



Report on Argo float deployments during SACO_S0 cruise

ARGO ESPAÑA – IEO - SOCIB / 25 – 93

Argo float deployment for
WMO 2903948 and 4903836

Mar 19, 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 criterion 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 Ciencias del Mar (ICM - CSIC), planned the deployment of two core Argo floats in the Southern Ocean. This is a milestone in the history of Argo Spain, not only for taking on the challenge of launching floats in these latitudes, but also for contributing to obtaining information from one of the most undersampled oceans to date.

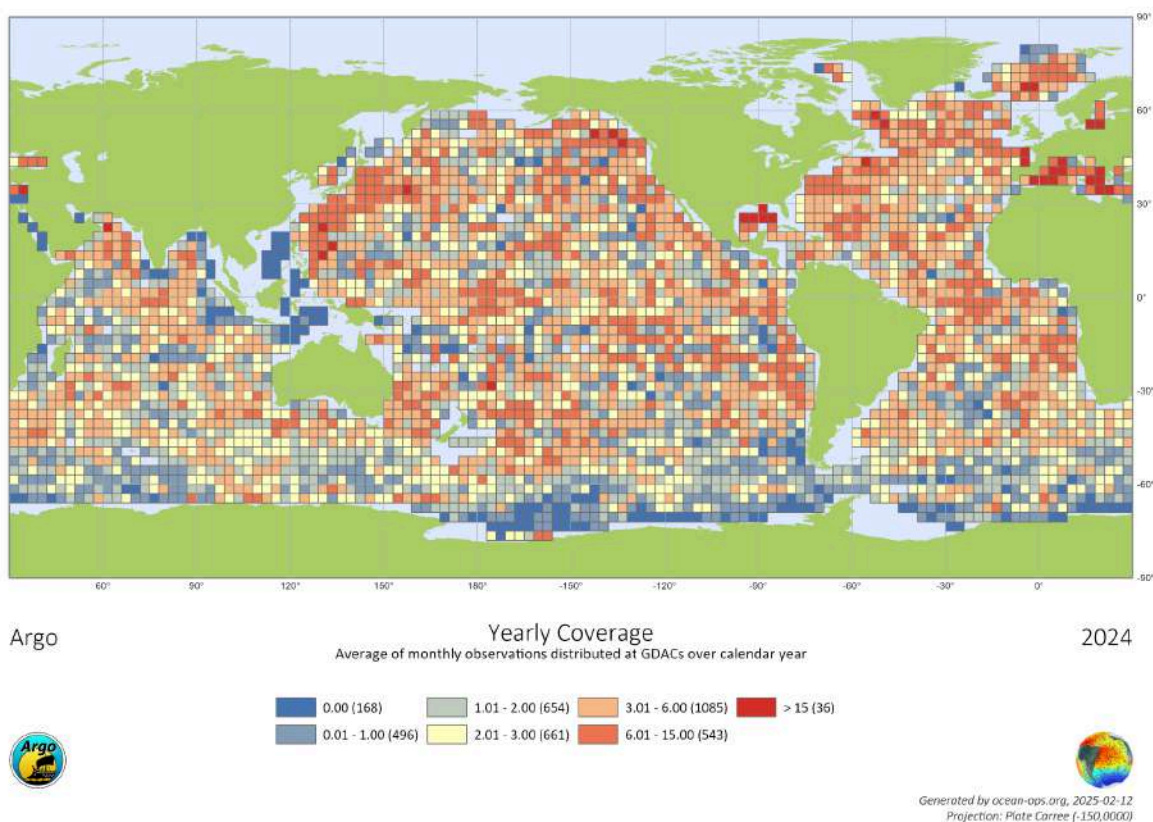


Figure 1. Density of Argo observations in the year 2024.

The SACO_SO cruise consisted of 29 stations distributed between 60°-64°S latitude and 44°-64°W longitude (Fig. 2). The Powell Basin and the Hesperides Trench were the locations selected for both deployments. The research cruise was conducted aboard the R/V Hespérides, and the principal investigator Pedro Llanillo del Río managed the launch of both floats in coordination with Argo Spain staff.

