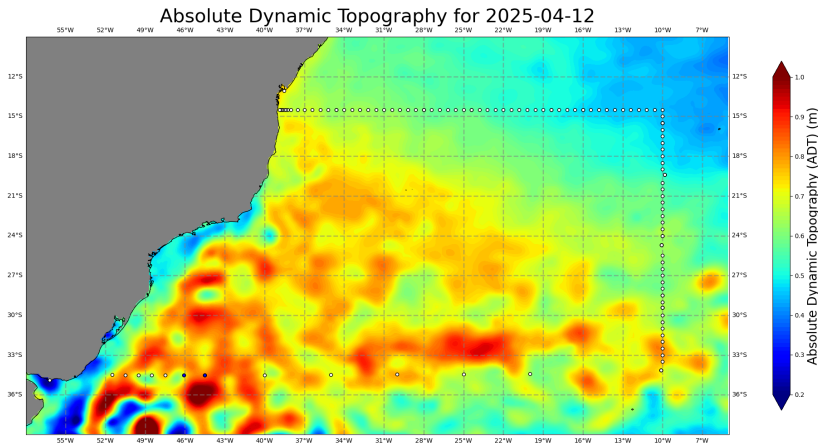


CRUISE REPORT: SACO10W14S



Cruise Summary Information

Expedition designation (ExpoCodes)	SACO10W14S
Chief Scientist	Alonso Hernández Guerra (ULPGC)
Dates	2025 April 9-2025 May 19
Ship	Hespérides
Ports of call	Montevideo (Uruguay)-Salvador de Bahía (Brasil)
Geographical Boundaries	
Stations	74
Floats and drifters deploys	6 BGC, 2 Deep Argo and 10 CORE
Mooring deployed or recovered	0

Chief Scientist Contact Information

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TOPICS

Abstract.....	3
Scientific personal	4
1. Overview.....	5
2. Argo floats.....	9
3. Water Sample Salinity Analysis	10
4. Oxygen sensor calibration during the SACO10W14S	13
5. Argo España	17
6. Argo USA	34

Abstract

A hydrographic section was carried out in the South Atlantic Ocean during April–May 2025 aboard the R/V BIO Hespérides. The survey consisted of a meridional section along 10°W between 34°S and 14°S, and a zonal section along 14°S extending to the Brazilian coast.

The primary objective of the cruise was to recover five PIES that had been deployed along 10°W between 34°S and 14°S in 2021. In addition, the hydrographic stations were designed to measure physical, chemical, and biological ocean parameters with the aim of quantifying water mass, heat, and freshwater transports, as well as other physical and biogeochemical properties in the South Atlantic Ocean, through a box-inverse analysis of the new observations. Several hydrographic sections were also conducted at 34.5°S to calibrate the PIES from the SAMBA array. Furthermore, six BGC, two Deep, and ten CORE Argo floats were deployed during the cruise.

A total of 74 CTD/LADCP stations were occupied across the South Atlantic. In addition to temperature, salinity, and oxygen profiles obtained from the CTD sensors, water samples collected with a 24-bottle rosette were analysed at each station for salinity, dissolved oxygen, and inorganic nutrients. Additional samples were collected at strategically selected stations for pH, alkalinity, nitrogen isotopes, POC, DOC, and eDNA analyses. Furthermore, samples from the ship's underway system were collected to calibrate and complement the continuous measurements provided by the thermosalinograph (TSG).

Full-depth velocity measurements were obtained at every station using a Master and Slave 300 kHz LADCP (Lowered Acoustic Doppler Current Profiler) mounted on the rosette frame. Throughout the cruise, upper-ocean velocity data were continuously collected using the ship-mounted SADCP (Shipboard Acoustic Doppler Current Profiler). Meteorological variables were monitored using the onboard SURFMET surface water and meteorological sampling system. Bathymetric data were collected using a hull-mounted echo sounder.

This report describes the methods used to acquire and process the data collected aboard the vessel during cruise SACO10W14S.

Scientific personal

Name	Role	Affiliation
Alonso Hernández Guerra	Chief Scientist	ULPGC
Mara Navarro Buigues	Physics	ULPGC
Ion Urtiaga Chasco	Physics	ULPGC
Javier Díaz Pérez	Physics	ULPGC
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Miguel Ángel Gutiérrez Guerra	Physics	ULPGC
José María Ramos Fernández	Physics	ULPGC
María del Río Díaz	Physics	ULPGC
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José Escáñez Pérez	Chemistry	CSIC
Laís Baroni Villet	Brazilian observer	Brasil Navy

ULPGC = Universidad de Las Palmas de Gran Canaria

CSIC = Consejo Superior de Investigaciones Científicas

UW = University of Washington

Technical personnel

Name	Role	Affiliation
Didac Casado Rodríguez	Informatic	UTM
Manuel García Salazar	CTD	UTM
Pregrino Cambeiro Beiro	Mechanic	UTM
Noemí Calafat Hernández	CTD	UTM
Camilo Gómez López	CTD	UTM

UTM = Unidad de Tecnología Marina

1. Overview

SACO10W14S consisted of two transoceanic sections along 10°W and 14°S, extending from Montevideo to the Brazilian coast, together with several hydrographic stations occupied at 34.5°S. The cruise entered Brazilian waters after obtaining clearance from the Brazilian authorities. The 10°W section repeated a previous occupation carried out by the same team in 2021, during which three tall moorings and five PIES were deployed along 10°W. The tall moorings were recovered in 2023.

On April 9, the scientific party, technicians, and crew embarked aboard the R/V *Hespérides* in Montevideo (Uruguay). During the initial meeting, the captain informed us that one of the ship's engines had broken down during the Antarctic campaign. As a consequence, the vessel's average cruising speed was reduced to approximately 7 knots instead of the usual 10 knots. This situation forced us to reconsider the original station strategy.

Initially, a total of 100 CTDO (Conductivity–Temperature–Depth–Oxygen) stations were planned using a 24-bottle rosette system. Additional instrumentation mounted on the package included a dual-head WH300 LADCP (Lowered Acoustic Doppler Current Profiler).

The CTD stations at 34.5°S were occupied to calibrate the PIES deployed by NOAA and Brazilian researchers. Unfortunately, weather conditions at Station 1 prevented the completion of the cast. At Station 2, severe weather conditions developed when the CTD package was approximately 500 m above the seafloor, forcing the cast to be terminated prematurely.

After analysing these two stations, a temperature difference of approximately 3×10^{-3} °C was detected between the primary and secondary sensors in the deep layers. To eliminate this discrepancy, the secondary sensor was replaced with a new one, and the corresponding XMLCON configuration file was changed at Station 3. Following the replacement, the temperature difference between the primary and the new secondary sensor decreased to approximately 1×10^{-3} °C, while salinity differences became practically negligible.

Station 6 exhibited a highly noisy temperature signal from the primary sensor. Consequently, only data from the secondary sensor will be used for this station.

Table 1 lists all CTD stations together with the XMLCON configuration files used for processing and the corresponding LADCP filenames. Additional comments describing station-specific issues are included in the final column.

Table 1. CTD cast number, XMLCON file used for processing, corresponding LADCP filename, and comments describing issues encountered during each cast.

CTD	.XMLcom	LADCP Master	LADCP Slave	Comentarios
1	SACO_W10.	MLADC000_0.000	SLADC000_0.000	
2	SACO_W10.	MLADC000.000	SLADC000.000	Se vira antes de llegas al fondo por oleaje
3	SACO_W10_3.	MLADC001.000	SLADC001.000	Se cambia el sensor secundario porque estaba calibrado en 2022 y daba diferencias significativas
4	SACO_W10_3.	MLADC002.000	SLADC002.000	
5	SACO_W10_3.	MLADC003.000	SLADC003.000	
6	SACO_W10_3.	MLADC004.000	SLADC004_0.000	El sensor primario tiene mucho ruido. No valen los datos del sensor primario. Se limpió para la estación siguiente
7	SACO_W10_3.	MLADC005.000	SLADC005.000	
8	SACO_W10_3.	MLADC006.000	SLADC007.000	
9	SACO_W10_3.	MLADC008.000	SLADC008.000	
10	SACO_W10_3.	MLADC009.000	SLADC009.000	
11	SACO_W10_3.	MLADC010.000	SLADC010.000	Posiblemente la rosetta chocó con el fondo ya que el altímetro no saltó. Pusieron, a continuación, dos altímetros. Los datos de salinidad de los últimos metros cerca del fondo son erróneos.
12	SACO_W10_3.	SLADC000.000	MLADC000.000	Se mandó el script del master al slave y del slave al Master. Por eso los ficheros están en carpetas cambiadas
13	SACO_W10_3.	MLADC011.000	SLADC011.000	
14	SACO_W10_3.	MLADC012.000	SLADC012.000	
15	SACO_W10_3.	SLADC001.000	SLADC001.000	Se mandó el script del master al slave y del slave al Master. Por eso los ficheros están en carpetas cambiadas
16	SACO_W10_3.	MLADC013.000	SLADC013.000	
17	SACO_W10_3.	MLADC014.000	SLADC015.000	
18	SACO_W10_3.	MLADC015.000	SLADC016.000	
19	SACO_W10_3.	MLADC016.000	SLADC017.000	
20	SACO_W10_3.	MLADC017.000	SLADC018.000	
21	SACO_W10_3.	MLADC018.000	SLADC019.000	

