Argo floats in the Argentine Basin- SAGA 10W opportunity

Camila Artana, Léa Poli, Christine Provost

The Spanish oceanographic cruise SAGA10W (South Atlantic GAteways) started on March 08 2021 from Punta Arenas and ended on April 15 2021 in Las Palmas. Within a French-Spanish collaboration we (C. Artana and L. Poli) could participate to this Spanish initiative and deploy 10 Argo floats (5 classic and 5 Deep) in the Zapiola Anticyclone.
The Argo floats were provided by Coriolis in the framework of the BACI LEFE GMMC project. 5 days (2 of transit and 3 for ctd stations) were accorded by the OFEG to perform these activities. The main objective is to document the circulation at two different depths (1000 and 3000 m) and the water masses between 0 and 4000 m. The collected data will be useful to evaluate Mercator-Ocean model at depths and contribute to improve the global ocean reanalysis below 2000 m. The floats were successfully deployed and we present here the preliminary results of the obtained data.

- **Scientific background**

The Deep Argentine Basin is a very active region of the Southern Ocean at the boundary between the subpolar and subtropical gyres (Figure 1). At the center of the Argentine Basin, the Zapiola Anticyclone, a sort of Taylor column located above a sedimentary deposit (Zapiola Rise of about 1200 m height), shows a volume transport equivalent to that of the strongest ocean currents (volume transport > 100 Sv). The Zapiola Anticyclone is believed to be driven by energy transfers from the strong mesoscale eddy kinetic energy to the mean kinetic energy. The Zapiola Anticyclone itself is a local minimum in Eddy Kinetic Energy and hosts mainly cyclonic eddies (Saraceno and Provost, 2012).

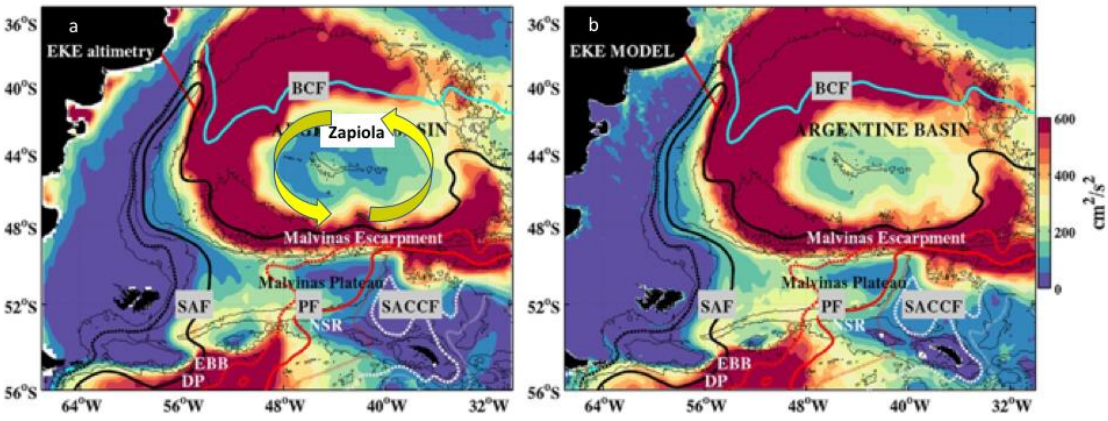


Figure 1: *The Zapiola Anticyclone appears as a local minimum in surface Eddy Kinetic Energy in the center of the Argentine Basin above a sedimentary ridge. a: EKE from satellite altimetry, b: Surface EKE from Mercator operational model (Artana et al., 2018b).*

The volume transport of the Zapiola Anticyclone shows important low frequency variations and possibly collapses (Saraceno et al., 2009) (Figure 2).

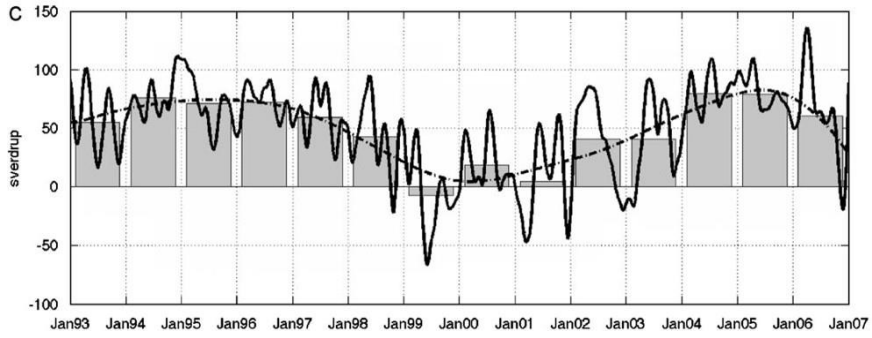


Figure 2: *Low frequency variations of the Zapiola anticyclone volume transport (Saraceno et al., 2009).*

The Zapiola Anticyclone circulation contributes to the stirring of the strongly contrasted water masses of different remote origins. Near the surface it promotes exchanges between the polar waters from the Antarctic Circumpolar Current and the tropical waters from the South Atlantic Current. At depth, elements of the deep waters formed in the North Atlantic (as the North Atlantic Deep Water) encounter waters formed off the Antarctic Continent (as the Lower Circumpolar Deep Water or the Upper Circumpolar Deep Water), and the stirring and mixing associated with the Zapiola anticyclone possibly constitute an important factor in determining the characteristicsof global deep water masses.

Argo floats, satellite altimetry and Mercator-Ocean global operational model at 1/12° (Lellouche et al., 2018) have been key tools to revisit water masses and dynamics of the upper 2000 m of the Argentine Basin (see references Artana et al., 2016, 2018a, b, c, 2019, 2021).

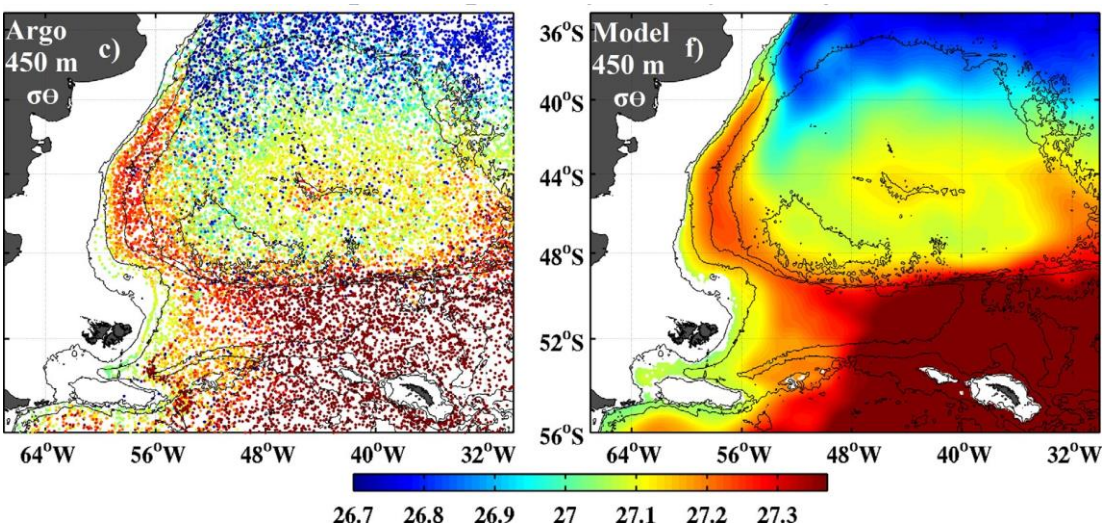


Figure 3: *Potential density (kg/m^3) at 450 m depth from Argo float profiles (a) and model mean (b) over the 2007-2016 period. Note that the model mean is compared to instantaneous measurements from Argo floats (Artana et al., 2018b).*

After evaluation (e.g. Figure 3), Mercator-Ocean GLORYS12 reanalysis was used to interpret the sparse in situ data in this rather poorly documented region and analyze variations from the synoptic scale to interannual modulations (e.g. Artana et al, 2018c, 2019, 2021). In particular, low frequency variations (about 7-year time scale) in water properties have been evidenced in the upper 2000 m in the Zapiola Anticyclone with changes in mean salinity at 541m of about 0.1 psu (Artana et al., 2018c) (Figure 4).

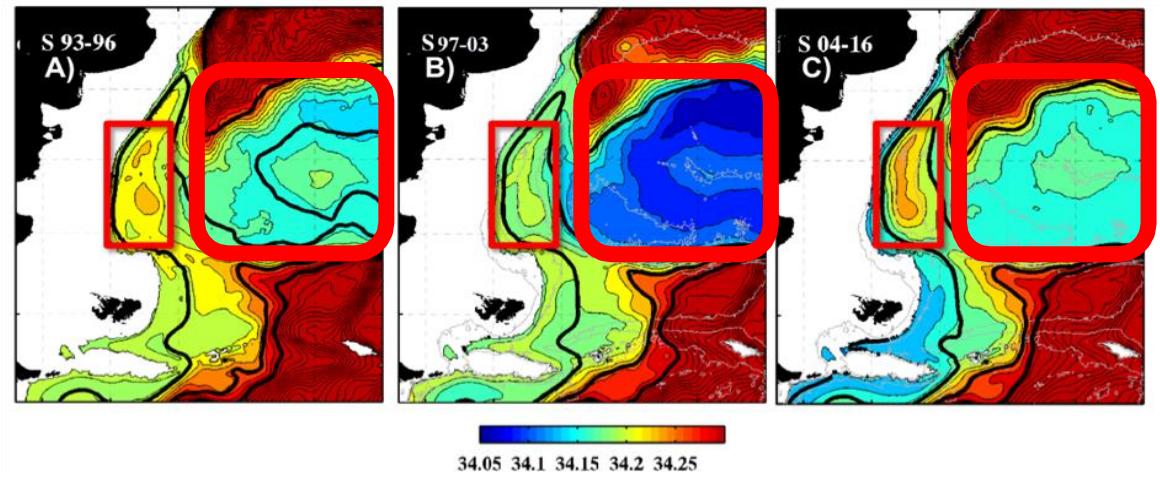


Figure 4: *Salinity (psu) at 541 m averaged over the period 1993-1996 (A), 1997-2003 (B) and 2004-2016 (C) showing changes in the water masses characteristics of the Malvinas recirculation region and the Zapiola Anticyclone region (red boxes). A salinity minimum is observed in the period 1997-2003 both in the Malvinas recirculation region and in the Zapiola Anticyclone region (adapted from Artana et al., 2018c).*

In situ data are scarce in the Argentine Basin and particularly at depth. This motivated the BACI proposal to LEFE GMMC to deploy newly developed deep ARGO floats in pair with classical floats to gather data to

- study water mass mixing
- examine water pathways circulation (2 levels): classic floats drifting at 1000 m and deep floats drifting at 3000 m
- evaluate Mercator-Ocean model at depth and contribute to improve the global ocean reanalysis below 2000 m

The deep Argentine Basin with the Zapiola Anticyclone was particularly suitable for such a deployment: the deep layers show large signal of variations in water properties between North Atlantic Deep Water (T of 3.0°C, S 34.92 psu) and Circumpolar Deep Water (UCDW 2.5°C, 34.60 psu; LCDW 1.5°C, 34.76psu).
The floats will probably get trapped in the Basin for quite some time and combined with Mercator-Ocean reanalysis will provide information on the mean state and variability of mean ocean circulation, the relationship between circulation and topography, circulation changes, the heat, salt and dissolved oxygen (DO) content evolutions.