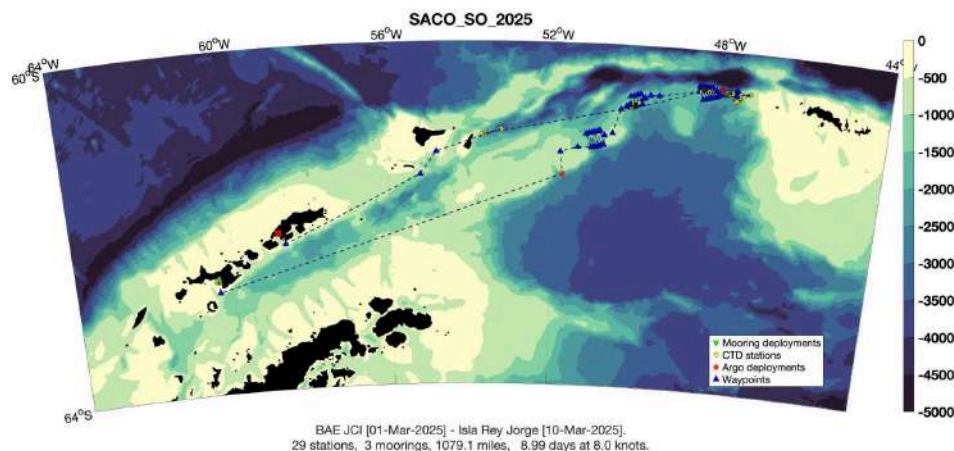


Figure 2. Deployment stations during SACO_SO cruise. Argo floats deployment locations in red.

2. Deployments' data

Information of the floats' deployment is shown next:

- a. **WMO 2903948.** The following table contains all the data of the WMO 2903948 deployment during the SACO_SO cruise. No troubled issues during the deployment were reported. A CTD cast at the deployment location is available (Fig. 3b). Coriolis was notified on Mar 03, 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/2903948.html>

DATE AND TIME	03 - 03 - 2025 / 05:00 UTC
DEPLOYMENT LOCATION	61.5342 S, 51.7632 W
DEPLOYMENT PLATFORM	R/V Hespérides
CRUISE ID	SACO_SO
FLOAT OWNER	IEO-CSIC
PLATFORM TYPE	NKE ARVOR – I
SERIAL NUMBER	AI2632-24SP002
TRANSMISSION SYSTEM	IRIDIUM
SENSORS	CTD + OPTODE (O ₂)
PARKING DEPTH (m)	1700
PROFILE DEPTH (m)	2000
DEPLOYMENT DEPTH (m)	>2000
WEATHER CONDITIONS	Rough
DEPLOYMENT OPERATOR	Pedro Llanillo del Río

Table 1. WMO 2903948 information deployment.



Figure 3a (left). Deployment maneuver of float 2903948 from R/V Hespérides. Figure 3b (right), deployment location and trajectory.