22	SACO_W10_3.	MLADC019.000	SLADC020.000	
23	SACO_W10_3.	MLADC020.000	SLADC021.000	
24	SACO_W10_3.	MLADC021.000	SLADC022.000	
25	SACO_W10_3.	MLADC022.000	SLADC023.000	
26	SACO_W10_3.	MLADC023.000	SLADC024.000	
27	SACO_W10_3.	MLADC024.000	SLADC025.000	
28	SACO_W10_3.	MLADC025.000	SLADC026.000	
29	SACO_W10_3.	MLADC026.000	SLADC027.000	
30	SACO_W10_3.	MLADC027.000	SLADC028.000	
31	SACO_W10_3.	MLADC028.000	SLADC029.000	
32	SACO_W10_3.	MLADC029.000	SLADC030.000	
33	SACO_W10_3.	MLADC030.000	SLADC031.000	
34	SACO_W10_3.	MLADC031.000	SLADC032.000	
35	SACO_W10_3.	MLADC032.000	SLADC033.000	
36	SACO_W10_3.	MLADC033.000	SLADC034.000	
37	SACO_W10_3.	MLADC034.000	SLADC035.000	Se detiene la bajada a 3602m para reposicionar el barco.
38	SACO_W10_3.	MLADC035.000	SLADC036.000	
39	SACO_W10_3.	MLADC036.000	SLADC037.000	Sonda muy variable. Altímetro no saltó. Largada hasta 4775m
40	SACO_W10_3.	MLADC037.000	SLADC038.000	
41	SACO_W10_3.	MLADC038.000	SLADC038.000	El slave tarda mucho en descargar
42	SACO_W10_3.	MLADC039.000	SLADC040.000	
43	SACO_W10_3.	MLADC040.000	SLADC041.000	
44	SACO_W10_3.	MLADC041.000	SLADC042.000	
45	SACO_W10_3.	MLADC043.000	SLADC044.000	Se demoró el congelar los tubos de nutrientes por 20-30 minutos
46	SACO_W10_3.	MLADC044.000	SLADC045.000	
47	SACO_W10_3.	MLADC045.000	SLADC046.000	
48	SACO_W10_3.	MLADC046.000	SLADC047.000	
49	SACO_W10_3.	MLADC047.000	SLADC048.000	
50	SACO_W10_3.	MLADC048.000	SLADC049.000	
51	SACO_W10_3.	MLADC049.000	SLADC050.000	
52	SACO_W10_3.	MLADC050.000	SLADC051.000	
53	SACO_W10_3.	MLADC051.000	SLADC052.000	

54	SACO_W10_3.	MLADC052.000	SLADC053.000	
55	SACO_W10_3.	MLADC053.000	SLADC054.000	
56	SACO_W10_3.	MLADC054.000	SLADC055.000	
57	SACO_W10_3.	MLADC055.000 MLADC06.000	SLADC056.000	El fichero Master se dividió en dos
58	SACO_W10_3.	MLADC057.000	SLADC057.000	
59	SACO_W10_3.	MLADC058.000	SLADC058.000	
60	SACO_W10_3.	MLADC059.000	SLADC059.000	
61	SACO_W10_3.	MLADC060.000	SLADC060.000	
62	SACO_W10_3.	MLADC061.000	SLADC061.000	Los dos ficheros se encuentran en la carpeta del Master
63	SACO_W10_3.	MLADC062.000 MLADC063.000	SLADC062.000 SLADC063.000	Se crearon dos ficheros. Se utilizó solo el 062 para el procesamiento.
64	SACO_W10_3.	MLADC064.000	SLADC064.000	
65	SACO_W10_3.	MLADC065.000	SLADC065.000	
66	SACO_W10_3.	MLADC066.000	SLADC066.000	
67	SACO_W10_3.	MLADC067.000	SLADC067.000	
68	SACO_W10_3.	MLADC068.000	SLADC068.000	
69	SACO_W10_3.	MLADC069.000	SLADC069.000	
70	SACO_W10_3.	MLADC070.000	SLADC070.000	
71	SACO_W10_3.	MLADC071.000	SLADC071.000	
72	SACO_W10_3.	MLADC072.000	SLADC072.000	
73	SACO_W10_3.	MLADC073.000	SLADC073.000	
74	SACO_W10_3.	MLADC074.000	SLADC074.000	

2. Argo floats

Table 2. Argo floats deployed during the cruise

Type	Float ID	Latitude	Longitude	Water Depth (m)	Deployment Date	Deploy. Time (UTC)
BGC	1647	-34:29.99	-44:30.08	4637	14/04/2025	15:06
CORE	2001	-34:29.94	-39:59.53	4714	15/04/2025	17:32
Deep-Argo	AD1700	-34:08.40	-10:07.36		22/04/2025	19:05
CORE	2002	-33:28.80	-35:0.33	4114	16/04/2025	22:10
CORE	7971	-34:29.60	-29:59.57	3190	17/04/2025	03:00
CORE	7992	-34:26.39	-24:59.84	3380	19/04/2025	05:50
CORE	11500	-34:25.19	-19:59.95	3929	20/04/2025	08:27
BGC	1663	-29:24.50	-9:59.60	4023	25/04/2025	02:10
Arvor	24SP001	-29:23.69	-9:59.61		25/04/2025	02:00
Arvor	24SP003	-24:42.81	-10:04.86		26/04/2025	19:20
BGC	1649	-24:41.90	-10:04.78		26/04/2025	19:20
Arvor	24SP002	-19:23.81	-9:50.85		29/04/2025	02:25
Deep-Argo	AD1700-24SP002	-14:29.99	-10:00.28		02/05/2025	02:35
BGC	1644	-14:29.25	-16:01.28	3857	04/05/2025	20:47
Argo	AE2600-24SP004	-14:29.99	-18:23.95		06/05/2025	03:00
BGC	1662	-14:29.79	-24:34.90	5000	10/05/2025	19:34
Argo	AI2632-24SP001	-14:29.55	-28:21.34		12/05/2025	16:58
BGC	1586	-14:30.00	-34:36.62	4595	15/05/2025	23:25

Continuous underway sampling included: 75 kHz vessel mounted ADCPs (VMADCP); thermosalinograph (TSG); surface meteorology; bathymetry; pCO₂.

3. Water Sample Salinity Analysis

(María del Río Díaz)

3.1 Sampling

Salinity samples were collected at each station from multiple depths, ranging from the bottom to 2000 meters. Samples were stored in 500 mL bottles with airtight caps. Prior to sampling, each bottle was rinsed three times with water drawn from the corresponding Niskin bottle on the CTD rosette. Bottles were then filled almost to the top, leaving a small air gap to accommodate thermal expansion. Once a sampling box was full, it was placed in the constant temperature (CT) laboratory and left to equilibrate with the ambient laboratory temperature for at least 24 hours.

3.2 Laboratory Setup

Salinity measurements were carried out using a Guildline 8410A Portable Salinometer (serial number: 64236). The temperature of the Portasal's water bath was maintained at 30°C and checked before, during, and after each analytical session. The laboratory temperature remained between 27.5°C and 29.5°C, slightly lower than the water bath temperature.

3.3 Analysis

Salinity analyses were conducted once at least three sampling boxes had equilibrated to room temperature. Each analytical session included at least one standard seawater sample. The procedure involved repeated measurements of the standard until stable readings were obtained, after which the instrument was standardized. Standard seawater was provided by Ocean Scientific Instruments Ltd. (OSIL), batch number P168, with a K15 ratio of 0.99993 and a K15 ratio x2 of 1.99986.

For each sample, the bath temperature, conductivity ratio, and salinity were recorded. All data were logged into an Excel spreadsheet using the Portasal's digital display. After processing data, it was determined that the error associated with sensor 1 is slightly lower than that of sensor 2. Therefore, all subsequent figures and calculations are based exclusively on the data from sensor 1.

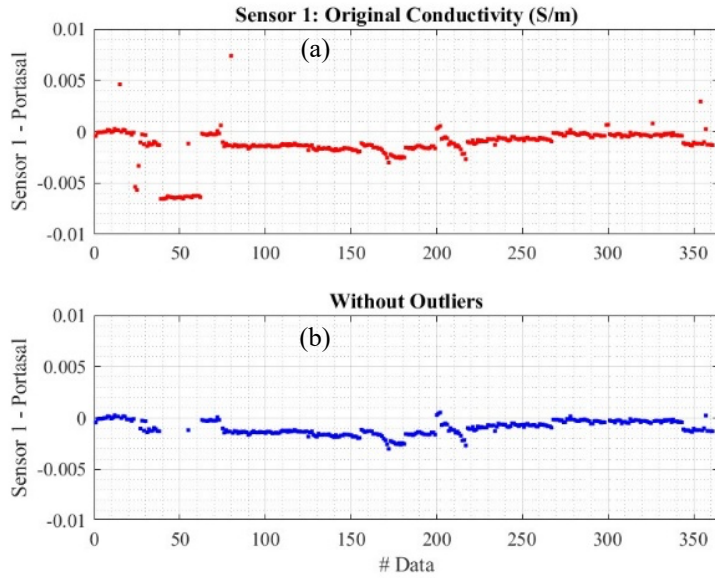


Figure 1. (a) Conductivity from the CTD first conductivity sensor minus the Portasal bottle-obtained conductivity. (b) The same but filtering out the outliers.

Figure 1a shows the differences between the conductivity values measured by the CTD's second sensor and those obtained from the Portasal salinometer. Figure 1b displays the same comparison after excluding outliers, which were defined as values exceeding ± 0.0018 S/m from the mean (i.e., one standard deviation). This threshold resulted in retaining approximately 90% of the original dataset.

3.4 Processing

Data processing was carried out using MATLAB. The first step involved the identification and removal of outliers. Next, the conductivity values from the Portasal were calculated using the following relationships:

$$C = C_R \times \frac{C_{35,15,0}}{10} \qquad C_R = sw_cndr(S, T_{ITS-68}, p)$$

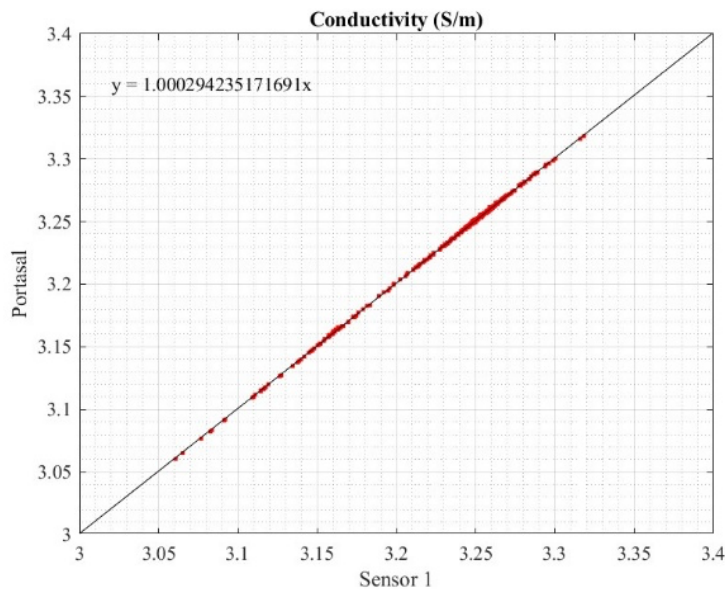


Figure 2. Calibration of the second CTD conductivity sensor by the Portasal. The linear model applied to the calibration is shown in the figure.

where C is the conductivity, CR is the conductivity ratio, and $C_{35,15,0}$ is the conductivity of standard seawater at 35 PSU, 15 °C, and 0 dbar. The MATLAB routine `sw_endr` (P. Morgan, 1994) was used to compute conductivity ratios based on $C_{35,15,0}$. S represents the salinity measured by the Portasal, T_{ITS-90} is the in situ temperature on the ITS-90 scale, and p is the in situ pressure.