Through a collaboration with Dr. Jose Luis Pelegri (CSIC, Spain), we participated to the SAGA10W cruise in March- April 2021 across the Argentine Basin and deployed the 5 pairs of classic and deep Argo floats provided by Coriolis within BACI.
These deployments are a pilot study. In the future, there will be new opportunities to deploy floats during Research Vessel transits to/from Antarctic bases to/from Europe.

- **Argo float Deployment**

The floats were deployed from **Spanish Research Vessel Sarmiento de Gamboa in March 2021** during the cruise **SAGA 10W** (The South Atlantic Gateway in the globalconveyor belt) (Reference RTI2018-100844-B-C31/C32/C33). The PI is **Josep Luis Pelegri** from CSIC Barcelona. We asked for 5 additional days of ship time within the OFEG framework (contact: Pascal Morin) in order to perform deep hydrological stations with DO(CTD-DO-LADCP) at each float deployment location. The ship was equipped with CTD SeaBirdSBE911 plus with oxygen sensor, fluorometer and turbidimeter, PAR…, LADCP, and with S-ADCP (Ocean Surveyor 75 and 150 kHz Doppler Current profiler)
(http://www.utm.csic.es/en/instalaciones/sdg/equipamiento/allpages).

Prior to the cruise, we organized with Mercator-Ocean to receive model outputs from PSY4V3 system on board. Boxes were defined to alleviate data volume to be transferred (See Table below and figure 5). Internet connection was rather poor on board hampering the files' transfer. Thus, model comparisons to in situ data were mainly performed after the cruise.

Zona	lon	lat	dates
Talud	-65°W -52°W	-54°S -45°S	28/02/21 -2/03/21
Zapiola	-52°W -30°W	-50°S -42°S	1/03/2021 - /03/2021
Transito	-32°W -15°W	-47°S -37°S	8/03/21 - 15/03/21
10°W-1	-15°W -5°W	-38°S -16°S	**12/03/2021 - 26/03/2021**
10°W-2	-15°W -5°W	-18°S 5°N	**25/03/2021- 06/04/2021**

Table 1: Location and dates of boxes defined to alleviate data volume transfer.

Ten Argo floats were deployed in the Zapiola Gyre in pairs (deep and classic Argo floats). The initial plan (Figure 1a) was modified due to bad weather (Figure 1b, c). A hydrographic station was conducted at each deployment. In addition, 5 classical floats were deployed along the 10W section at the points where moorings were deployed as part of SAGA10W.

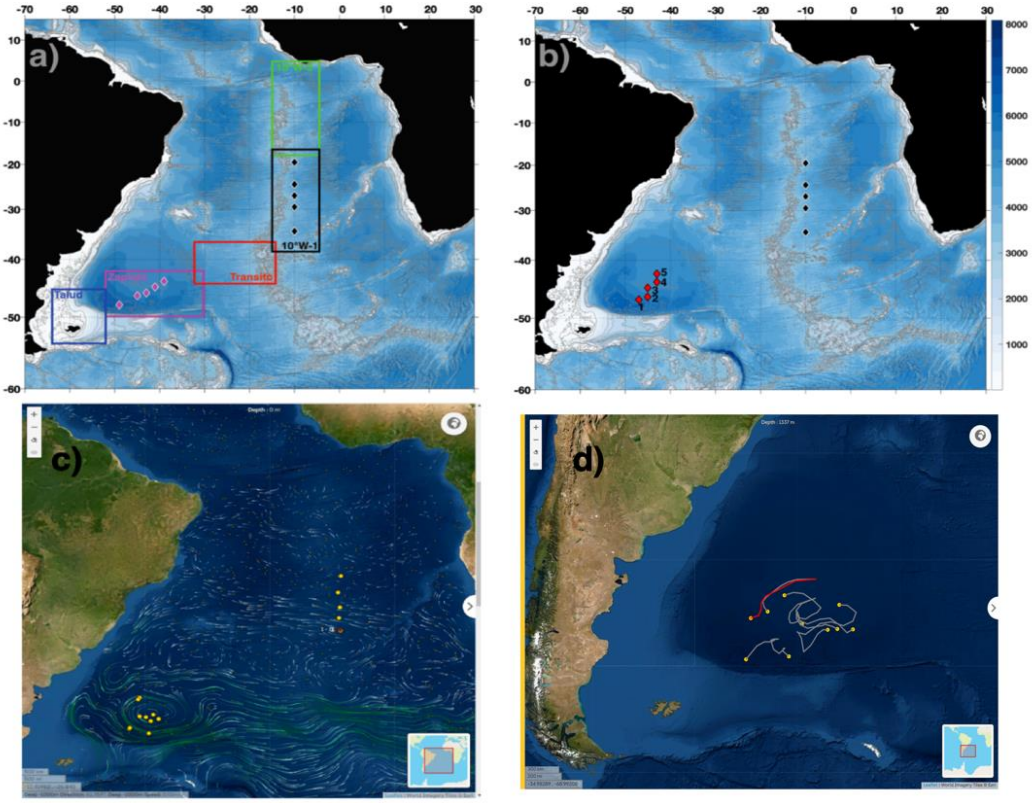


Figure 5 *: a) initial plan for the Argo float deployment b) final position where the floats were deployed. c) Position of the Argo floats indicated in yellow dots. The contours correspond to velocities at 1000 meters deduced from the trajectory of historical Argo floats. d) Position of the Argo floats on 03/05/2021*
The rectangular colored boxes correspond to the defined regions for PSY4V3 outputs transfer from Mercator Ocean.

- **Sampling frequency**

Sampling period is of 5 days when the floats are in the Argentine Basin.
When the floats eventually escape the Basin, they can be set back to the nominal 10-day sampling period.

- **Parking depths:**

- 3000 m for deep Argo
- 1000 m for classic Argo

This way we'll have drift information at two distinct deep levels.

- **Preliminary results:**

Hydrography from CTDs and Argo floats:

The θS diagrams of the CTD stations performed in the Zapiola Gyre are shown in Figure 6. The different water masses AAIW, UCDW, NADW, LCDW, AABW and WSDW are labelled.
Figure 7 shows the first temperature and salinity profile from a deep Argos buoy along with a θS plot. Coriolis informed us data Argo floats 6902892 et 6902977 are susceptible to suffer a salinity drift in the future as reported by Seabird. Systematic checks will be carefully performed to detect a salinity drift.

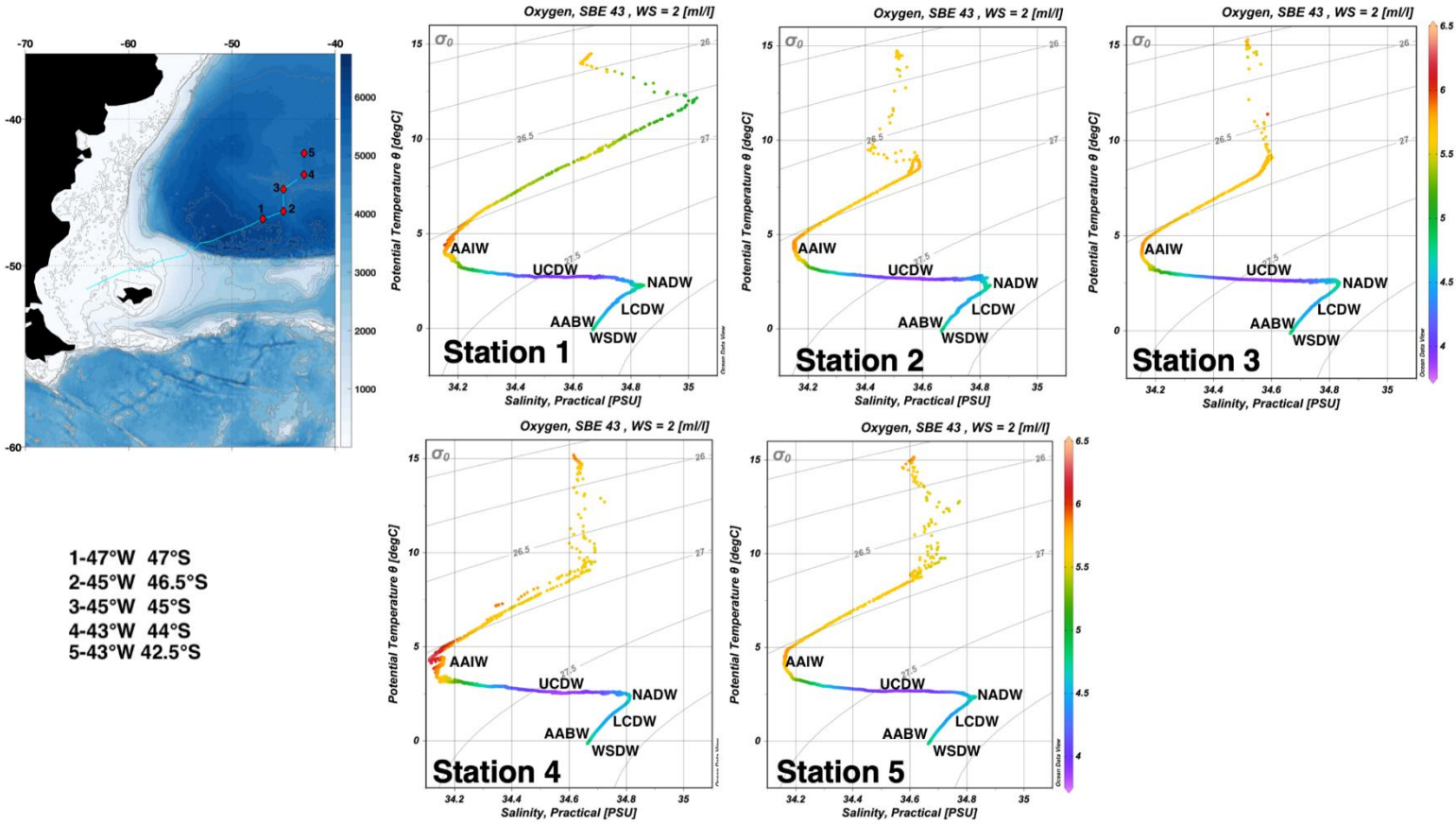


Figure 6: *θS diagram at each CTD station (indicated with red diamonds in the map). The colors correspond to dissolved oxygen concentrations (ml/l).*