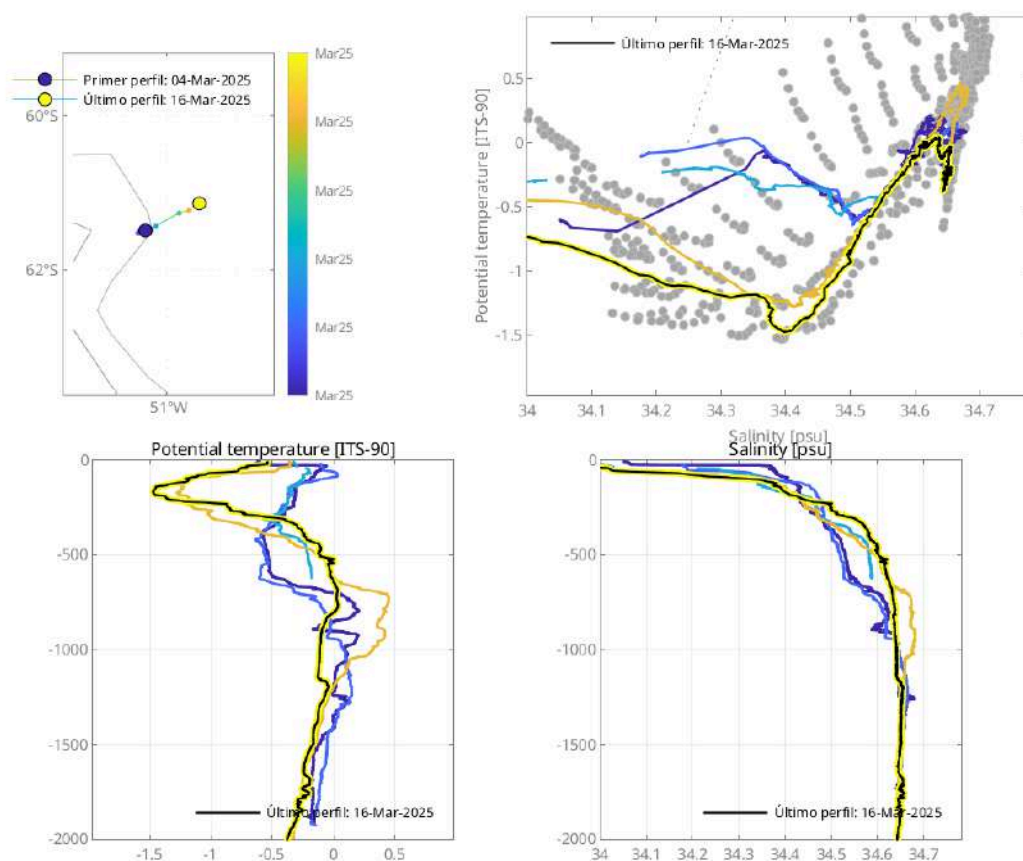


Figure 4. T-S diagram and temperature – salinity profiles from data collected by WMO 2903948.

- b. **WMO 4903836.** The following table contains all the data of the WMO 4903836 deployment during the SACO_SO cruise. Bad weather conditions, caused by 37 knots of wind and 3 to 4 m wave height prevented shipboard CTD operations. However, an XBT was launched to obtain data useful for temperature calibration. Coriolis was notified on Mar 07, 2024. It was reported a transmission issue that caused a delay in the publication of the first profile. 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/4903836.html>

DATE AND TIME	06 - 03 - 2025 / 11:10 UTC
DEPLOYMENT LOCATION	-60.4508, -48.0164
DEPLOYMENT PLATFORM	R/V Hespérides
CRUISE ID	SACO_SO
FLOAT OWNER	IEO-CSIC
PLATFORM TYPE	NKE ARVOR – I
SERIAL NUMBER	AI2600-24SP005
SENSORS	CTD
TRANSMISSION SYSTEM	IRIDIUM
PARKING DEPTH (m)	1850
PROFILE DEPTH (m)	2000
DEPLOYMENT DEPTH (m)	>2000
WEATHER CONDITIONS	Rough
DEPLOYMENT OPERATOR	Pedro Llanillo del Río

Table 2. WMO 4903836 information deployment.



Figure 5a (left). Deployment maneuver of the float WMO 4903836 from R/V Ramón Margalef. Figure 5b (right), deployment location and trajectory.