Following this, the calibration slope between the CTD conductivity and the Portasal conductivity was calculated as recommended in Sea-Bird's Application Note 31:

$$Slope = \frac{\sum_{i=1}^n (\alpha_i)(\beta_i)}{\sum_{i=1}^n (\alpha_i)(\alpha_i)} \quad (\text{typically } > 1.0)$$

where α represents the CTD conductivity, β the Portasal conductivity, and n the number of bottle samples. The calculated slope was subsequently filtered to remove outliers by applying a threshold range of 1 ± 0.0018 . The resulting slope distribution is presented in Figure 2.

Salinity was calculated from conductivity using the MATLAB function `sw_salt`, which derives salinity based on the conductivity ratio (CR), in situ temperature (ITS-90), and in situ pressure. The relative error of the calculated salinity was then evaluated against the salinity measured by the Portasal. Based on this, the total salinity error was estimated as follows:

$$Error = \sqrt{\sum (E_{relative})^2}$$

The error in the salinity calculated from Sensor 1 data is 0.0042 psu.

3.5 References

SEAWATER: A Library of MATLAB Computational Routines for the Properties of Sea Water (1994). Phillip P. Morgan. CSIRO Marine Laboratories Report 222. 29pp.

Computing Temperature & Conductivity Slope & Offset Correction Coefficients from Lab Calibration & Salinity Bottle Samples. Application Note 31 (revised 2016). 1-8pp. SeaBird Scientific.

7. Oxygen sensor calibration during the SACO10W14S

Only one oxygen sensor was used during the SACO10W14S cruise. The values of the sensor are compared with the values obtained using the Winkler method for the water samples of the Niskin bottles. The samples were analyzed by José Escánez.

All oxygen values are given in $\mu\text{mol}/\text{kg}$. In Figure 1, the difference between sensor measurements and Winkler estimations is shown. The mean difference between sensor and Winkler is $7.37 \mu\text{mol}/\text{kg}$, that is, 3.8% of the mean value of the sensor and 3.7% of the mean value of the Winkler. The standard deviation is $4.39 \mu\text{mol}/\text{kg}$. The plot does not reveal the existence of drift in the sensor.

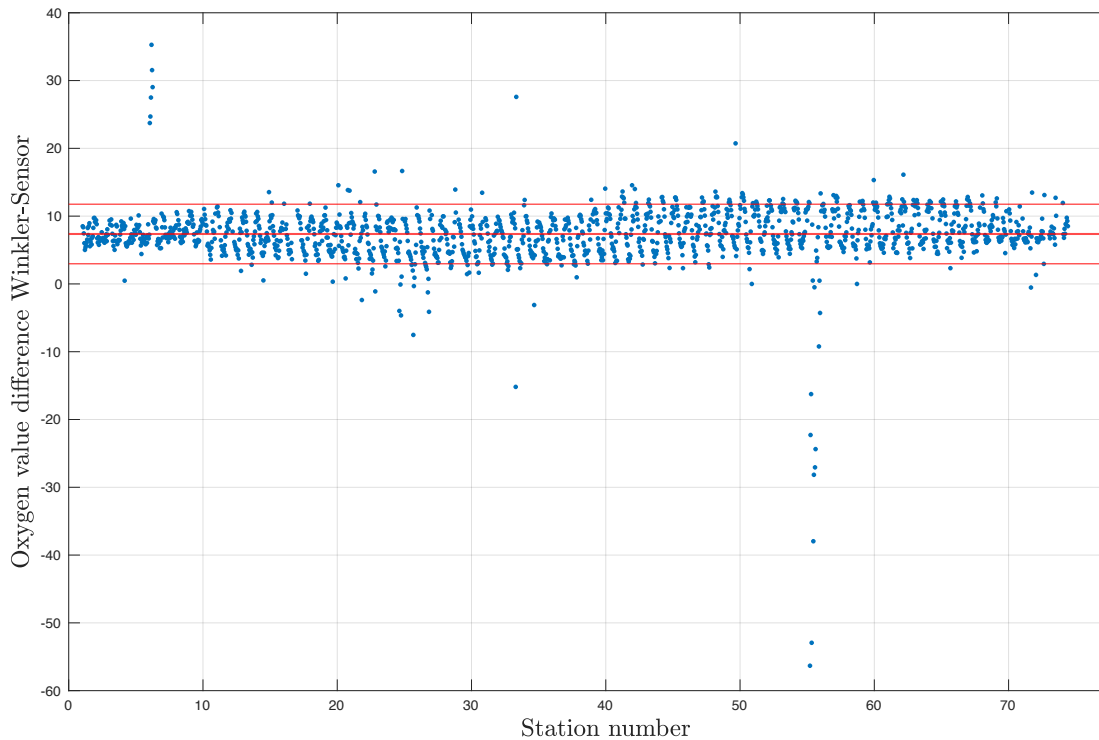


Figure 1. Difference between the oxygen sensor measurements and the Winkler estimations (in $\mu\text{mol}/\text{kg}$) for all the Niskin bottles closed during the cruise.

Additionally, for both the Winkler and the sensor, the pressure (in *dbar*) has been represented against the oxygen values (see Figure 2 below).

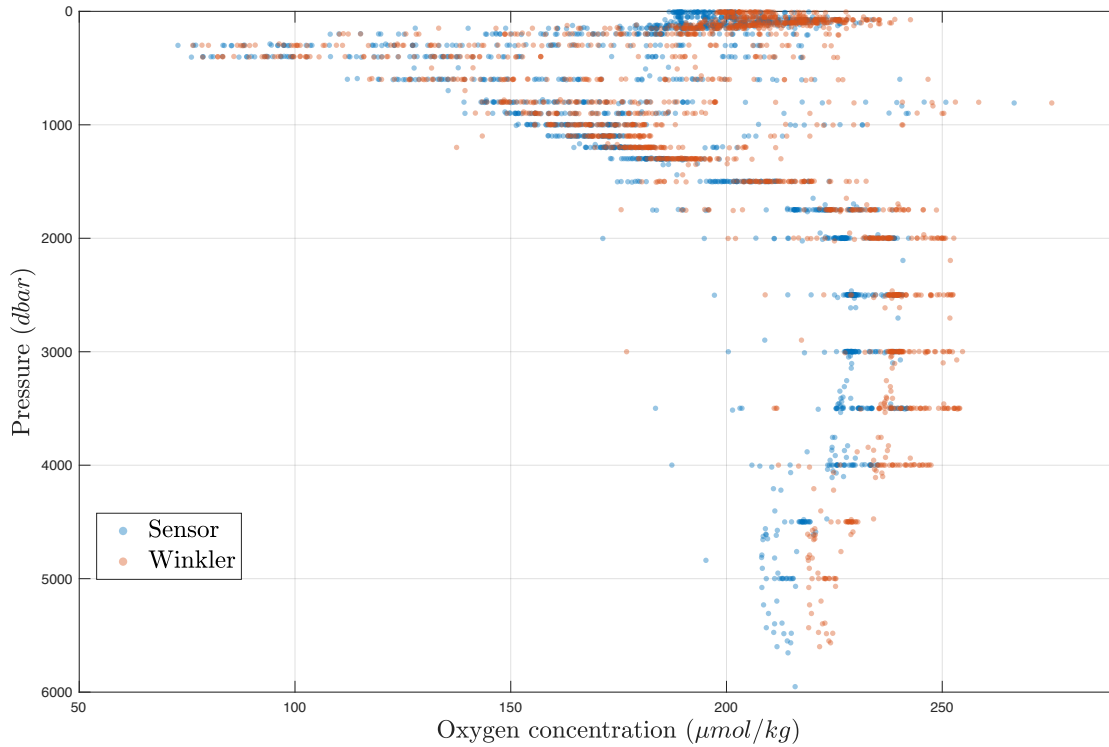


Figure 2. Winkler estimations and sensor measurements as a function of pressure.

It is clear from Figure 2 that the sensor underestimates the oxygen concentration. Because this is more obvious for larger pressure values (due to higher spacing between the bottles), we have additionally calculated the percentage of oxygen values from the sensor that are smaller than the corresponding Winkler estimates for (a) the whole water column, (b) pressure values smaller than 2000 dbar, (c) pressure values smaller than 1000 dbar and (d) pressure values smaller than 500 dbar.

	Full water column	< 2000 dbar	< 1000 dbar	< 500 dbar
Percentage of sensor values that are smaller than their corresponding Winkler estimation	98.49	96.82	96.48	95.71

Now, to calibrate the oxygen estimates of the sensor, the Winkler values are plotted against the sensor values (see Figure 3) and a linear model of the shape $y = \alpha x$ (that is, a line with zero intercept) is performed. This way, we obtain a single correction ratio for all the oxygen measurements, and we keep the corresponding definition given in SeaBird’s Application Note 64-2. Because some of the Winkler-Sensor pairs obtained were not realistic, we have filtered the dataset in such way that the only values considered for the linear regression are those whose values lie between the mean difference minus one standard deviation and the mean difference plus one standard deviation (this can be easily understood by seeing Figure 1). In Figure 3, pink crosses are the values that have been left out of the linear model, while blue dots are the values that are used for the linear regression. The resulting slope is 1.039 (showing more decimals 1.038954378713730).