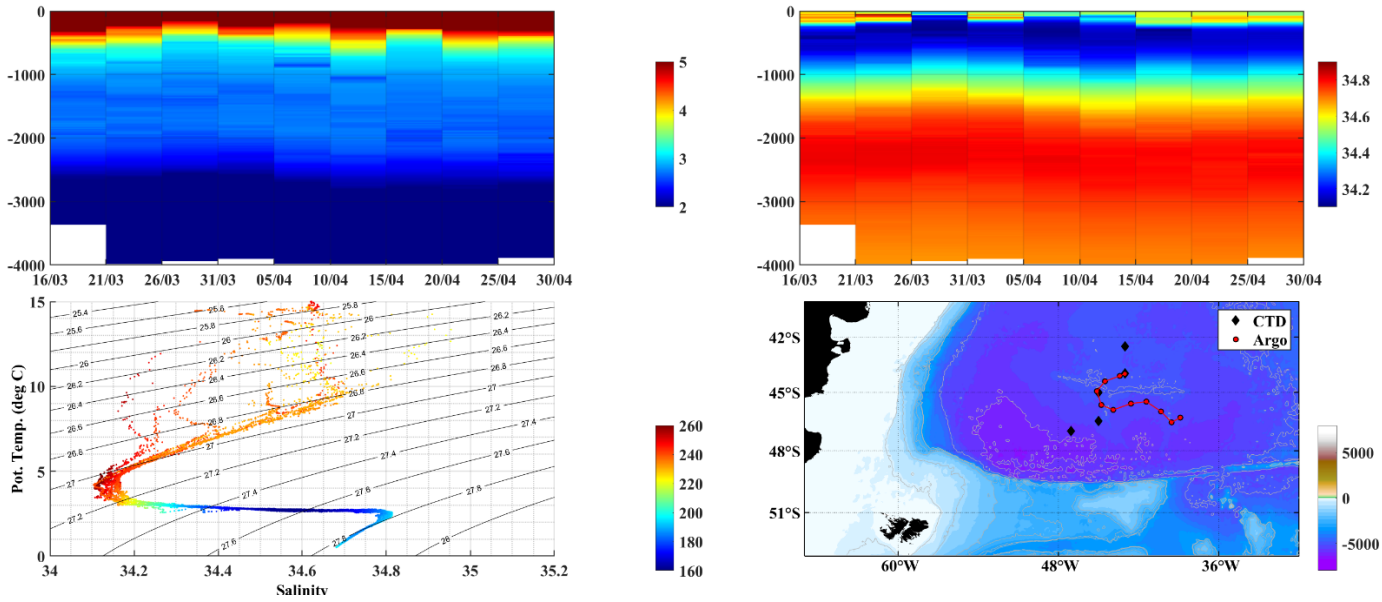


Figure 7: *Temperature and salinity profile from the Argo float 6902977, θS diagram with oxygen measurements (ml/l) in color and map with the float trajectory.*

- **Velocities from LADCP and SADCP**

The positive and negative velocities in the zonal direction associated with the Zapiola gyre are observed in the interpolated LADCP measurements at each station (Figure 8). The westward velocities are larger in the upper 500 m (>0.3 m/s) while the eastward velocities are larger below 4000 m (>0.2 m/s). However, the LADCP data need to be treated with caution. The data of the stations located at 10W show inconsistent values at depth and a second data processing will be done.

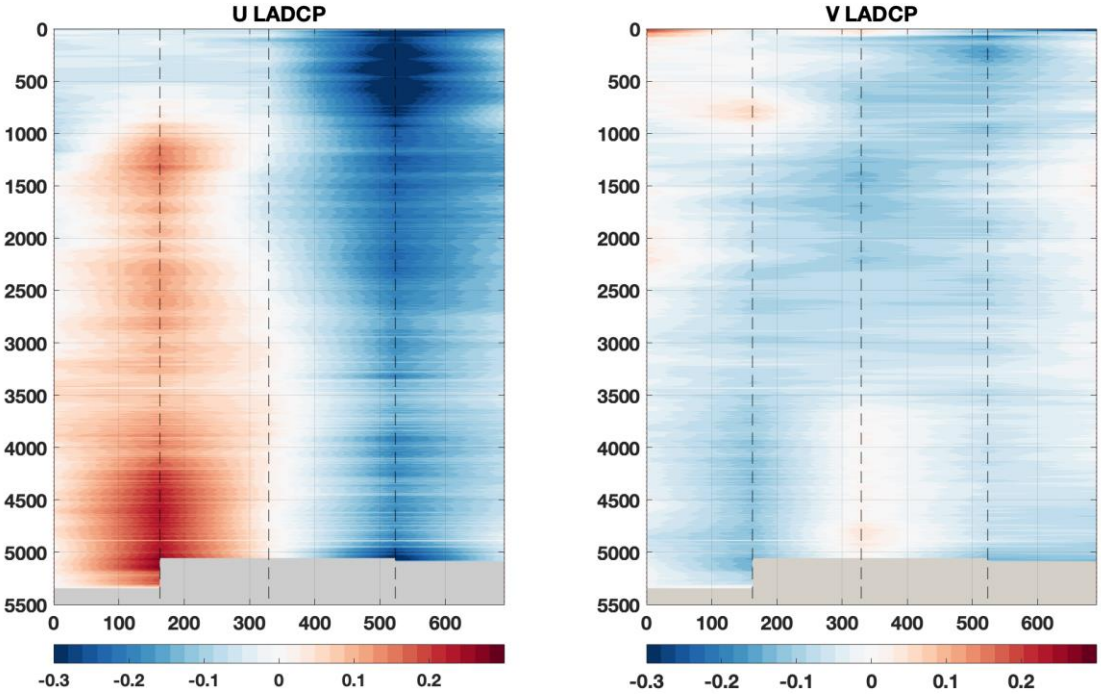


***Figure 8**: Zonal and meridional velocities (m/s) interpolated between stations. These are preliminary data that need further processing and validation.*

The Zapiola gyre is also observed in the velocities obtained from the SADCP (Figure 9).

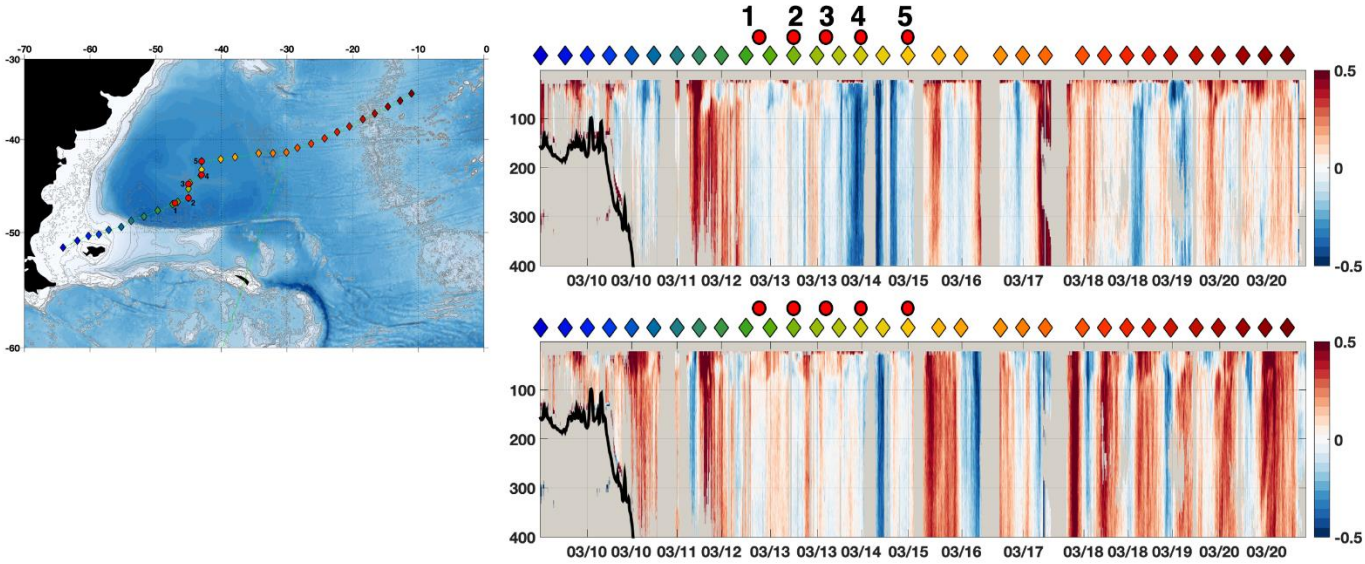


***Figure 9:** SADCP velocities (broadband Long Time average): Zonal and meridional velocities (m/s)*

- **Comparisons to Mercator Ocean ocean system:**

Model outputs from Mercator Oceans system PSY4V3 were provided by ftp during the ocean cruise. The model outputs were compared to the *in situ* data. Comparisons to CTD data and Argo floats are shown in Figure 10. Temperature and salinity maps at different depths provide a spatial context for these measurements (Figure 11).

There is a general agreement between model and temperature and salinity observations below 500m. The large differences temperature and salinity differences (>0.2 psu and 2°C) are associated to the presence of numerous and intense mesoscale and submesoscale structures in the region (Figure 11). In fact, the rms error between the model and the CTD data is in general lower than the spatial std (Figure 12).

