4369	23864	108730	5.77 GB
Nov 2012	369	566	2088	11234	684.25 MB
Dic 2012	0	0	0	0	0
Total	9350	16168	130104	569508	41.35 GB

INCIDENCES OF THE CRUISE

In the Leg 1 of the cruise CATARINA, we have had bad weather in 3 occasions along the section OVIDE and one in the Labrador Sea section that impeded to end it.

28/06/2012: Station 23 was delayed for 8 hours because wind speed with gust of 30 knots (force 8) and waves of 4-6 meters.

04/07/2012: Station 38 was delayed for 18 hours due to winds speed with gust higher than 25 knots.

11/07/2012: Station 60 was delayed for more than 25 hours also due to winds speed with gust higher than 25 knots.

The protocol used by the UTM technicians to launch the CTD is delimited to the wind speed with gust lower that 25 knots.

There is a passage of storms in the section OVIDE and the probability of occurrence of gusts of 25 knots is of 80%, according to the calculation performed from the three previous campaigns conducted in the same dates (2004, 2006, and 2008). In the five previous expeditions on board R/V Thalassa, not better equipped than the BIO Sarmiento de Gamboa, CTD was launched with force 8 or 9 (39-46, 47-54 knots).

During maneuvers of launch and recovery of the VPM buoy, there were a couple of incidents:

25/06/2012: Station 10, the VMP buoy struck against into the hull of the ship and the float broke in the recovery maneuver.

06/07/2012: Station 43, the VMP buoy did not return to the surface water up to six hours later when we were in transit to station 44. We returned to its position and the VMP buoy was recovered in good condition.

The total delay of more than 50 hours due to weather conditions, coupled with the slow speed of the vessel, which was later increased, led us to reconsider the original plan by removing 3 stations of the OVIDE section, in order to reach the goal closing the section which will allow us to calculate the transport of water, salt, C_{ANT} and other biogeochemical tracers through the section.

The initially 27 proposed stations in the Labrador Sea were redesigned to perform 15. However due to the delay during OVIDE section and a persistent storm in the area close to the Canadian coast, only 8 stations were performed.

Despite the incidences, the balance of the cruise has been positive. We have achieved the posed objectives and a good database. We have had the best team of scientists and technicians on board and an excellent crew.

ACKNOWLEDGEMENTS

We have a great satisfaction by the course of the cruise and, in general terms, the obtained results are very satisfactory because they guarantee the feasibility of aims described in the scientific proposal of CATARINA project.

The success of the cruise has been possible as a far extent thanks to all involved people. Crew, technician and scientific teams were very competent and exhibited a large professionalism and human quality. We enjoyed a friendly atmosphere on board for work and also for spare time and all of them have contributed to safety of operations and quality of data. We thank Arturo Castellón by facilities provided during the cruise preparation. Special thanks to Luis Ansorena both by the facilities provided during the cruise preparation and for his constant support from land during the course of the cruise. Thank you all!