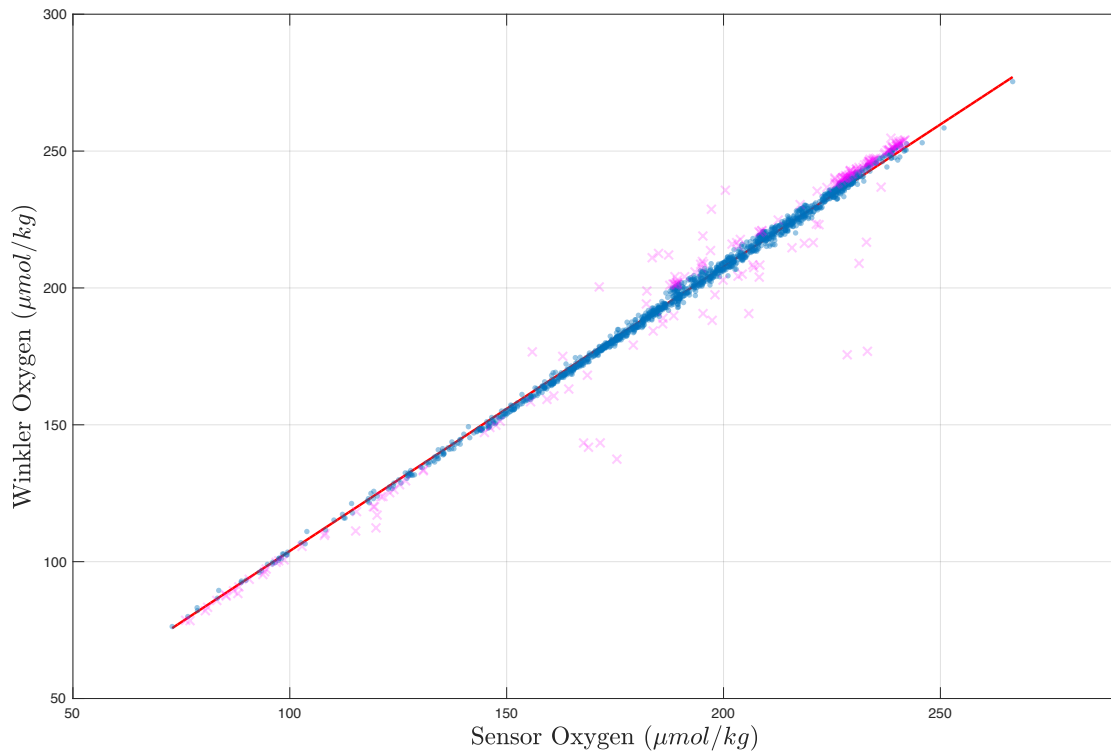


Figure 3. Discarded values for the linear regression (pink crosses), used values (blue dots) and the resulting (red) line of best fit.

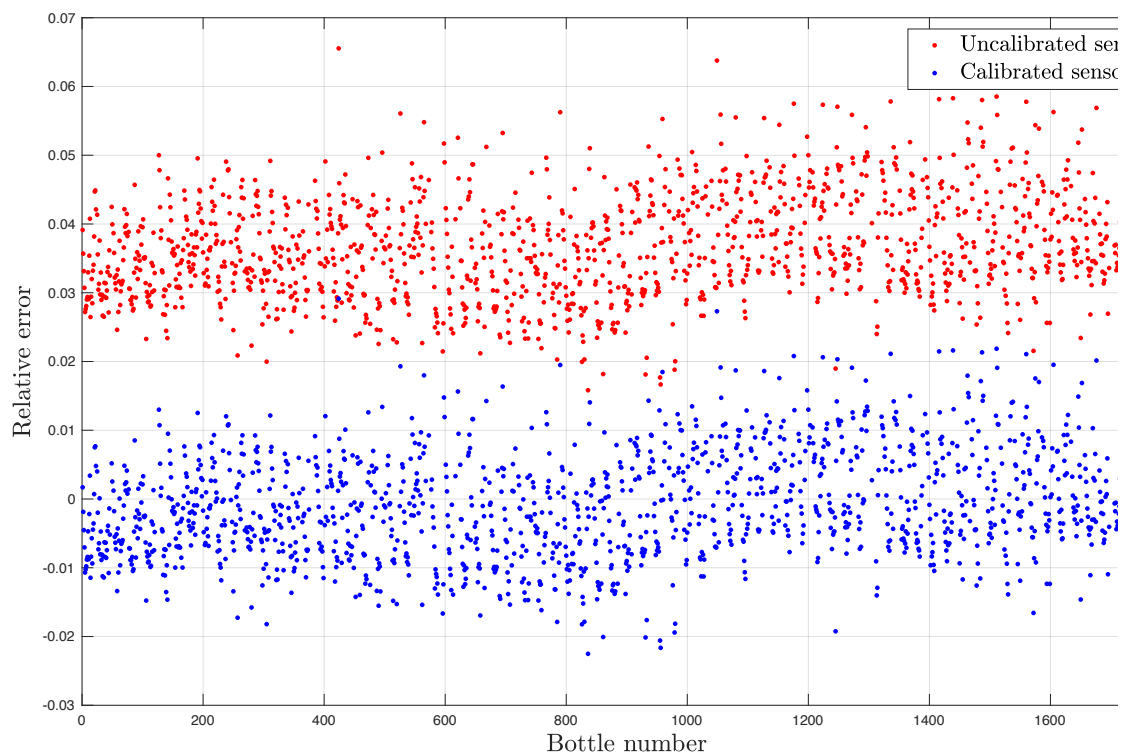


Figure 4. Relative error between Winkler and sensor measurements before (red dots) and after (blue dots) the calibration.

Finally, the correction ratio (slope) obtained is used to calibrate the sensor measurements by multiplying the original sensor values by the slope. The relative error between the

sensor measurements and the Winkler estimations (reference/*true* value) has been calculated both before and after the calibration (see Figure 4 above). It becomes clear that the error notably reduces after the calibration since it is centered around 0 while previously it was around 0.3-0.4. Thus, the slope that has been obtained will be applied to the SeaBird data processing software for the oxygen sensor to reprocess all the cruise stations.

References

SBE 43 Dissolved Oxygen Sensor Calibration and Data Corrections. Application Note 64-2 (revised January 2024). SeaBird Electronics, Inc.

Argo-España

Parte de la estrategia global de observación del océano



Report on Argo float deployments during SACO_10W_14S cruise

ARGO ESPAÑA – IEO - SOCIB / 25 – 94

Argo float deployment for
WMO 7902236, 1902732, 6990677,
7902237, 2903947, 3902624 and 3902625

May 16, 2025

A. González-Santana - L. Díaz-Barroso
Instituto Español de Oceanografía (IEO) - Sistema de Observación y Predicción
Costero de las Illes Balears (SOCIB)

1. Deployment design

Following the objectives of the Argo program, the float density criteria requires a 3° x 3° grid cell coverage distribution (Fig. 1). To maintain the global coverage of the Argo network and considering the current distribution of Argo floats, the IEO - CSIC (Spanish Institute of Oceanography – Spanish National Research Council), in collaboration with the Instituto de Oceanografía y Cambio Global (IOCAG) of Universidad de Las Palmas de Gran Canaria (ULPGC), planned the deployment of seven Argo floats in the South Atlantic Ocean.

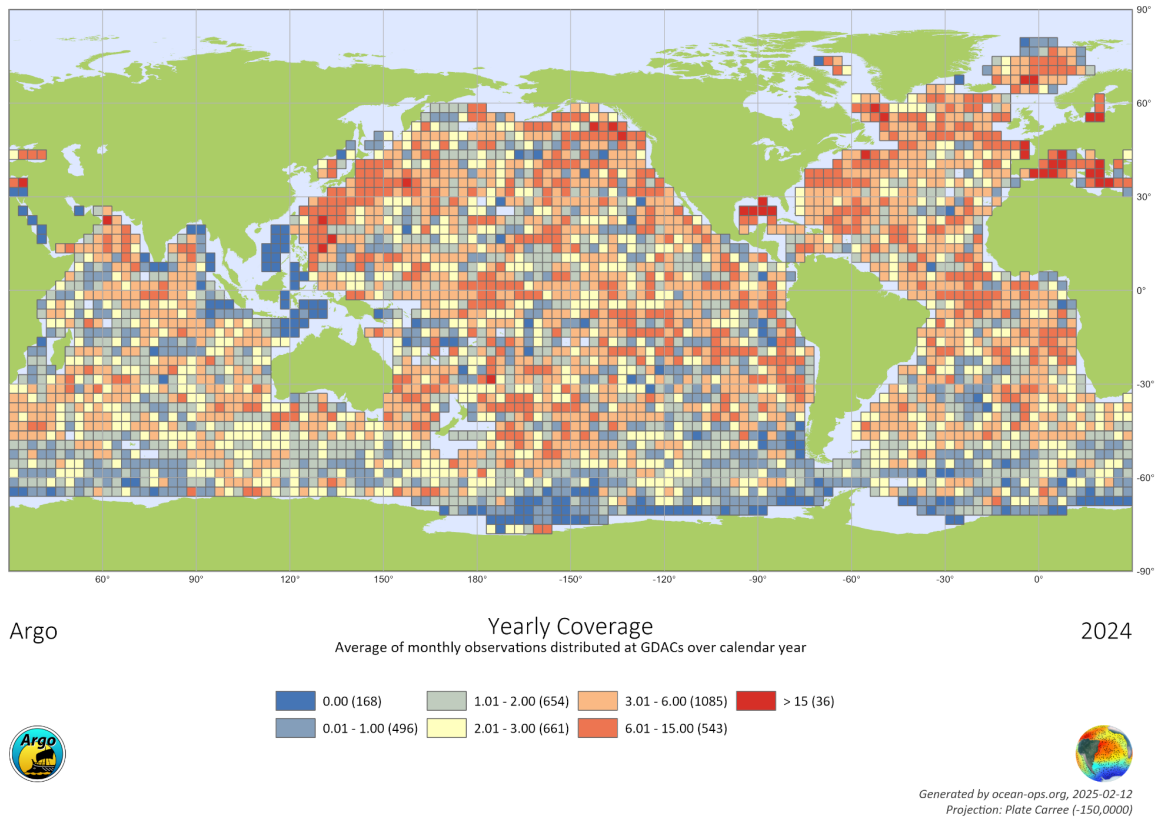


Figure 1. Density of Argo observations in the year 2024.