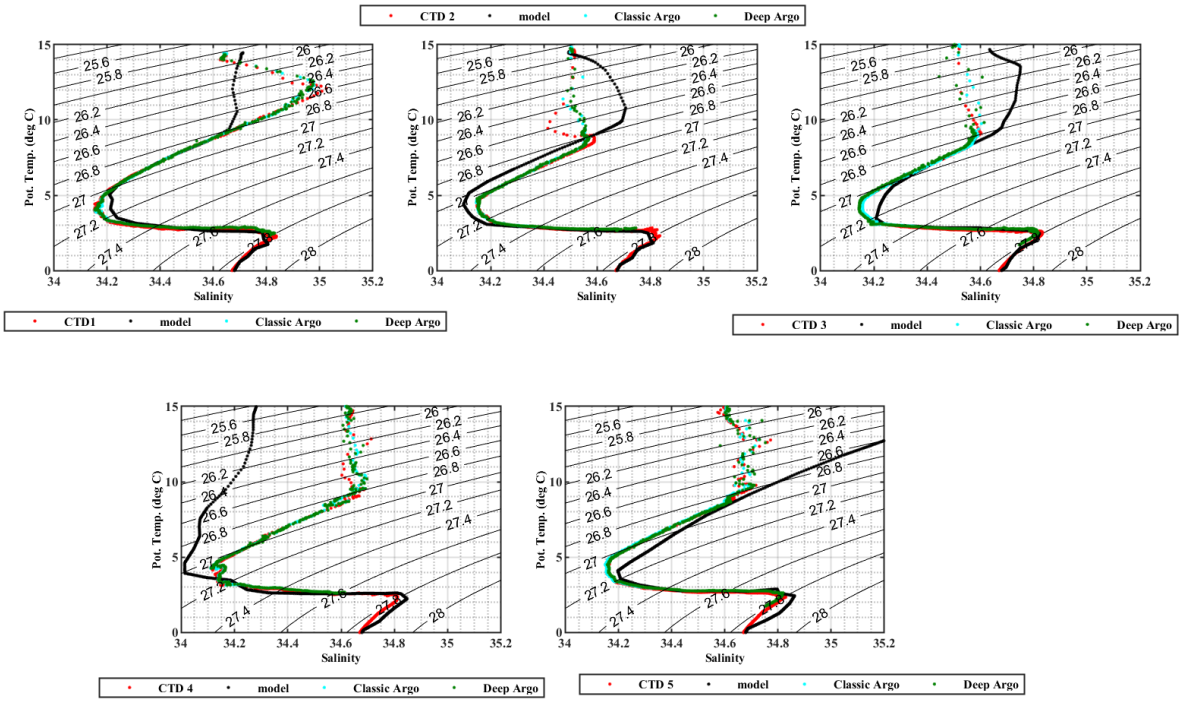
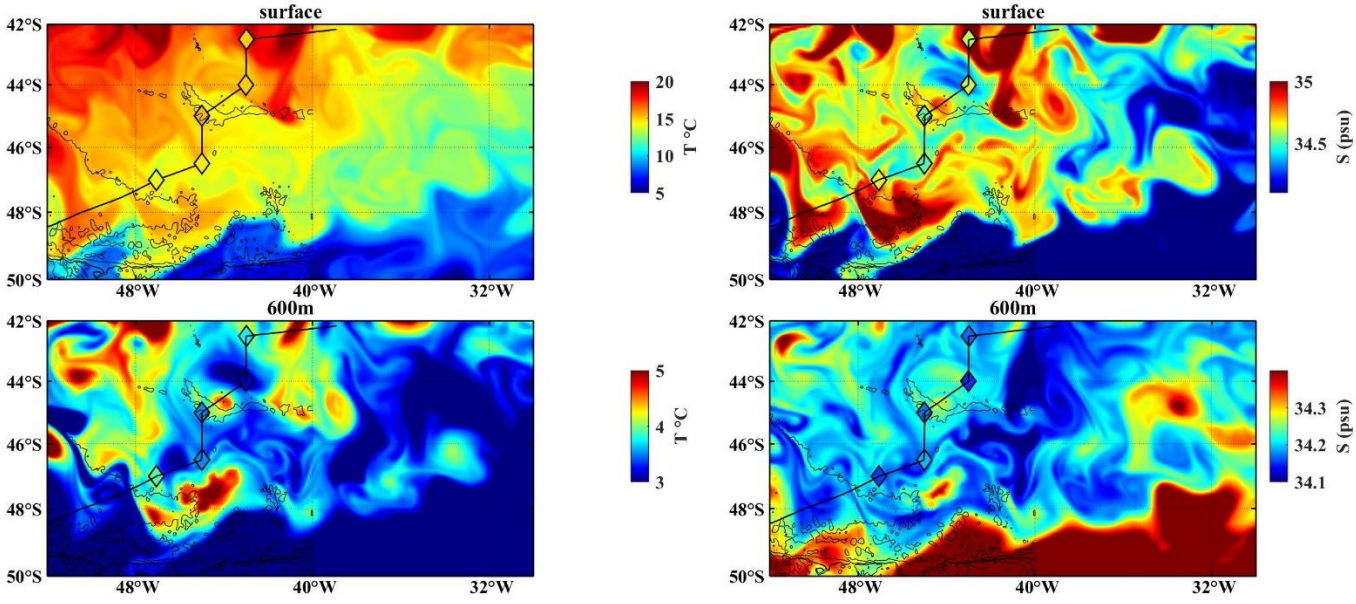


Figure 10: *Model and in situ θS diagram from CTD and Argo data and model outputs.*



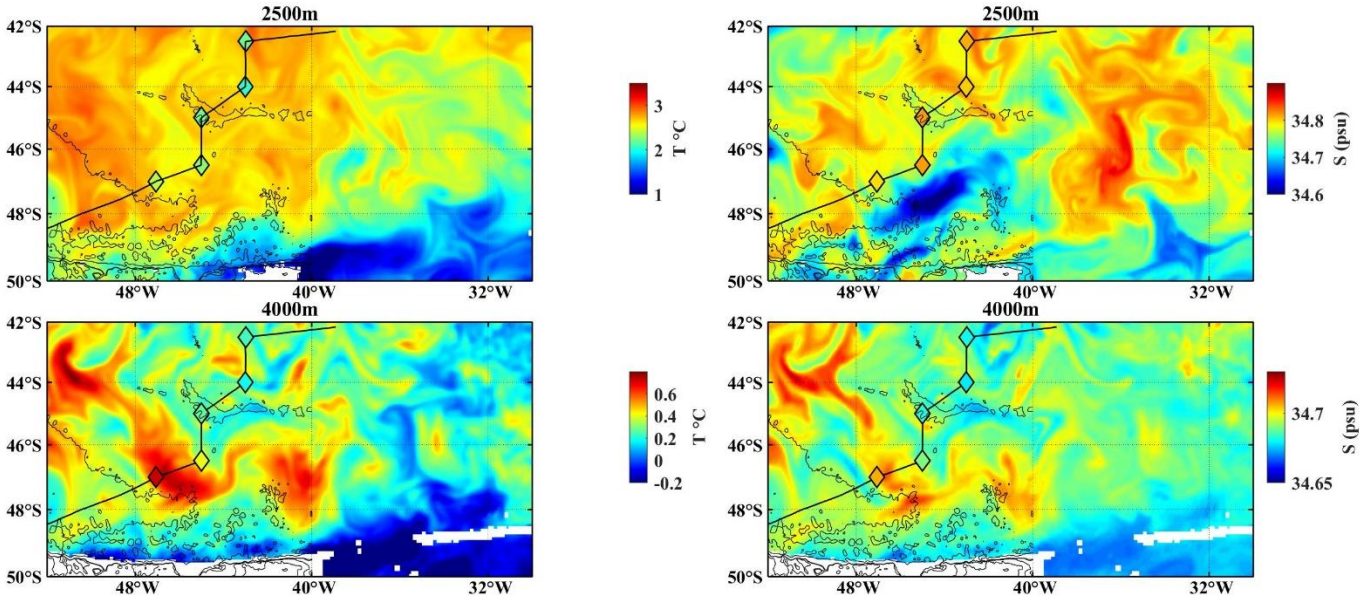


Figure 11: *Temperature (left) and salinity (right) maps at the surface,600 m, 2500m and 4000 m depth for the 13 march 2021. The temperature and salinity measurements from the CTD casts are indicated with a colored diamond.*

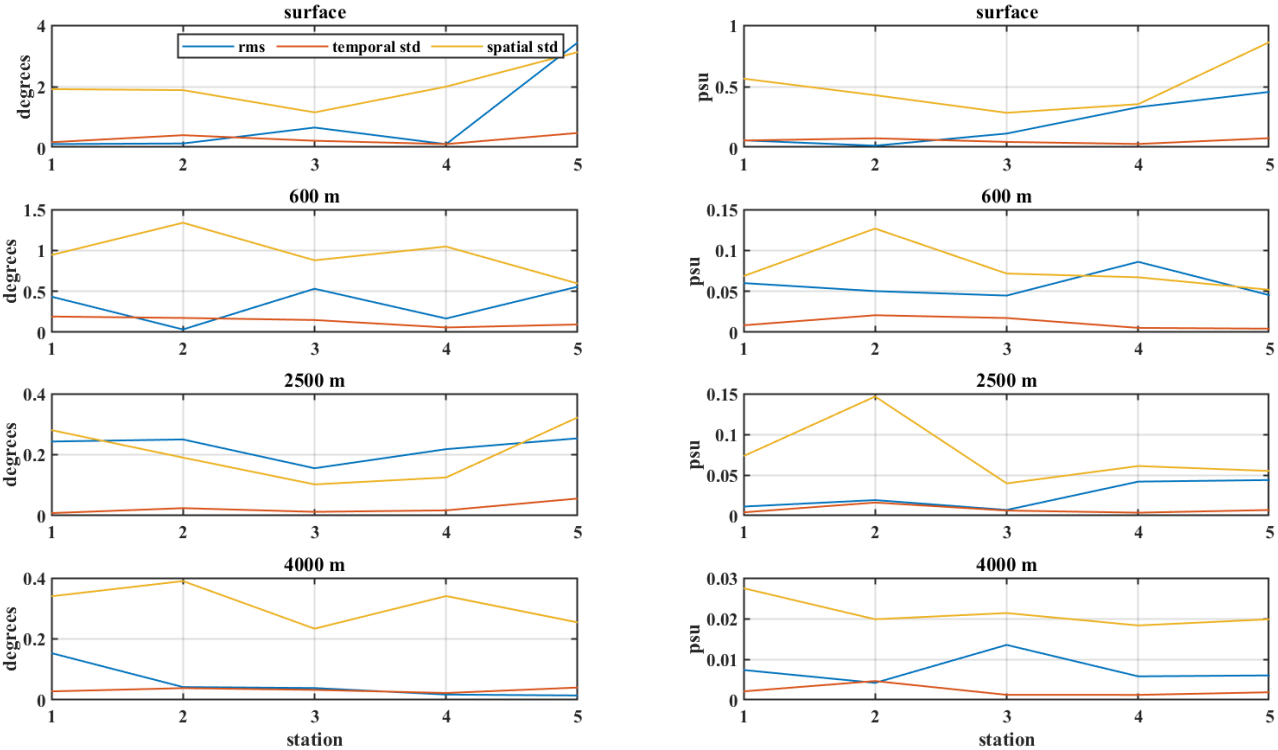


Figure 12: *Model spatial and temporal std and rms error at each CTD cast at different depth for temperature (left column) and salinity (right column). The spatial std is computed in a 1° box centered at each CTD location.*

Model temperature and salinity outputs were also compared to the thermosalinograph measurements at 5 m depth (Figure 13). The model comparisons with the thermosalinograph are satisfying in terms of mean considering this stringent comparison.