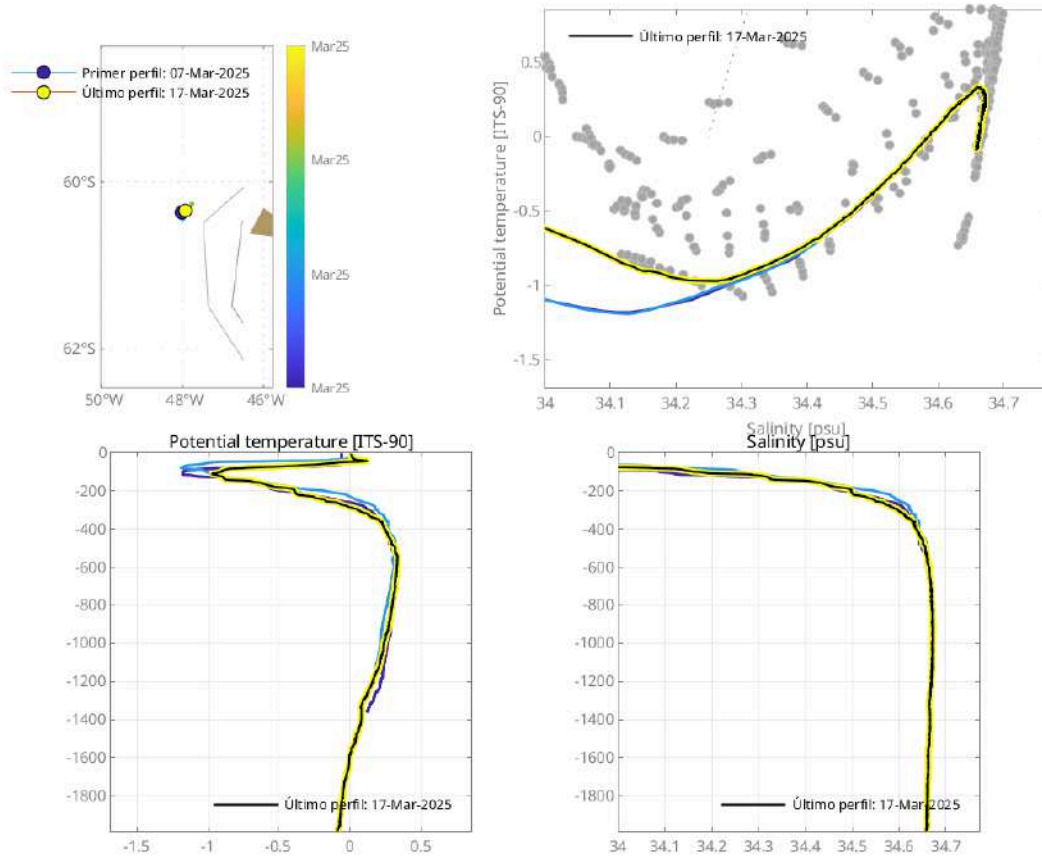


Figure 6. T-S diagram and temperature – salinity profiles from data collected by WMO 4903836.

3. Float configuration

The configuration parameters (MC - Table 3) were modified both on land and on board to ensure the floats' proper functioning. Since the study area has hydrographic peculiarities, such as areas covered by surface ice or the presence of icebergs in the surroundings (Fig. 7), it was necessary to activate the ice module (ISA - Ice Sensing Algorithm) in advance to operate efficiently and ensure the floats' integrity. The following tables detail the configurations of both floats:

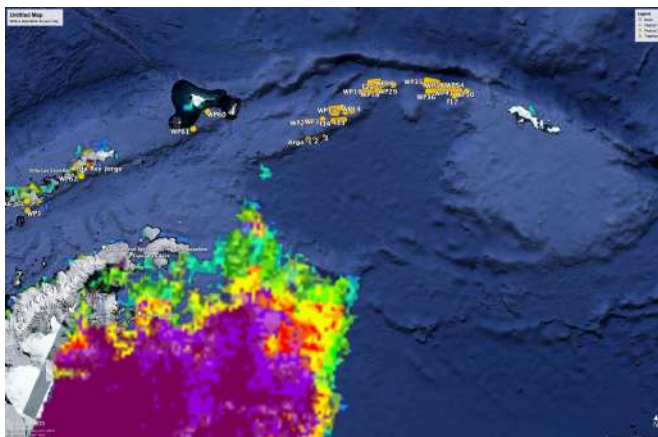


Figure 7. Progressive advance of the ice in a northerly direction, towards the location of float WMO 2903948.

Command no.	Name	Modified Value	Units
Mission Commands for WMO 2903948			
MC0	Total Number of Cycles	500	Whole number
MC1	Number of cycles with "Cycle Period 1"	6	
MC2	Cycle Period 1	72	Hours
MC3	Cycle Period 2	235	Hours
MC4	Reference Day	1	Nº of days
MC5	Expected hour at the surface	6	Hours
MC6	Delay Before Mission	5	Minutes
MC7	CTD acquisition mode	1	
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	1850	dBar
MC12	Profile Depth for "MC1" first cycles	2000	dBar
MC13	Drift Depth after "MC1" cycles are done	1700	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	400	dBar
MC18	Threshold Intermediate /bottom Pressure	1000	dBar
MC19	Thickness of the surface slices	2	dBar
MC20	Thickness of the intermediate slices	2	dBar
MC21	Thickness of the bottom slices	2	dBar
MC22	Iridium End Of life period	60	Minutes
MC23	2 nd Iridium Session Wait Period	3	Minutes
MC24	Grounding mode (0= Shift, 1 : Stay grounded)	1	
MC25	Grounding switch pressure	0	dBar
MC26	Delay at surface if grounding at surface	0	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 3. Standard configuration sheet sample for WMO 2903948 float during the SACO_SO cruise.