The SACO_SO_10W_14S cruise consisted of 76 stations distributed between 14° - 40°S latitude and 60° - 10°W longitude (Fig. 2). Transects located along 14°S and 10°W were selected to carry out the deployments. The research cruise was conducted aboard the R/V Hespérides, and the cruise team led by principal investigator Alonso Hernández Guerra (Universidad de Las Palmas de Gran Canaria - ULPGC) managed the launch of the floats in coordination with the Argo Spain staff.

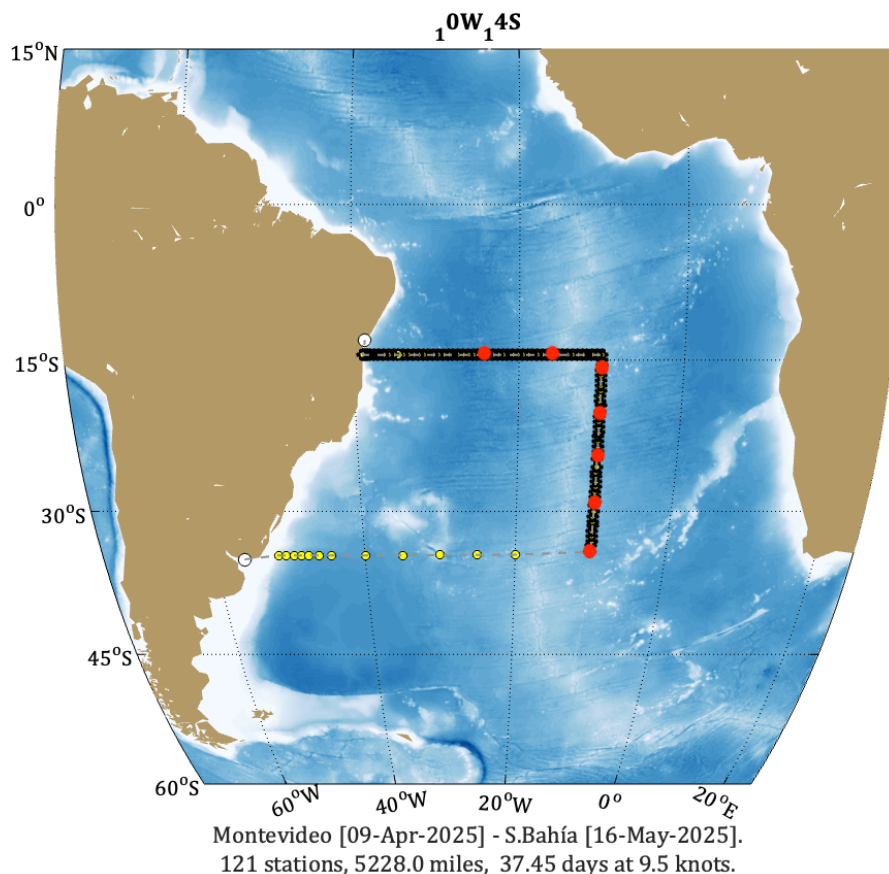


Figure 2. Deployment stations during SACO_SO_10W_14S cruise. Argo floats deployment locations in red.

2. Deployments' data

Information of the floats' deployment is shown next:

- a. **WMO 3902624.** All the data of the WMO 3902624 deployment during the SACO_10W_14S cruise is contained in the next table. The launch procedure for this profiler did not follow Argo Spain's guidelines. After analyzing the profiler's condition, any malfunctions have been ruled out. A CTD cast at the deployment location is available (Fig. 3b). Coriolis was notified on May 02, 2025, and all the information was registered at the Argo Information Center database. The data is free and publicly available through the Argo data stream:

<http://www.oceanografia.es/argo/datos/floats/3902624.html>

DATE AND TIME	22 - 04 - 2025 / 02:13 UTC
DEPLOYMENT LOCATION	34.1398 S 10.1226 W
DEPLOYMENT PLATFORM	R/V Hespérides
CRUISE ID	SACO_10W_14S
FLOAT OWNER	IEO-CSIC
PLATFORM TYPE	DEEP ARVOR
SERIAL NUMBER	AD1700 - 24SP001
TRANSMISSION SYSTEM	IRIDIUM
SENSORS	CTD

PARKING DEPTH (m)	1000
PROFILE DEPTH (m)	4000
DEPLOYMENT DEPTH (m)	>2000
WEATHER CONDITIONS	Rough
DEPLOYMENT OPERATOR	José Manuel and María

Table 1. WMO 3902624 information deployment.

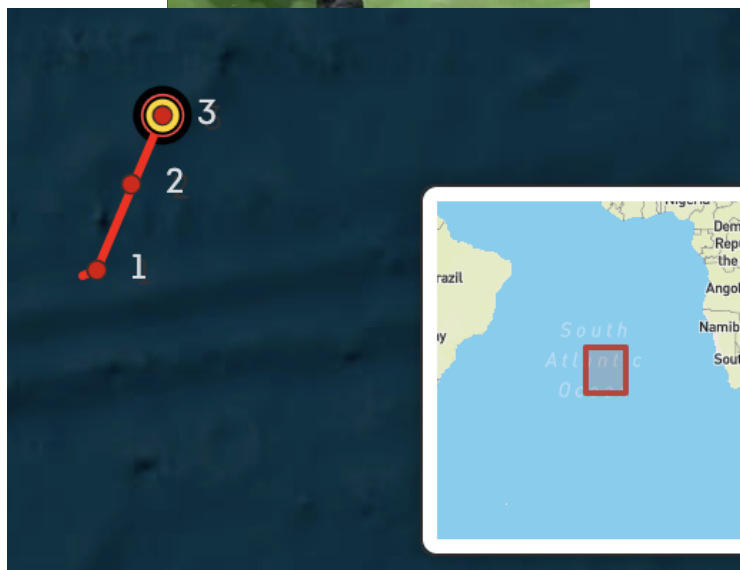
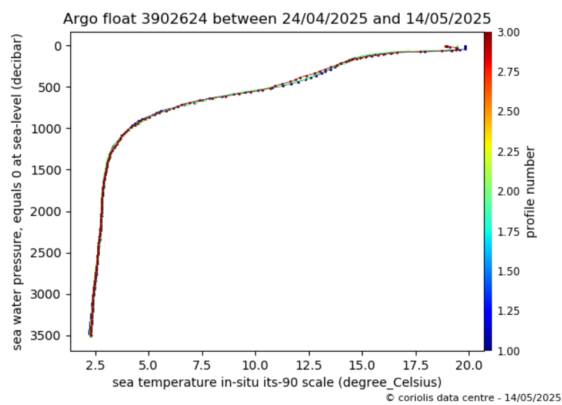


Figure 3a (left). Deployment maneuver of float 3902624 from R/V Hespérides. Figure 3b (right), deployment location and trajectory.

Overlaid profiles TEMP



Overlaid profiles PSAL

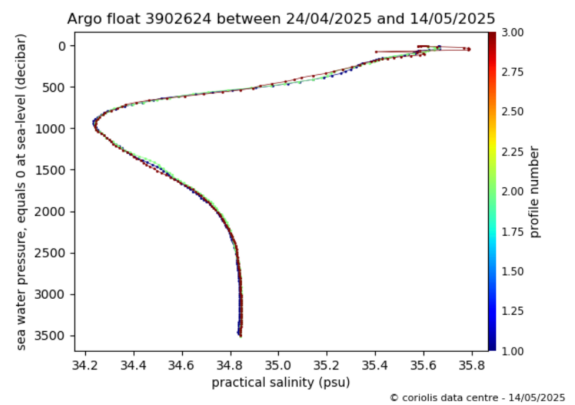


Figure 4. Overlaid temperature and salinity profiles from data collected by WMO 3902624.

- b. **WMO 3902625.** The following table contains all the data of the WMO 3902625 deployment during the SACO_10W_14S cruise. No troubled issues during the deployment were reported. CTD cast is available at the deployment location. Coriolis was notified on May 02, 2025. All the information was registered at the Argo Information Center database. The data is free and publicly available through the Argo data stream:

<http://www.oceanografia.es/argo/datos/floats/3902625.html>

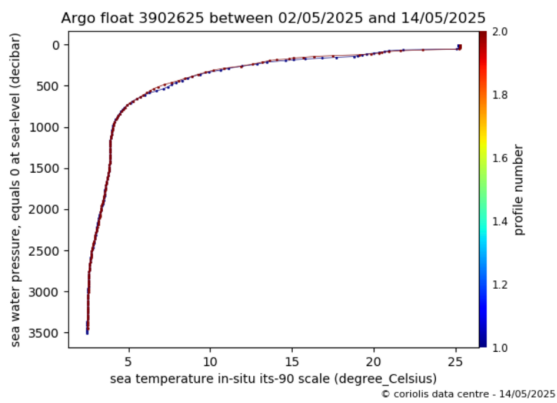
DATE AND TIME	02 - 05 - 2025 / 02:35 UTC
DEPLOYMENT LOCATION	-14.4998, -10.0047
DEPLOYMENT PLATFORM	R/V Hespérides
CRUISE ID	SACO_10W_14S
FLOAT OWNER	IEO-CSIC
PLATFORM TYPE	DEEP ARVOR
SERIAL NUMBER	AD1700-24SP002
SENSORS	CTD
TRANSMISSION SYSTEM	IRIDIUM
PARKING DEPTH (m)	1000
PROFILE DEPTH (m)	4000
DEPLOYMENT DEPTH (m)	>2000
WEATHER CONDITIONS	Rough
DEPLOYMENT OPERATOR	María y Dani

Table 2. WMO 3902625 information deployment.



Figure 5a (left). Deployment maneuver of the float WMO 3902625 from R/V R/V Hespérides. Figure 5b (right), deployment location and trajectory.

Overlaid profiles TEMP



Overlaid profiles PSAL

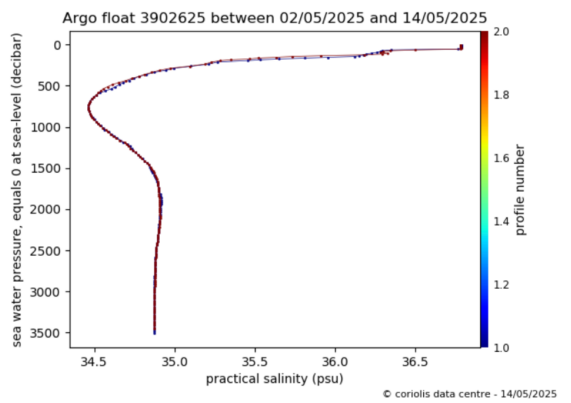


Figure 6. Overlaid temperature and salinity profiles from data collected by WMO 3902625.

