SHIRSHOV INSTITUTE OF OCEANOLOGY

CRUISE REPORT No. 47

RV *AKADEMIK SERGEY VAVILOV* CRUISE 05 NOV 2018 – 22 MAR 2019

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2019

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ABSTRACT

RV ***Akademik SergeyVavilov*** Cruise 47 was a contribution to the Russian CLIVAR and World Ocean Research Programme. Underway measurements of the surface temperature, conductivity and currents in the upper 800 m were designed to enable the ocean circulation in Drake Passage and the Scotia Sea to be mapped and in particular the course and short-term variability of the Subantarctic, Polar and Southern Front of the Antarctic Circumpolar Current within the region to be determined. The main goal is austral summer monitoring of the Antarctic Circumpolar Current.

KEYWORDS

CRUISE 47 2018-2019, *AKADEMIK SERGEY VAVILOV,* **ANTARCTIC CIRCUMPOLAR CURRENT, POLAR FRONT, SUBANTARCTIC FRONT, BOTTOM RELEIF, SURFACE TEMPRATURE AND SALINITY, DRAKE PASSAGE, SCOTIA SEA, CLIVAR, VMADCP, THERMOSALINOGRAPH SBE21**

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Contents
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BULYCHEV, V.V.	VMADCP OS-75, thermosalinograph SBE21	Shirshov Atlantic Branch
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1. CRUISE NARRATIVE

1.1 Cruise Details

Expedition Designation: R/V ***Akademik Sergey Vavilov*** Cruise 47, RUSSIA CLIVAR

Principal Scientists: Dr Sergey V. Gladyshev (Shirshov Institute)

Ship: RV ***Akademik Sergey Vavilov***

Port of Calls: Ushuaia (Argentina), Port Stanley (Great Britain)

Cruise Dates: 05th Nov 2018 to 22th Mar 2019

1.2 Cruise Summary

1.2.1 Cruise Tracks

The cruise tracks are shown in Fig. 1, 2 where surface temperature and salinity are in color.