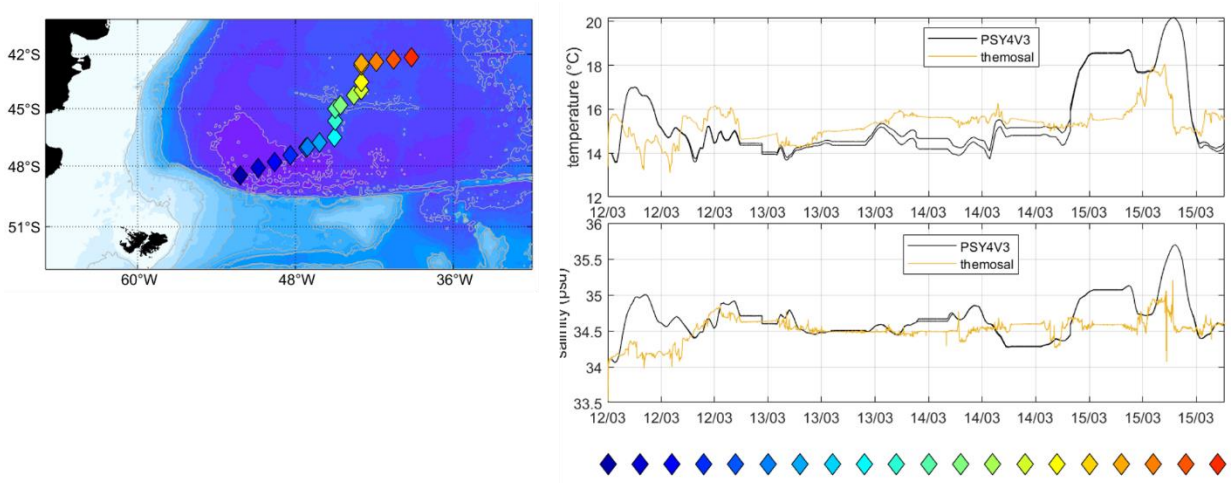


Figure 13: *Model and thermosaligraph salinity and temperature along the ship track indicated with colored diamonds in the map.*

Model velocities were compared to the SADCP velocities along the ship track (Figure 14). The large meridional velocities at the shelf break (>0.5 m/s) are probably associated with the SAF-N. The main core of the MC was not sampled by the SADCP due to rough weather. On March 12 the SADCP measurements show large southward (0.4 m/s) and eastward velocities (> 0.5 m/s) probably associated with an intense mesoscale structure. The model reproduces the jet associated with the SAF-N with lower velocities and also show the position of the MC main jet.

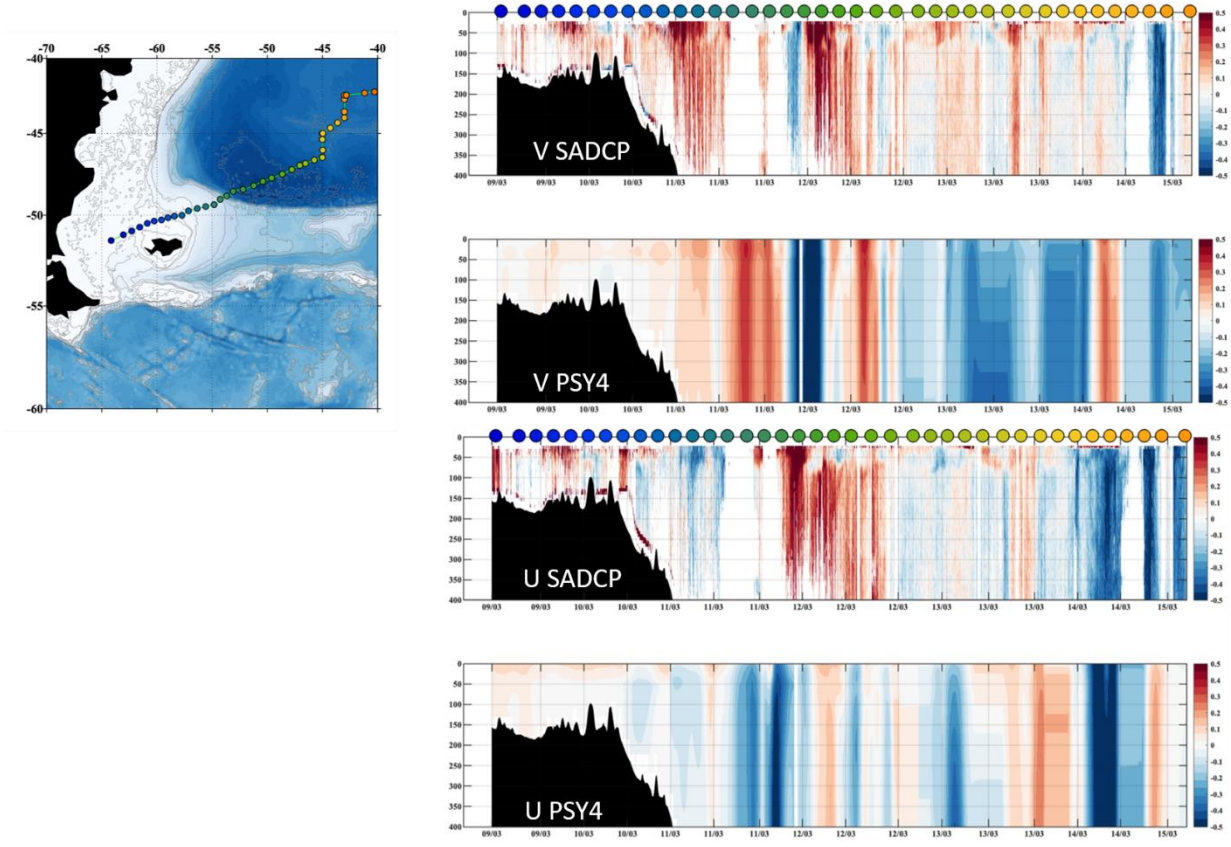


Figure 14: *SADCP and model (PSY4) velocities (U and V) along the ship track (m/s)*

Comparisons with the LADCP data at each station are very satisfying. In general the model velocities are orientated in the same direction that the LADCP data (Figure 15) and the rms error is in the order of magnitude of the temporal std (computed between March 11 and 16, Figure 16 and 17) and spatial std (Figure 17).

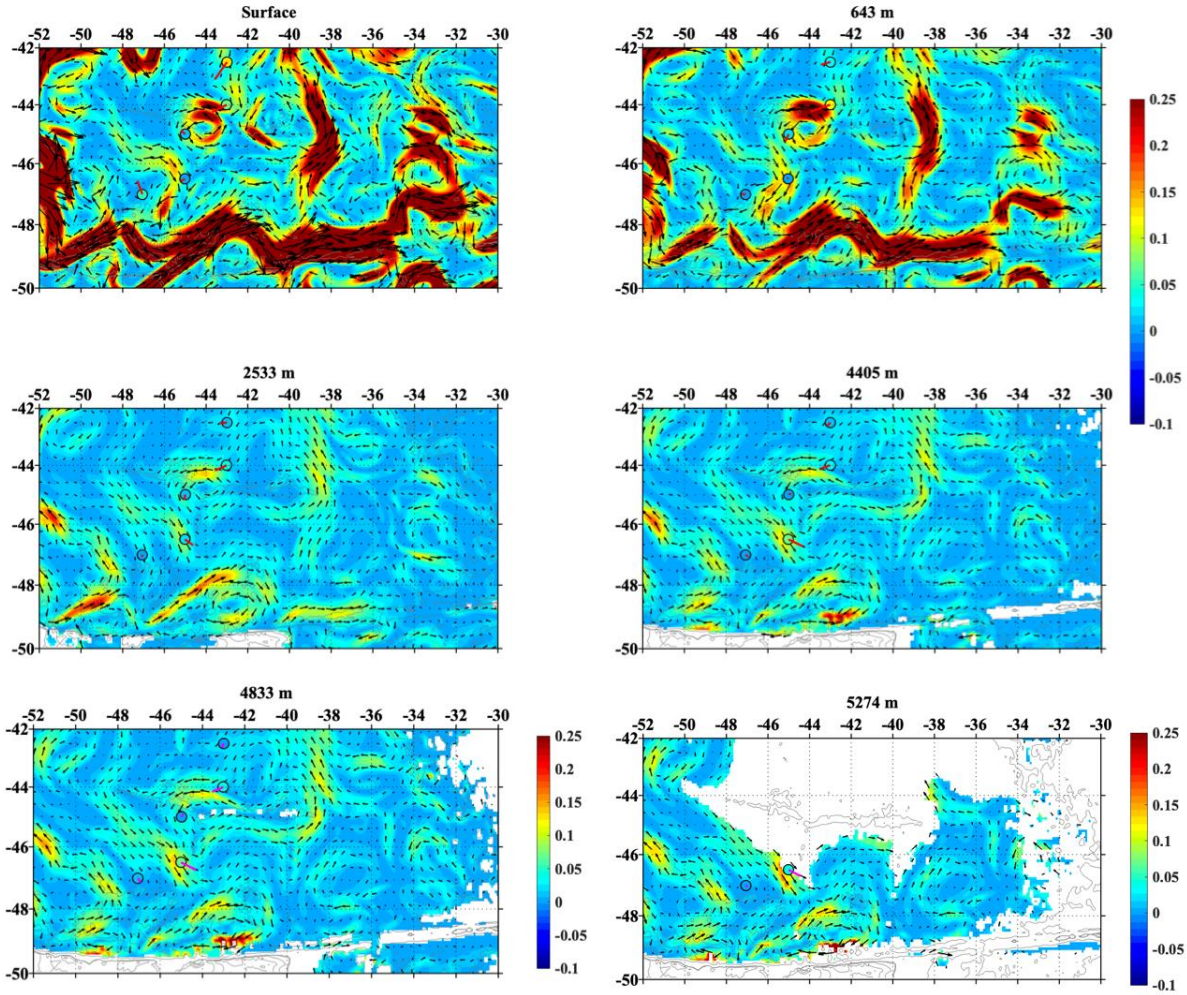


Figure 15: Model velocities at the surface, 600 m, 2500m and 4400 m, 4800 m and 5200 m depth for the March 13. The corresponding LADCP velocity intensity at each station is indicated with a colored circle.