- c. **WMO 7902236.** The following table contains all the data of the WMO 7902236 deployment during the SACO_10W_14S cruise. Wood chips/mold were reported upon opening the profiler box. CTD cast is available at the deployment location. Coriolis was notified on May 02, 2025. All the information was registered at the Argo Information Center database. The data is free and publicly available through the Argo data stream:

<http://www.oceanografia.es/argo/datos/floats/7902236.html>

DATE AND TIME	25 - 04 - 2025 / 02:13 UTC
DEPLOYMENT LOCATION	-29.3932, -9.9936
DEPLOYMENT PLATFORM	R/V Hespérides
CRUISE ID	SACO_10W_14S
FLOAT OWNER	IEO-CSIC
PLATFORM TYPE	NKE ARVOR - I
SERIAL NUMBER	AI2600-24SP001
SENSORS	CTD
TRANSMISSION SYSTEM	IRIDIUM
PARKING DEPTH (m)	1000
PROFILE DEPTH (m)	2000
DEPLOYMENT DEPTH (m)	>2000
WEATHER CONDITIONS	Calm
DEPLOYMENT OPERATOR	Chema y Miguel

Table 3. WMO 7902236 information deployment.



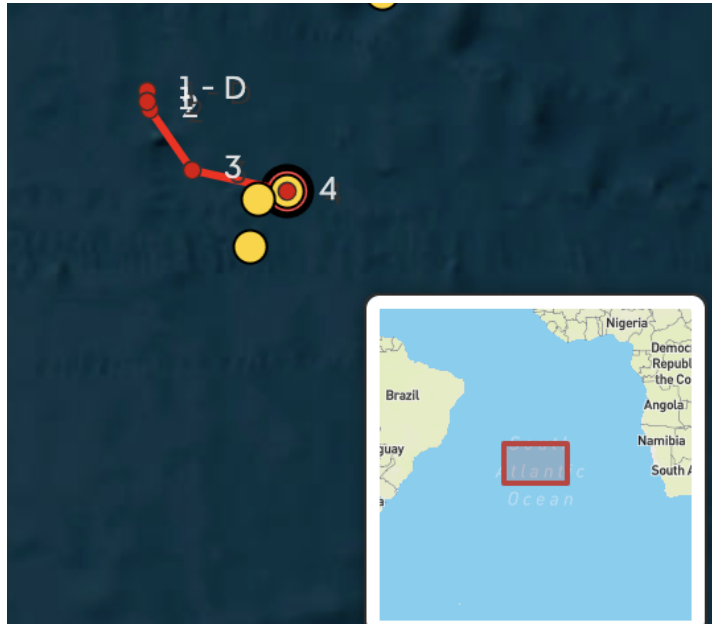
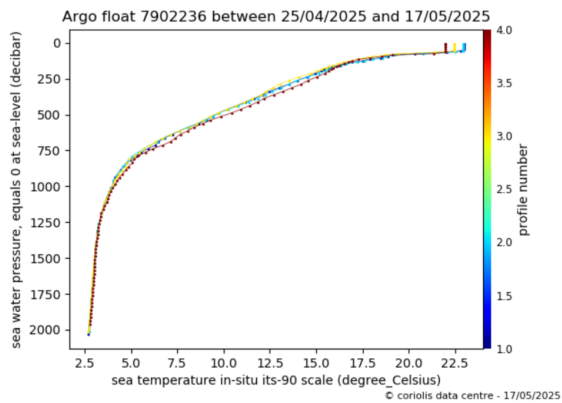


Figure 7a (left). Deployment maneuver of the float WMO 7902236 from R/V R/V Hespérides. Figure 7b (right), deployment location and trajectory.

Overlaid profiles TEMP



Overlaid profiles PSAL

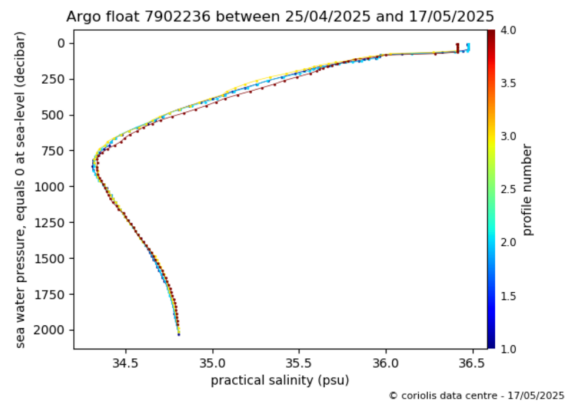


Figure 8. Overlaid temperature and salinity profiles from data collected by WMO 7902236.

d. **WMO 1902732.** The following table contains all the data of the WMO 1902732 deployment during the SACO_10W_14S cruise. No troubled

issues during the deployment were reported. CTD cast is available at the deployment location. Coriolis was notified on May 14, 2025. All the information was registered at the Argo Information Center database. The data is free and publicly available through the Argo data stream:

<http://www.oceanografia.es/argo/datos/floats/1902732.html>

DATE AND TIME	29 - 04 - 2025 / 02:25 UTC
DEPLOYMENT LOCATION	-19.3969, -9.8476
DEPLOYMENT PLATFORM	R/V Hespérides
CRUISE ID	SACO_10W_14S
FLOAT OWNER	IEO-CSIC
PLATFORM TYPE	NKE ARVOR - I
SERIAL NUMBER	AI2600-24SP002
SENSORS	CTD
TRANSMISSION SYSTEM	IRIDIUM
PARKING DEPTH (m)	1000
PROFILE DEPTH (m)	2000
DEPLOYMENT DEPTH (m)	>2000
WEATHER CONDITIONS	Calm
DEPLOYMENT OPERATOR	María and Dani

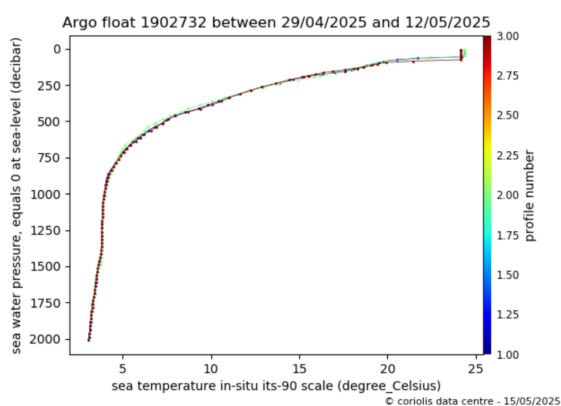
Table 4. WMO 1902732 information deployment.





Figure 9a (left). Deployment maneuver of the float WMO 1902732 from R/V R/V Hespérides. Figure 9b (right), deployment location and trajectory.

Overlaid profiles TEMP



Overlaid profiles PSAL

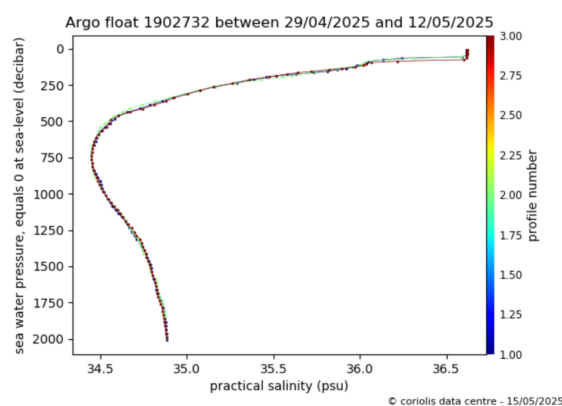


Figure 10. Overlaid temperature and salinity profiles from data collected by WMO 1902732.

- e. **WMO 6990677**. The following table contains all the data of the WMO 6990677 deployment during the SACO_10W_14S cruise. No troubled issues during the deployment were reported. CTD cast is available at the deployment location. Coriolis was notified on May 02, 2025. All the information was registered at the Argo Information Center database. The data is free and publicly available through the Argo data stream:

<http://www.oceanografia.es/argo/datos/floats/6990677.html>

DATE AND TIME	26 - 04 - 2025 / 19:20 UTC
DEPLOYMENT LOCATION	-24.7135, -10.081
DEPLOYMENT PLATFORM	R/V Hespérides
CRUISE ID	SACO_10W_14S
FLOAT OWNER	IEO-CSIC
PLATFORM TYPE	NKE ARVOR - I
SERIAL NUMBER	AI2600-24SP003

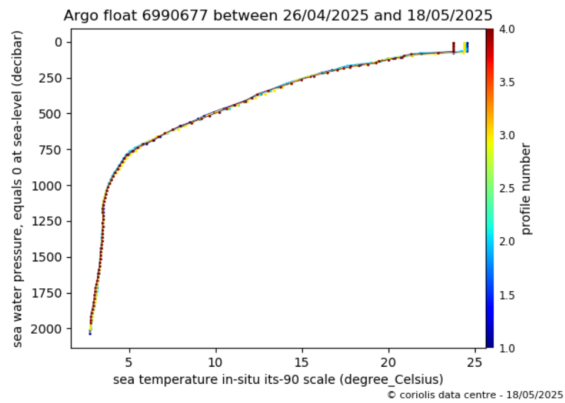
SENSORS	CTD
TRANSMISSION SYSTEM	IRIDIUM
PARKING DEPTH (m)	1000
PROFILE DEPTH (m)	2000
DEPLOYMENT DEPTH (m)	>2000
WEATHER CONDITIONS	Calm
DEPLOYMENT OPERATOR	María and Dani

Table 5. WMO 6990677 information deployment.



Figure 11a (left). Deployment maneuver of the float WMO 6990677 from R/V R/V Hespérides. Figure 11b (right), deployment location and trajectory.