Command no.	Name	Modified Value	Units
ISA Commands for WMO 2903948			
IC0	Nb of day without surface emergence if Ice detected	10	days
IC1	Nb of day before surface emergence even with ice detected	330	days
IC2	Nb of detection to confirm Ice at surface	255	
IC3	Start pressure detection	255	decibars
IC4	Stop pressure detection	15	decibars
IC5	Temperature threshold	-1795	1/1000 degC
IC6	Slowdown pressure threshold	150	decibars
IC7	Pressure acquisition period during ascent (slow speed), once P < IC6	2	minute
IC8	Pressure delta min before pump action	4	decibars
IC9	Pump action duration	500	centisec
IC10	GPS timeout	15	minutes
IC11	1st Iridium lock timeout	10	minutes
IC12	Delay before ascent blocking detection	80	minutes
IC13	Pressure variation for speed inversion	20	decibars
IC14	Valve action volume	9	cm3
IC15	Max valve volume to detect grounding on descent	900	cm3

Table 4. ISA configuration sheet sample for WMO 2903948 float during the SACO_SO cruise.

Command no.	Name	Modified Value	Units
Mission Commands for WMO 4903836			
MC0	Total Number of Cycles	500	Whole number
MC1	Number of cycles with "Cycle Period 1"	6	
MC2	Cycle Period 1	120	Hours
MC3	Cycle Period 2	235	Hours
MC4	Reference Day	1	Nº of days
MC5	Expected hour at the surface	6	Hours
MC6	Delay Before Mission	5	Minutes
MC7	CTD acquisition mode	1	
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	1850	dBar
MC12	Profile Depth for "MC1" first cycles	2000	dBar
MC13	Drift Depth after "MC1" cycles are done	1700	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	400	dBar
MC18	Threshold Intermediate /bottom Pressure	1000	dBar
MC19	Thickness of the surface slices	2	dBar
MC20	Thickness of the intermediate slices	2	dBar
MC21	Thickness of the bottom slices	2	dBar
MC22	Iridium End Of life period	60	Minutes
MC23	2 nd Iridium Session Wait Period	3	Minutes
MC24	Grounding mode (0= Shift, 1 : Stay grounded)	1	
MC25	Grounding switch pressure	0	dBar

MC26	Delay at surface if grounding at surface	0	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 5. Standard configuration sheet sample for WMO 4903836 float during the SACO_SO cruise.

Command no.	Name	Modified Value	Units
ISA Commands for WMO 4903836			
IC0	Nb of day without surface emergence if Ice detected	10	days
IC1	Nb of day before surface emergence even with ice detected	330	days
IC2	Nb of detection to confirm Ice at surface	255	
IC3	Start pressure detection	255	decibars
IC4	Stop pressure detection	15	decibars
IC5	Temperature threshold	-1795	1/1000 degC
IC6	Slowdown pressure threshold	150	decibars
IC7	Pressure acquisition period during ascent (slow speed), once P < IC6	2	minute
IC8	Pressure delta min before pump action	4	decibars
IC9	Pump action duration	500	centisec
IC10	GPS timeout	15	minutes
IC11	1st Iridium lock timeout	10	minutes
IC12	Delay before ascent blocking detection	80	minutes
IC13	Pressure variation for speed inversion	20	decibars
IC14	Valve action volume	9	cm3
IC15	Max valve volume to detect grounding on descent	900	cm3

Table 6. ISA configuration sheet sample for WMO 4903836 float during the SACO_SO cruise.

4. Acknowledgements

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