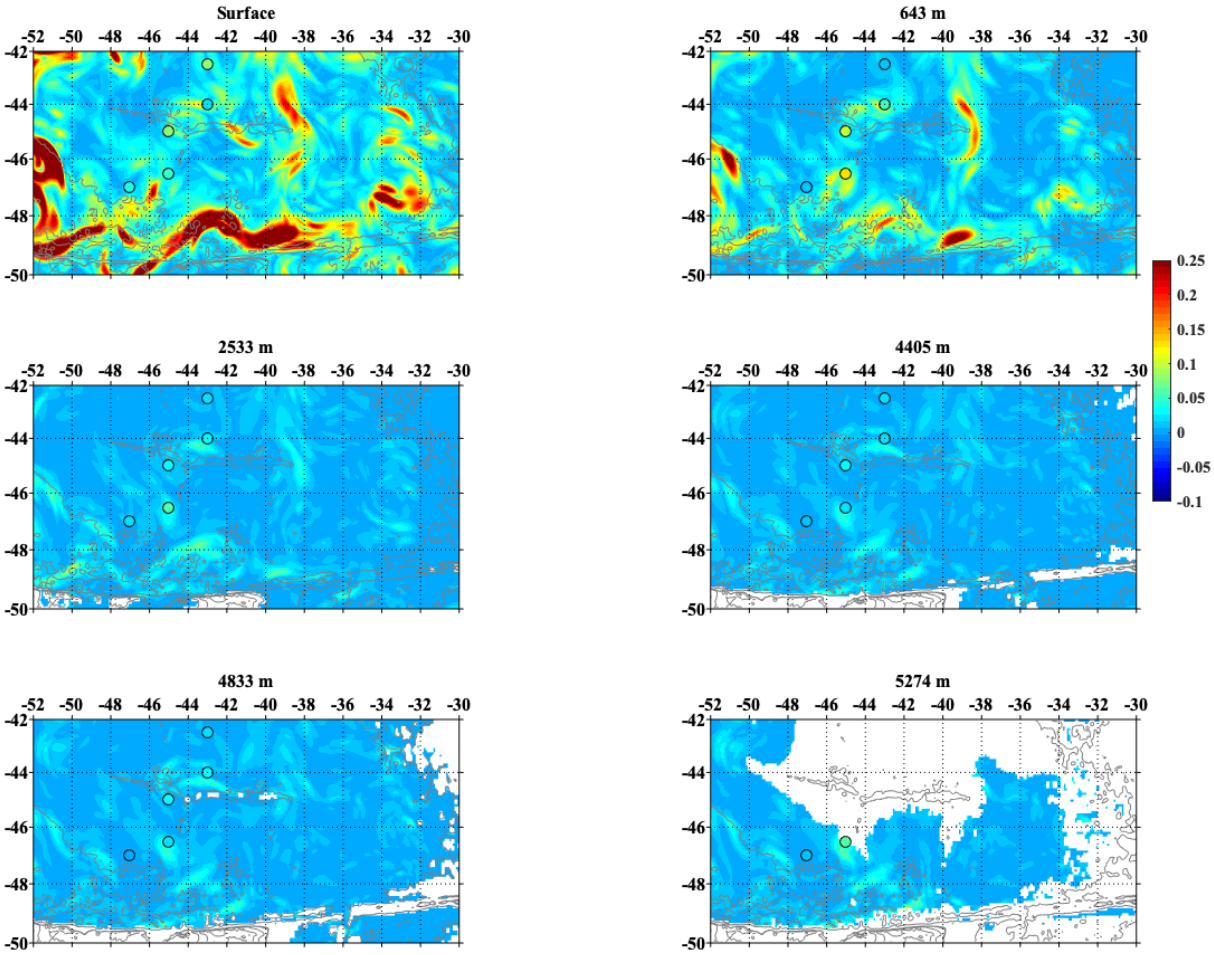


Figure 16: Velocity std from model outputs computed between March 11 and 16 with rms error (computed with LADCP data) at each CTD indicated with a colored circle.

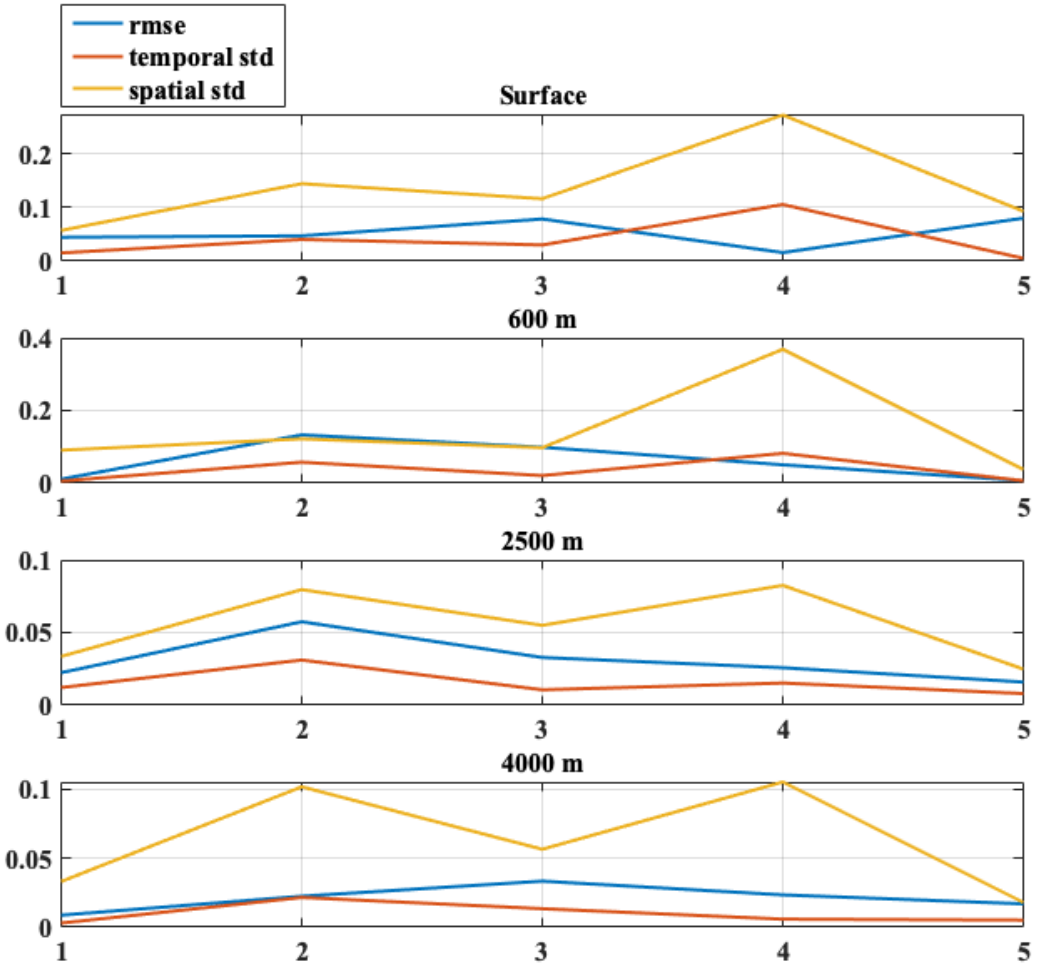


Figure 17: Model spatial and temporal std and rms error at each CTD cast at different depth for velocity intensity. The spatial std is computed in a 1° box centered at each CTD location.

- **Perspectives:**

Overall the model comparisons with the *in situ* data are very satisfactory in this region filled with intense mesoscale (and submesoscale) structures with short temporal scales. The velocity, temperature and salinity fields show large variability over the 5 days we sampled the Zapiola Anticyclone (Figure 18).

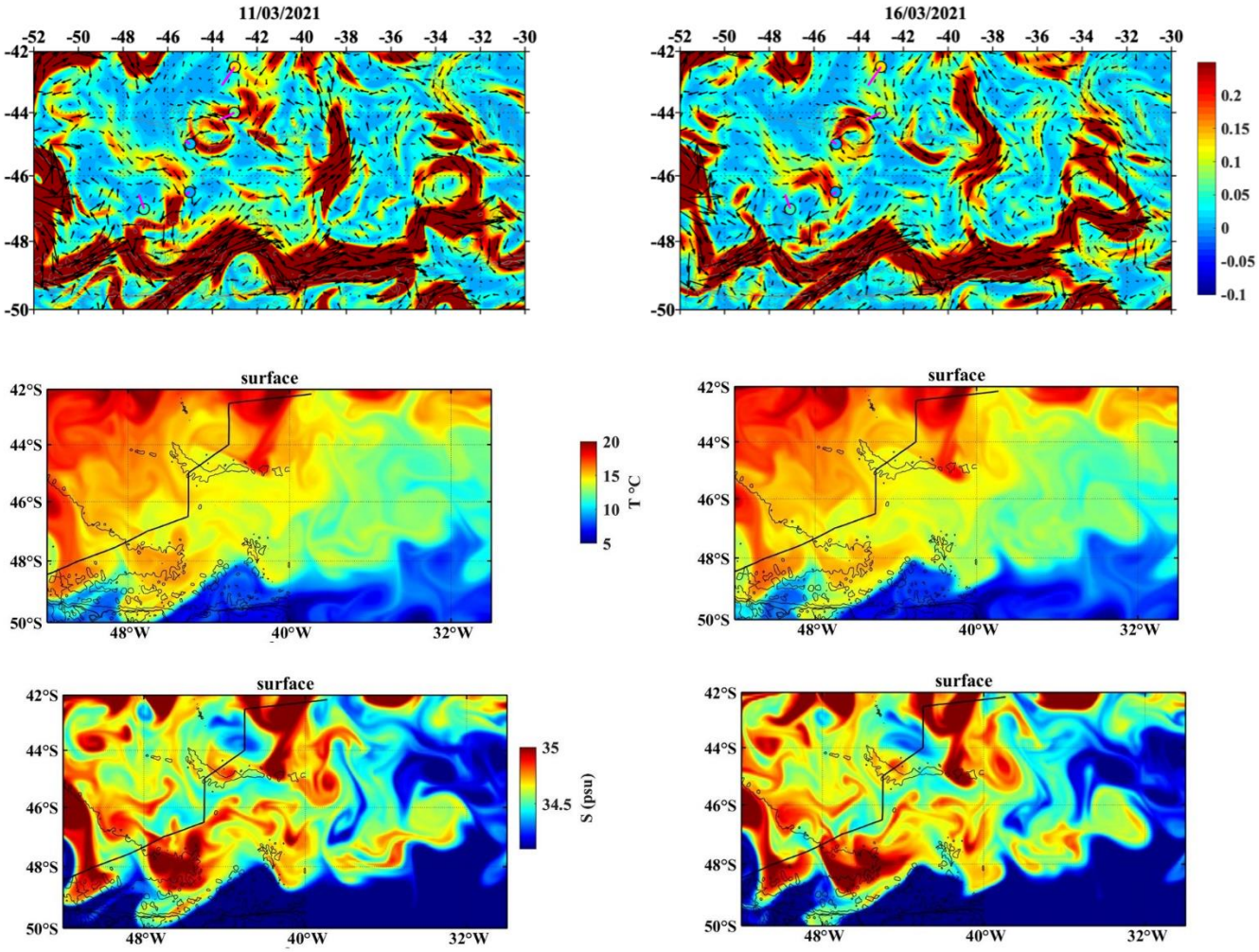


Figure 18: *Velocity, temperature, salinity and field for March 11 and 16.*

So far the Argo float performed 11 cycles and the θS diagram show a large spread at the surface, in Intermediate waters and North Atlantic Deep Waters (Figure 19). These variations deserve further investigation.