Overlaid profiles TEMP



Overlaid profiles PSAL

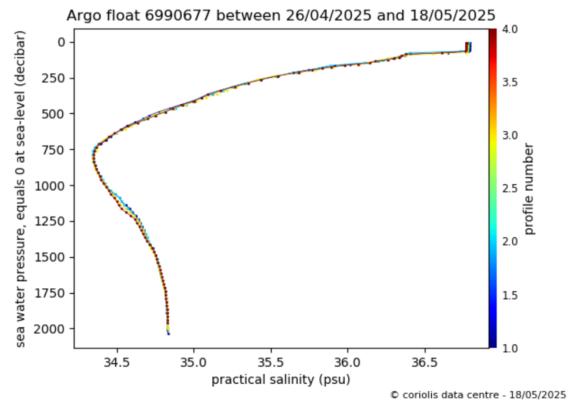


Figure 12. Overlaid temperature and salinity profiles from data collected by WMO 6990677.

- f. **WMO 7902237**. The following table contains all the data of the WMO 7902237 deployment during the SACO_10W_14S cruise. No troubled issues during the deployment were reported. CTD cast is available at the deployment location. Coriolis was notified on May 14, 2025. All the information was registered at the Argo Information Center database. The data is free and publicly available through the Argo data stream:

<http://www.oceanografia.es/argo/datos/floats/7902237.html>

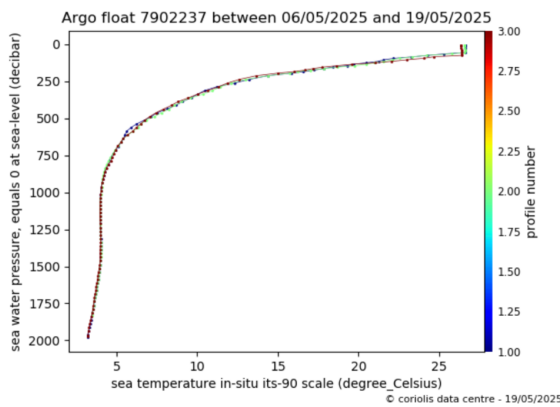
DATE AND TIME	06 - 05 - 2025 / 03:00 UTC
DEPLOYMENT LOCATION	-14.4996, -18.3992
DEPLOYMENT PLATFORM	R/V Hespérides
CRUISE ID	SACO_10W_14S
FLOAT OWNER	IEO-CSIC
PLATFORM TYPE	NKE ARVOR - I
SERIAL NUMBER	AI2600-24SP004
SENSORS	CTD
TRANSMISSION SYSTEM	IRIDIUM
PARKING DEPTH (m)	1000
PROFILE DEPTH (m)	2000
DEPLOYMENT DEPTH (m)	>2000
WEATHER CONDITIONS	Slight
DEPLOYMENT OPERATOR	María and Dani

Table 6. WMO 7902237 information deployment.



Figure 13a (left). Deployment maneuver of the float WMO 7902237 from R/V R/V Hespérides. Figure 13b (right), deployment location and trajectory.

Overlaid profiles IEMP



Overlaid profiles PSAL

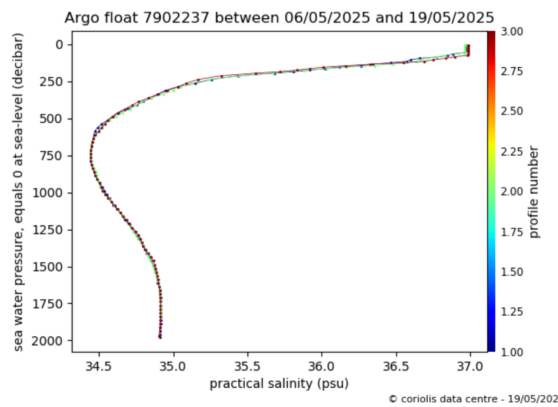


Figure 14. Overlaid temperature and salinity profiles from data collected by WMO 7902237.

- g. **WMO 2903947**. The following table contains all the data of the WMO 2903947 deployment during the SACO_10W_14S cruise. Wood chips/mold were reported upon opening the profiler box. CTD cast is available at the deployment location. Coriolis was notified on May 14, 2025. All the information was registered at the Argo Information Center database. The data is free and publicly available through the Argo data stream:

<http://www.oceanografia.es/argo/datos/floats/2903947.html>

DATE AND TIME	12 - 05 - 2025 / 16:58 UTC
DEPLOYMENT LOCATION	-14.4987, -28.3598
DEPLOYMENT PLATFORM	R/V Hespérides
CRUISE ID	SACO_10W_14S
FLOAT OWNER	IEO-CSIC
PLATFORM TYPE	NKE ARVOR - I
SERIAL NUMBER	AI2632-24SP001
SENSORS	CTD + O ₂
TRANSMISSION SYSTEM	IRIDIUM
PARKING DEPTH (m)	1000
PROFILE DEPTH (m)	2000
DEPLOYMENT DEPTH (m)	>2000
WEATHER CONDITIONS	Slight
DEPLOYMENT OPERATOR	María

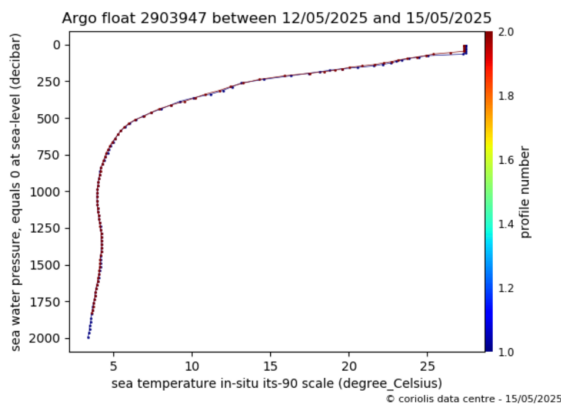
Table 7. WMO 2903947 information deployment.





Figure 15a (left). Deployment maneuver of the float WMO 2903947 from R/V R/V Hespérides. Figure 15b (right), deployment location and trajectory.

Overlaid profiles IEMP



Overlaid profiles PSAL

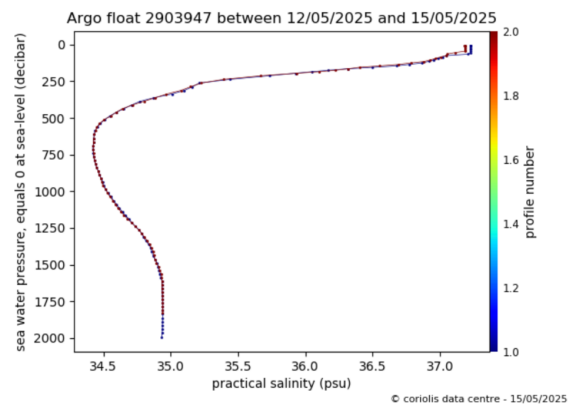


Figure 16. Overlaid temperature and salinity profiles from data collected by WMO 2903947.

3. Float configuration

The configuration parameters of Arvor - I floats (Table 8) and Deep - Arvor floats (Table 9) were modified both on land to ensure the floats' proper functioning.

Command no.	Name	Modified Value	Units
Mission Commands for WMO 2903947, 7902236, 1902732, 6990677 and 7902237			
MC0	Total Number of Cycles	500	Whole number
MC1	Number of cycles with "Cycle Period 1"	300	
MC2	Cycle Period 1	235	Hours
MC3	Cycle Period 2	235	Hours
MC4	Reference Day	2	N° of days
MC5	Expected hour at the surface	6	Hours
MC6	Delay Before Mission	0	Minutes
MC7	CTD acquisition mode		
MC8	Descent Sampling Period	0	Seconds
MC9	Drift Sampling Period	12	Hours
MC10	Ascent Sampling Period	10	Seconds
MC11	Drift Depth for "MC1" first cycles	1000	dBar
MC12	Profile Depth for "MC1" first cycles	2000	dBar
MC13	Drift Depth after "MC1" cycles are done	1000	dBar
MC14	Profile Depth after "MC1" cycles are done	2000	dBar
MC15	Alternate profile period	1	
MC16	Alternate profile pressure	2000	dBar
MC17	Threshold surface/Intermediate Pressure	10	dBar
MC18	Threshold Intermediate /bottom Pressure	200	dBar
MC19	Thickness of the surface slices	1	dBar
MC20	Thickness of the intermediate slices	10	dBar
MC21	Thickness of the bottom slices	25	dBar
MC22	Iridium End Of life period	60	Minutes
MC23	2 nd Iridium Session Wait Period	0	Minutes
MC24	Grounding mode (0= Shift, 1 : Stay grounded)	0	
MC25	Grounding switch pressure	50	dBar
MC26	Delay at surface if grounding at surface	1	Minutes
MC27	Optode type (0: none, 1 : 4330, 2 : 3830)	0	
MC28	CTD sensor Cut-Off pressure (Pump stop)	5	dBar
MC29	"In Air acquisition" cycle periodicity	0	
MC30	"In Air acquisition" sampling period	30	Seconds
MC31	"In Air acquisition" total duration	5	Minutes

Table 8. Standard configuration sheet sample for floats type Arvor - I during SACO_10W_14S cruise.

Command no.	Name	Modified Value	Units
Mission Commands for WMO 3902624 and 3902625			
PM0	Number of Cycles	500	Whole number
PM1	Cycle period	10	Nb of days
PM2	Reference day	2	days
PM3	Estimated hour at the surface	6	Hours
PM4	Delay Before Mission	0	Minutes
PM5	Descent Sampling Period	0	Seconds
PM6	Drift Sampling Period	12	Hours
PM7	Ascent Sampling Period	10	Seconds
PM8	Drift depth	1000	dBar
PM9	Profile depth	4000	dBar
PM10	Threshold surface/Intermediate pressure	10	dBar
PM11	Threshold surface/bottom pressure	200	dBar
PM12	Thickness of the surface slices	1	dBar
PM13	Thickness of the intermediate slices	10	dBar
PM14	Thickness of the bottom slices	25	dBar
PM15	Iridium End of Life transmission period	60	Minutes
PM16	2nd Iridium session wait period	0	Minutes
PM17	Wait at surface after grounding	60	Minutes
PM18	Bottom area threshold after grounding	50	dBar

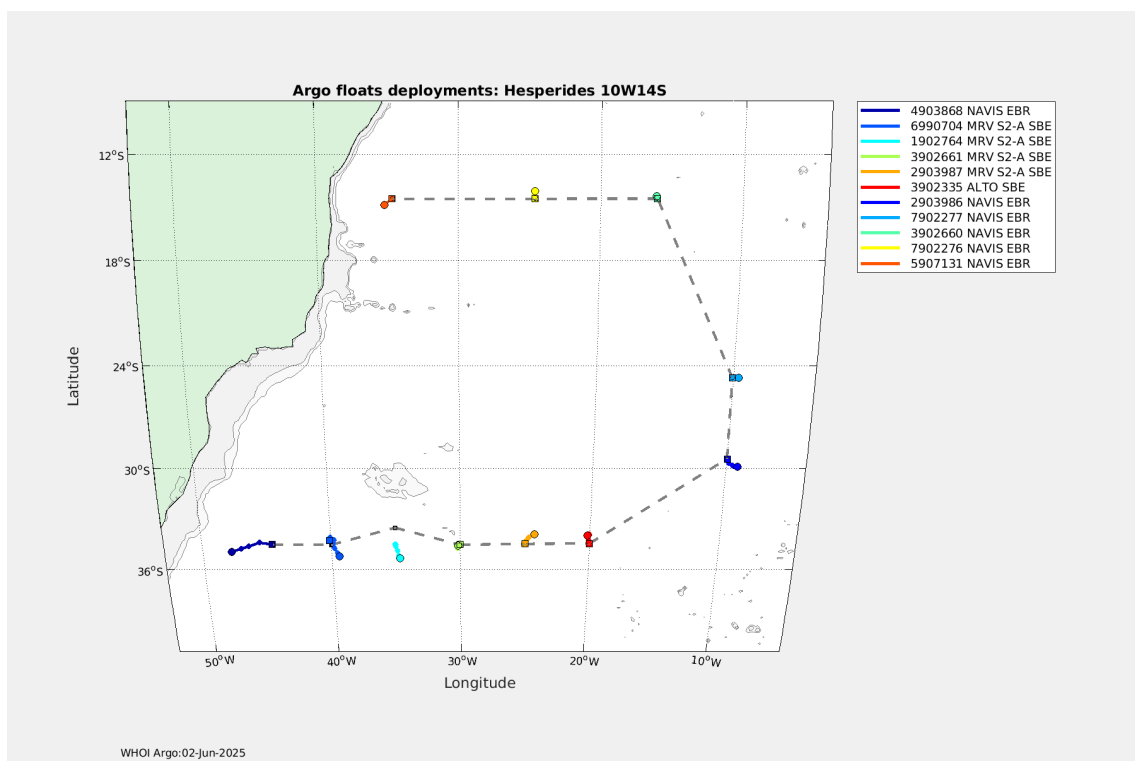
Table 9. Standard configuration sheet sample for floats type Deep Arvor during SACO_10W_14S cruise.

4. Acknowledgements

Argo España thanks the ULPGC staff and the crew of the R/V Hespérides for their cooperation in the success of the mission.

ARGO USA

https://argo.whoi.edu/argo/maps/cruises/2025_argo_cruises.html



Serial Number	WMO Number	Date	~Time (GMT)	Latitude	Longitude
1647	4903868	4/14/2025	15:06	34.500° S	44.501° W
2001	6990704	4/15/2025	16:32	34.499° S	39.992° W
2002	1902764	4/16/2025	21:10	34.480° S	35.006° W
7971	3902661	4/18/2025	01:00	34.493° S	29.997° W
7992	2903987	4/19/2025	03:50	34.440° S	24.997° W
11500	3902335	4/20/2025	06:27	34.420° S	19.999° W

1663	2903986	4/25/2025	02:10	29.408° S	9.993° W
1649	7902277	4/26/2025	19:20	24.698° S	10.080° W
1644	3902660	5/4/2025	20:47	14.488° S	16.021° W
1662	7902276	5/10/2025	19:34	14.496° S	24.582° W
1586	5907131	5/15/2025	23:25	14.500° S	34.610° W

CTD	.XMLcom	LADCP Master	LADCP Slave	Comentarios
1	SACO W10.	MLADC000 0.000	SLADC000 0.000	
2	SACO_W10.	MLADC000.000	SLADC000.000	Se vira antes de llegas al fondo por oleaje
3	SACO_W10_3.	MLADC001.000	SLADC001.000	Se cambia el sensor secundario porque estaba calibrado en 2022 y daba diferencias significativas
4	SACO_W10_3.	MLADC002.000	SLADC002.000	
5	SACO_W10_3.	MLADC003.000	SLADC003.000	
6	SACO_W10_3.	MLADC004.000	SLADC004 .000	El sensor primario tiene mucho ruido. No valen los datos del sensor primario. Se limpió para la estación siguiente
7	SACO_W10_3.	MLADC005.000	SLADC005.000	
8	SACO_W10_3.	MLADC006.000	SLADC007.000	
9	SACO_W10_3.	MLADC008.000	SLADC008.000	
10	SACO_W10_3.	MLADC009.000	SLADC009.000	
11	SACO_W10_3.	MLADC010.000	SLADC010.000	Posiblemente la rosetta chocó con el fondo ya que el altímetro no saltó. Pusieron, a continuación, dos altímetros. Los datos de salinidad de los últimos metros cerca del fondo son erróneos.
12	SACO_W10_3.	SLADC000.000	MLADC000.000	Se mandó el script del master al slave y del slave al Master. Por eso los ficheros están en carpetas cambiadas
13	SACO_W10_3.	MLADC011.000	SLADC011.000	
14	SACO_W10_3.	MLADC012.000	SLADC012.000	
15	SACO_W10_3.	SLADC001.000	SLADC001.000	Se mandó el script del master al slave y del slave al Master. Por eso los ficheros están en carpetas cambiadas
16	SACO_W10_3.	MLADC013.000	SLADC013.000	
17	SACO_W10_3.	MLADC014.000	SLADC015.000	
18	SACO_W10_3.	MLADC015.000	SLADC016.000	
19	SACO_W10_3.	MLADC016.000	SLADC017.000	
20	SACO_W10_3.	MLADC017.000	SLADC018.000	
21	SACO_W10_3.	MLADC018.000	SLADC019.000	
22	SACO_W10_3.	MLADC019.000	SLADC020.000	

23	SACO_W10_3.	MLADC020.000	SLADC021.000	
24	SACO_W10_3.	MLADC021.000	SLADC022.000	
25	SACO_W10_3.	MLADC022.000	SLADC023.000	
26	SACO_W10_3.	MLADC023.000	SLADC024.000	
27	SACO_W10_3.	MLADC024.000	SLADC025.000	
28	SACO_W10_3.	MLADC025.000	SLADC026.000	
29	SACO_W10_3.	MLADC026.000	SLADC027.000	
30	SACO_W10_3.	MLADC027.000	SLADC028.000	
31	SACO_W10_3.	MLADC028.000	SLADC029.000	
32	SACO_W10_3.	MLADC029.000	SLADC030.000	
33	SACO_W10_3.	MLADC030.000	SLADC031.000	
34	SACO_W10_3.	MLADC031.000	SLADC032.000	
35	SACO_W10_3.	MLADC032.000	SLADC033.000	
36	SACO_W10_3.	MLADC033.000	SLADC034.000	
37	SACO_W10_3.	MLADC034.000	SLADC035.000	Se detiene la bajada a 3602m para reposicionar el barco.
38	SACO_W10_3.	MLADC035.000	SLADC036.000	
39	SACO_W10_3.	MLADC036.000	SLADC037.000	Sonda muy variable. Altimetro no saltó. Largada hasta 4775m
40	SACO_W10_3.	MLADC037.000	SLADC038.000	
41	SACO_W10_3.	MLADC038.000	SLADC038.000	El slave tarda mucho en descargar
42	SACO_W10_3.	MLADC039.000	SLADC040.000	
43	SACO_W10_3.	MLADC040.000	SLADC041.000	
44	SACO_W10_3.	MLADC041.000	SLADC042.000	
45	SACO_W10_3.	MLADC043.000	SLADC044.000	Se demoró el congelar los tubos de nutrientes por 20-30 minutos
46	SACO_W10_3.	MLADC044.000	SLADC045.000	
47	SACO_W10_3.	MLADC045.000	SLADC046.000	
48	SACO_W10_3.	MLADC046.000	SLADC047.000	
49	SACO_W10_3.	MLADC047.000	SLADC048.000	
50	SACO_W10_3.	MLADC048.000	SLADC049.000	
51	SACO_W10_3.	MLADC049.000	SLADC050.000	
52	SACO_W10_3.	MLADC050.000	SLADC051.000	
53	SACO_W10_3.	MLADC051.000	SLADC052.000	
54	SACO_W10_3.	MLADC052.000	SLADC053.000	

55	SACO_W10_3.	MLADC053.000	SLADC054.000	
56	SACO_W10_3.	MLADC054.000	SLADC055.000	
57	SACO_W10_3.	MLADC055.000 MLADC06.000	SLADC056.000	El fichero Master se dividió en dos
58	SACO_W10_3.	MLADC057.000	SLADC057.000	
59	SACO_W10_3.	MLADC058.000	SLADC058.000	
60	SACO_W10_3.	MLADC059.000	SLADC059.000	
61	SACO_W10_3.	MLADC060.000	SLADC060.000	
62	SACO_W10_3.	MLADC061.000	SLADC061.000	Los dos ficheros se encuentran en la carpeta del Master
63	SACO_W10_3.	MLADC062.000 MLADC063.000	SLADC062.000 SLADC063.000	Se crearon dos ficheros. Se utilizó solo el 062 para el procesamiento.
64	SACO_W10_3.	MLADC064.000	SLADC064.000	
65	SACO_W10_3.	MLADC065.000	SLADC065.000	
66	SACO_W10_3.	MLADC066.000	SLADC066.000	
67	SACO_W10_3.	MLADC067.000	SLADC067.000	
68	SACO_W10_3.	MLADC068.000	SLADC068.000	
69	SACO_W10_3.	MLADC069.000	SLADC069.000	
70	SACO_W10_3.	MLADC070.000	SLADC070.000	
71	SACO_W10_3.	MLADC071.000	SLADC071.000	
72	SACO_W10_3.	MLADC072.000	SLADC072.000	
73	SACO_W10_3.	MLADC073.000	SLADC073.000	
74	SACO_W10_3.	MLADC074.000	SLADC074.000	