Preliminary results show that the Deep Argo floats drifted with larger velocities than the classic Argo suggesting larger velocities at depth in agreement with the LADCP velocity profile (Figure 8). The velocities at 3000 m and 1000 m will be quantified using specific algorithms.

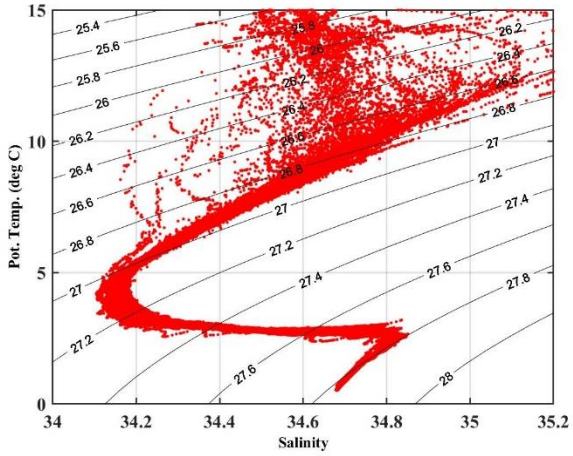


Figure 19: *θS diagram from the 10 Argo floats deployed in the Zapiola Anticylone after 11 cycles.*

Annexe:

12-03-2021

CTD-1 (21:55 UTC) Depth (5922m) (-47.014°S- -47.060°W)

Oxygen and salinity samples at the following depth:

N° bottle	depth
1	3500m
2	2800m
3	2000m
4	600m

Fiest Argo float deployment (classic 6903048-deep 6902892)

DEPLOYMENT SHEET	ARVOR BACI	DEEP ARVOR BACI
Float serial number	AI2600-20FR006	AD2700-18FR005
WMO number	6903048	6902892
IMEI	300534060603570	300234065895840
Comment after visual inspection of the float	ok	ok
Comment after visual inspection of the ballast	ok	ok
Deployment mission name (cruise name)	SAGA 10W	SAGA 10W
Deployment ship name	SARMIENTO DE GAMBOA	SARMIENTO DE GAMBOA
Name of the operator in charge of the deployment	ARTANA-POLI	ARTANA-POLI
CTD or XBT profile done during deployment (yes/no)	yes	yes
Magnet removal time (dd/mm/yyyy hh:mm)	13/03/2021 02:04 (UTC)	13/03/2021 02:03 (UTC)
Comment on float internal checks (valve and pump actions, argos transmission check)	ok	ok
Deployment time (dd/mm/yyyy hh:mm)	13/03/2021 02:07 (UTC)	13/03/2021 02:06 (UTC)
Deployment latitude (dd°mm,mm N/S or dd°mm'ss" N/S)	47.00 824°S	47.00 824°S
Deployment longitude (ddd°mm,mm E/W or ddd°mm'ss" E/W)	47.03 680 °W	47.03 680 °W
Buoyancy description	ok	ok
Deployment method (release box, manual, expendable cardboard, etc...)	manual	manual
Deployment height (m)	1	1
Ship speed (kts)	0.8	0.5
Wind speed (Beaufort)	1	1
Sea state (calm, smooth, slight, moderate, rough, very rough, high, very high, phenomenal)	calm	calm
Bathymetry at deployment position (m)	5920	5920
Number of days until the first ascending profile (copy of the PM2 parameter value)	5	5
Miscellaneous comment on the deployment	CTD 1	CTD 1

13-03-2021

CTD-2 (11:53 UTC) depth (5458m) (-46.505°S- -45.012°W)
Oxygen and salinity samples at the following depth:

N° bottle	depth
1	3500m
2	2800m
3	1400m
4	400m

Second Argo float deployment (classic 6903049-deep 6902894)

DEPLOYMENT SHEET	ARVOR BACI	DEEP ARVOR BACI
Float serial number	AI2600-20FR007	AD2700-18FR007
WMO number	6903049	6902894
IMEI	300534060221090	300234065896910
Comment after visual inspection of the float	ok	ok
Comment after visual inspection of the ballast	ok	ok
Deployment mission name (cruise name)	SAGA 10W	SAGA 10W
Deployment ship name	SARMIENTO DE GAMBOA	SARMIENTO DE GAMBOA
Name of the operator in charge of the deployment	ARTANA-POLI	ARTANA-POLI
CTD or XBT profile done during deployment (yes/no)	yes	yes
Magnet removal time (dd/mm/yyyy hh:mm)	13/03/2021 15:45 (UTC)	13/03/2021 15:45 (UTC)
Comment on float internal checks (valve and pump actions, argos transmission check)	ok	ok
Deployment time (dd/mm/yyyy hh:mm)	13/03/2021 15:55 (UTC)	13/03/2021 15:56 (UTC)
Deployment latitude (dd°mm,mm N/S or dd°mm'ss" N/S)	46.30 436°S	46.30 436°S
Deployment longitude (ddd°mm,mm E/W or ddd°mm'ss" E/W)	45.00 831°W	45.00 831°W
Buoyancy description	ok	ok
Deployment method (release box, manual, expendable cardboard, etc...)	manual	manual
Deployment height (m)	1	1
Ship speed (kts)	1.5	1.5
Wind speed (Beaufort)	0	0
Sea state (calm, smooth, slight, moderate, rough, very rough, high, very high, phenomenal)	calm	calm
Bathymetry at deployment position (m)	5460.36	5460.36
Number of days until the first ascending profile (copy of the PM2 parameter value)	5	5
Miscellaneous comment on the deployment	CTD 2	CTD 2

CTD-3 (00:55 UTC) depth (5198m) (-46.004°S- -45.000°W)
Oxygen and salinity samples at the following depth:

N° bottle	depth
1	3000m
2	2500m
3	1200m
4	600m

Third Argo float deploymennt (classic 6903050-deep 6902977)

DEPLOYMENT SHEET	ARVOR BACI	DEEP ARVOR BACI
Float serial number	AI2600-20FR008	AD2700-18FR016
WMO number	6903050	6902977
IMEI	300534060229090	300234067210120
Comment after visual inspection of the float	ok	ok
Comment after visual inspection of the ballast	ok	ok
Deployment mission name (cruise name)	SAGA 10W	SAGA 10W
Deployment ship name	SARMIENTO DE GAMBOA	SARMIENTO DE GAMBOA
Name of the operator in charge of the deployment	ARTANA-POLI	ARTANA-POLI
CTD or XBT profile done during deployment (yes/no)	yes	yes
Magnet removal time (dd/mm/yyyy hh:mm)	14/03/2021 4:40 (UTC)	14/03/2021 4:40 (UTC)
Comment on float internal checks (valve and pump actions, argos transmission check)	ok	ok
Deployment time (dd/mm/yyyy hh:mm)	14/03/2021 4:45 (UTC)	14/03/2021 4:45 (UTC)
Deployment latitude (dd°mm,mm N/S or dd°mm'ss" N/S)	45.00 278°S	45.00 278°S
Deployment longitude (ddd°mm,mm E/W or ddd°mm'ss" E/W)	45.00 107 °W	45.00 107 °W
Buoyancy description	ok	ok
Deployment method (release box, manual, expendable cardboard, etc...)	manual	manual
Deployment height (m)	1	1
Ship speed (kts)	1	1
Wind speed (Beaufort)	0	0
Sea state (calm, smooth, slight, moderate, rough, very rough, high, very high, phenomenal)	calm	calm
Bathymetry at deployment position (m)	5197.25m	5197.25m
Number of days until the first ascending profile (copy of the PM2 parameter value)	5	5
Miscellaneous comment on the deployment	CTD3	CTD3

14-03-2021

CTD-4 (15:07 UTC) depth (5126.6m) (-44.002°S- -43.008°W)
Oxygen and salinity samples at the following depth:

N° bottle	depth
1	3000m
2	2000m
3	1300m
4	300m

Fourth Argo float deployment (classic 6903049-deep 6902894)

DEPLOYMENT SHEET	ARVOR BACI	DEEP ARVOR BACI
Float serial number	AI2600-20FR009	AD2700-18FR018
WMO number	6903051	6902979
IMEI	300534060229060	300234067213160
Comment after visual inspection of the float	ok	ok
Comment after visual inspection of the ballast	ok	ok
Deployment mission name (cruise name)	SAGA 10W	SAGA 10W
Deployment ship name	SARMIENTO DE GAMBOA	SARMIENTO DE GAMBOA
Name of the operator in charge of the deployment	ARTANA-POLI	ARTANA-POLI
CTD or XBT profile done during deployment (yes/no)	yes	yes
Magnet removal time (dd/mm/yyyy hh:mm)	14/03/2021 19:02 (UTC)	14/03/2021 19:02 (UTC)
Comment on float internal checks (valve and pump actions, argos transmission check)	ok	ok
Deployment time (dd/mm/yyyy hh:mm)	14/03/2021 19:13 (UTC)	14/03/2021 19:14 (UTC)
Deployment latitude (dd°mm,mm N/S or dd°mm'ss" N/S)	44.00 299 °S	44.00 299 °S
Deployment longitude (ddd°mm,mm E/W or ddd°mm'ss" E/W)	43.00 537 °W	43.00 537 °W
Buoyancy description	ok	ok
Deployment method (release box, manual, expendable cardboard, etc...)	manual	manual
Deployment height (m)	1	1
Ship speed (kts)	1.5	1.9
Wind speed (Beaufort)	1	1
Sea state (calm, smooth, slight, moderate, rough, very rough, high, very high, phenomenal)	moderate	moderate
Bathymetry at deployment position (m)	5199	5199
Number of days until the first ascending profile (copy of the PM2 parameter value)	5	5
Miscellaneous comment on the deployment	CTD 4	CTD 4

15-03-2021

CTD-5 (04:03 UTC) depth (5180m) (-42.506°S- -42.999°W)
Oxygen and salinity samples at the following depth:

N° bottle	depth
1	3000m
2	2400m
3	1200m
4	600m

Fifth Argo float deployment (classic 6903049-deep 6902894)

DEPLOYMENT SHEET	ARVOR BACI	DEEP ARVOR BACI
Float serial number	AI2600-20FR010	AD2700-18FR020
WMO number	6903052	6902981
IMEI	300534060229080	300234067219110
Comment after visual inspection of the float	ok	ok
Comment after visual inspection of the ballast	ok	ok
Deployment mission name (cruise name)	SAGA 10W	SAGA 10W
Deployment ship name	SARMIENTO DE GAMBOA	SARMIENTO DE GAMBOA
Name of the operator in charge of the deployment	ARTANA-POLI	ARTANA-POLI
CTD or XBT profile done during deployment (yes/no)	yes	yes
Magnet removal time (dd/mm/yyyy hh:mm)	15/03/2021 7:43 (UTC)	15/03/2021 7:44 (UTC)
Comment on float internal checks (valve and pump actions, argos transmission check)	ok	ok
Deployment time (dd/mm/yyyy hh:mm)	15/03/2021 7:57 (UTC)	15/03/2021 7:59 (UTC)
Deployment latitude (dd°mm,mm N/S or dd°mm'ss" N/S)	42.30 403 °S	42.30 403 °S
Deployment longitude (ddd°mm,mm E/W or ddd°mm'ss" E/W)	42.59 843°W	42.59 843°W
Buoyancy description	ok	ok
Deployment method (release box, manual, expendable cardboard, etc...)	manual	manual
Deployment height (m)	1	1
Ship speed (kts)	1.9	1
Wind speed (Beaufort)	1	1
Sea state (calm, smooth, slight, moderate, rough, very rough, high, very high, phenomenal)	calm	calm
Bathymetry at deployment position (m)	5178.47	5178.47
Number of days until the first ascending profile (copy of the PM2 parameter value)	5	5
Miscellaneous comment on the deployment	CTD 5	CTD 5

24-03-2021

CTD-13 (3:31 UTC) depth (4068m) (-31.519°S- -9.900°W)
Sixth Argo float deployment (classic 6902993)

DEPLOYMENT SHEET	ARVOR SAGA
Float serial number	AI2600-19FR009
WMO number	6902993
IMEI	300234068702260
Comment after visual inspection of the float	ok
Comment after visual inspection of the ballast	ok
Deployment mission name (cruise name)	SAGA 10W
Deployment ship name	SARMIENTO DE GAMBOA
Name of the operator in charge of the deployment	ARTANA-POLI
CTD or XBT profile done during deployment (yes/no)	yes
Magnet removal time (dd/mm/yyyy hh:mm)	24/03/2021 11:43 (UTC)
Comment on float internal checks (valve and pump actions, argos transmission check)	ok
Deployment time (dd/mm/yyyy hh:mm)	24/03/2021 11:53 (UTC)
Deployment latitude (dd°mm,mm N/S or dd°mm'ss" N/S)	31.29 935°S
Deployment longitude (ddd°mm,mm E/W or ddd°mm'ss" E/W)	9.54 041°W
Buoyancy description	ok
Deployment method (release box, manual, expendable cardboard, etc...)	manual
Deployment height (m)	1
Ship speed (kts)	1
Wind speed (Beaufort)	0
Sea state (calm, smooth, slight, moderate, rough, very rough, high, very high, phenomenal)	calm
Bathymetry at deployment position (m)	4155
Number of days until the first ascending profile (copy of the PM2 parameter value)	2
Miscellaneous comment on the deployment	CTD 13

26-03-2021

CTD-18 (7:35 UTC) depth (4024m) (-29.404°S- -9.994°W)
Seventh Argo float deployment (classic 6902991)

DEPLOYMENT SHEET	ARVOR SAGA
Float serial number	AI2600-19FR007
WMO number	6902991
IMEI	300234068804580
Comment after visual inspection of the float	ok
Comment after visual inspection of the ballast	ok
Deployment mission name (cruise name)	SAGA 10W
Deployment ship name	SARMIENTO DE GAMBOA
Name of the operator in charge of the deployment	ARTANA-POLI
CTD or XBT profile done during deployment (yes/no)	yes
Magnet removal time (dd/mm/yyyy hh:mm)	26/03/2021 10:33 (UTC)
Comment on float internal checks (valve and pump actions, argos transmission check)	ok
Deployment time (dd/mm/yyyy hh:mm)	26/03/2021 10:40 (UTC)
Deployment latitude (dd°mm,mm N/S or dd°mm'ss" N/S)	29.24 284°S
Deployment longitude (ddd°mm,mm E/W or ddd°mm'ss" E/W)	009.59 624 °W
Buoyancy description	ok
Deployment method (release box, manual, expendable cardboard, etc...)	manual
Deployment height (m)	1
Ship speed (kts)	0.8
Wind speed (Beaufort)	0
Sea state (calm, smooth, slight, moderate, rough, very rough, high, very high, phenomenal)	Rough
Bathymetry at deployment position (m)	4022.27
Number of days until the first ascending profile (copy of the PM2 parameter value)	2
Miscellaneous comment on the deployment	CTD 18

28-03-2021

CTD-22 (23:20 UTC) depth (4358m) (-27.27 52°S- -9.50 56°W)
Eigth Argo float deployment (classic 6902994)

DEPLOYMENT SHEET	ARVOR SAGA
Float serial number	AI2600-19FR010
WMO number	6902994
IMEI	300234068607940
Comment after visual inspection of the float	ok
Comment after visual inspection of the ballast	ok
Deployment mission name (cruise name)	SAGA 10W
Deployment ship name	SARMIENTO DE GAMBOA
Name of the operator in charge of the deployment	ARTANA-POLI
CTD or XBT profile done during deployment (yes/no)	yes
Magnet removal time (dd/mm/yyyy hh:mm)	28/03/2021 7:48 (UTC)
Comment on float internal checks (valve and pump actions, argos transmission check)	ok
Deployment time (dd/mm/yyyy hh:mm)	28/03/2021 7:58 (UTC)
Deployment latitude (dd°mm,mm N/S or dd°mm'ss" N/S)	27.28 176°S
Deployment longitude (ddd°mm,mm E/W or ddd°mm'ss" E/W)	9.51 143°W
Buoyancy description	ok
Deployment method (release box, manual, expendable cardboard, etc...)	manual
Deployment height (m)	1
Ship speed (kts)	0.8
Wind speed (Beaufort)	0
Sea state (calm, smooth, slight, moderate, rough, very rough, high, very high, phenomenal)	moderate
Bathymetry at deployment position (m)	4352.05
Number of days until the first ascending profile (copy of the PM2 parameter value)	2
Miscellaneous comment on the deployment	CTD 22

29-03-2021

CTD-27 (19:42 UTC) depth (4062.1m) (-27.717°S- -10.081°W)
Nineth Argo float deployment (classic 6902992)

DEPLOYMENT SHEET	ARVOR SAGA
Float serial number	AI2600-19FR008
WMO number	6902992
IMEI	300234068807390
Comment after visual inspection of the float	ok
Comment after visual inspection of the ballast	ok
Deployment mission name (cruise name)	SAGA 10W
Deployment ship name	SARMIENTO DE GAMBOA
Name of the operator in charge of the deployment	ARTANA-POLI
CTD or XBT profile done during deployment (yes/no)	yes
Magnet removal time (dd/mm/yyyy hh:mm)	29/03/2021 22:38 (UTC)
Comment on float internal checks (valve and pump actions, argos transmission check)	ok
Deployment time (dd/mm/yyyy hh:mm)	29/03/2021 22:43 (UTC)
Deployment latitude (dd°mm,mm N/S or dd°mm'ss" N/S)	24.43 026 °S
Deployment longitude (ddd°mm,mm E/W or ddd°mm'ss" E/W)	10.05 008 °W
Buoyancy description	ok
Deployment method (release box, manual, expendable cardboard, etc...)	manual
Deployment height (m)	1
Ship speed (kts)	1.8
Wind speed (Beaufort)	1
Sea state (calm, smooth, slight, moderate, rough, very rough, high, very high, phenomenal)	calm
Bathymetry at deployment position (m)	4067.55
Number of days until the first ascending profile (copy of the PM2 parameter value)	2
Miscellaneous comment on the deployment	CTD 27

31-03-2021

CTD-33 (13:41 UTC) depth(4408.7m) (-21.634°S- -9.698°W)
Tenth Argo float deployment (classic 6902990)

DEPLOYMENT SHEET	ARVOR SAGA
Float serial number	AI2600-19FR006
WMO number	6902990
IMEI	300234068604920
Comment after visual inspection of the float	ok
Comment after visual inspection of the ballast	ok
Deployment mission name (cruise name)	SAGA 10W
Deployment ship name	SARMIENTO DE GAMBOA
Name of the operator in charge of the deployment	ARTANA-POLI
CTD or XBT profile done during deployment (yes/no)	yes
Magnet removal time (dd/mm/yyyy hh:mm)	31/03/2021 21:23 (UTC)
Comment on float internal checks (valve and pump actions, argos transmission check)	ok
Deployment time (dd/mm/yyyy hh:mm)	31/03/2021 21:31 (UTC)
Deployment latitude (dd°mm,mm N/S or dd°mm'ss" N/S)	21. 37 624°S
Deployment longitude (ddd°mm,mm E/W or ddd°mm'ss" E/W)	9.41 408°W
Buoyancy description	ok
Deployment method (release box, manual, expendable cardboard, etc...)	manual
Deployment height (m)	1
Ship speed (kts)	1.9
Wind speed (Beaufort)	1
Sea state (calm, smooth, slight, moderate, rough, very rough, high, very high, phenomenal)	calm
Bathymetry at deployment position (m)	4407.93
Number of days until the first ascending profile (copy of the PM2 parameter value)	2
Miscellaneous comment on the deployment	CTD 33

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