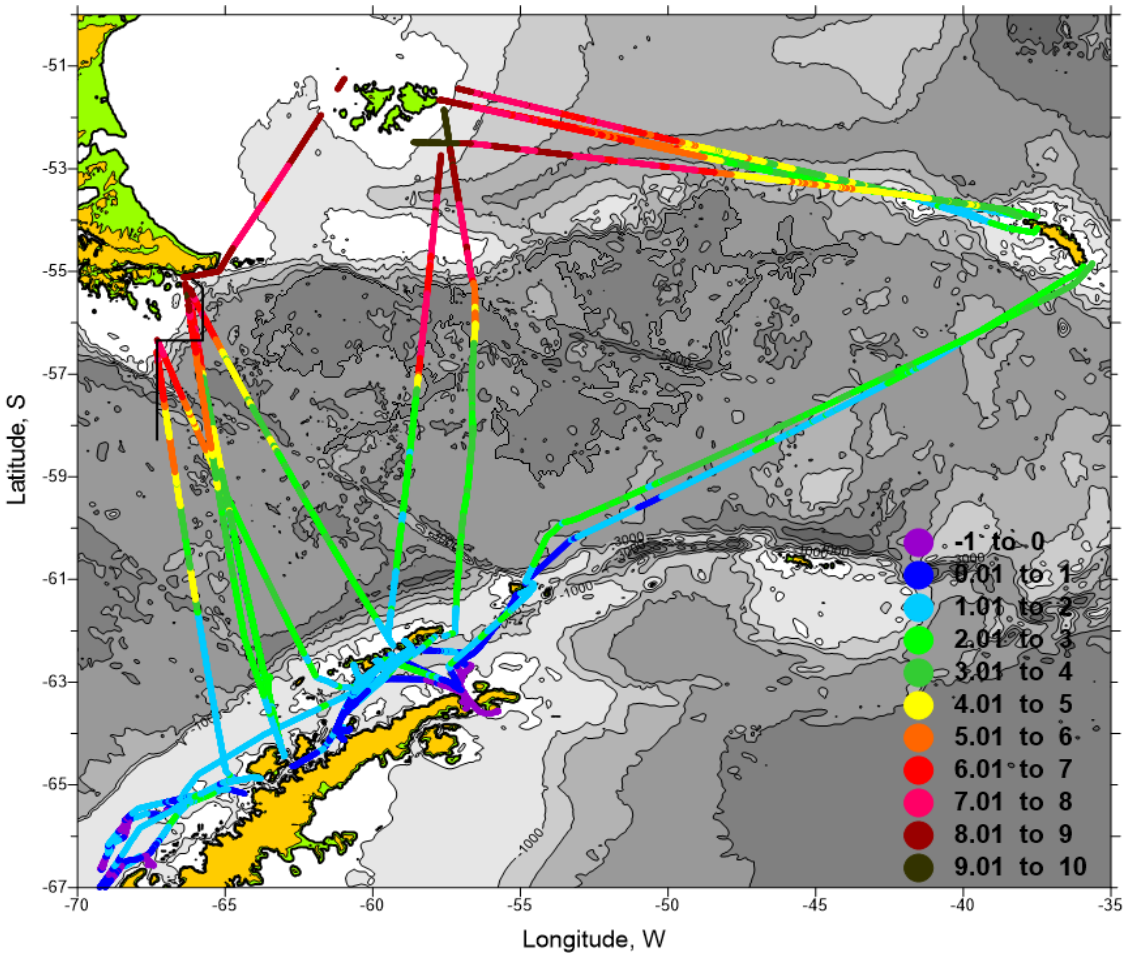

Figure 1. The chart showing *Akademik Sergey Vavilov* tracks from 1 to 49. Surface temperature along the tracks is given in different color. The Argentine-Chilean sea border is shown in black.

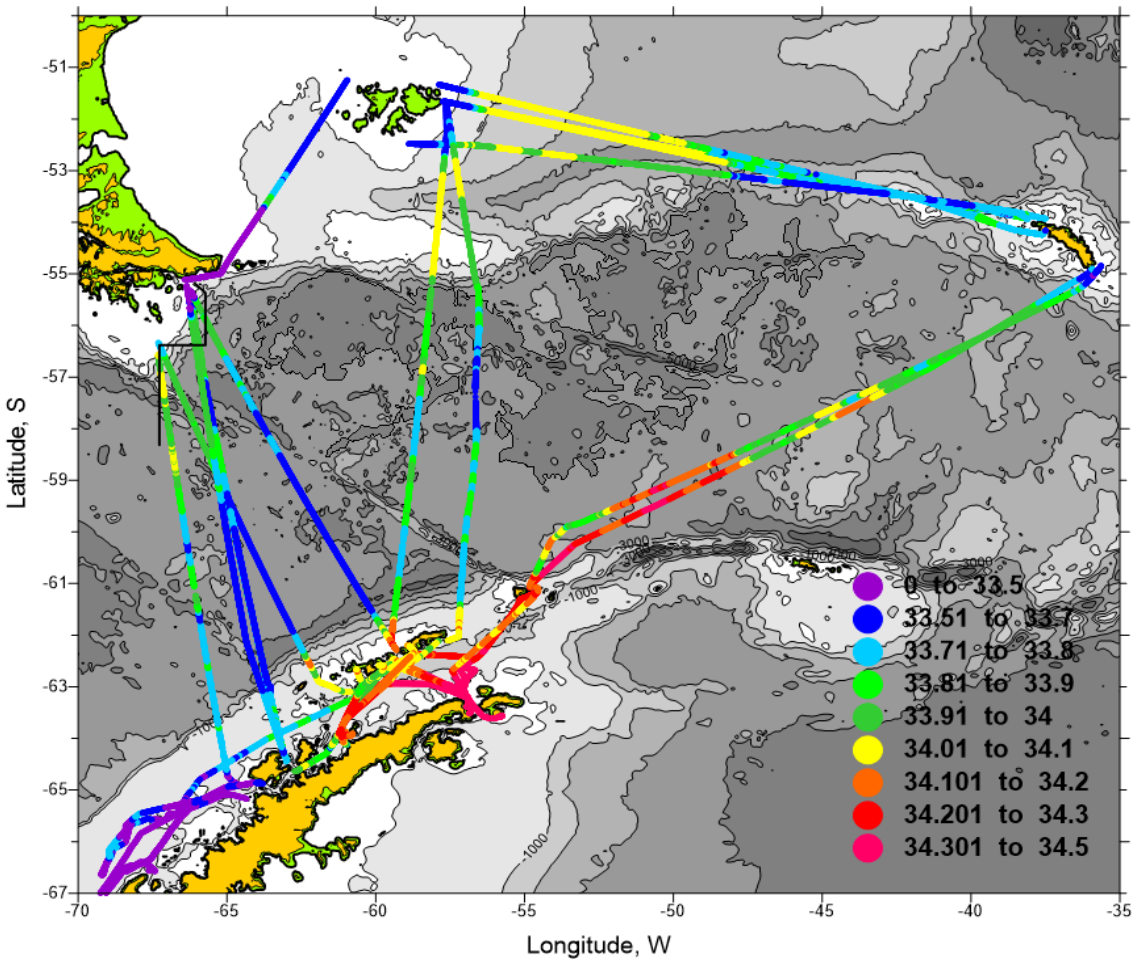

Figure 2. The chart showing *Akademik Sergey Vavilov* tracks from 1 to 49. Surface salinity along the tracks is color coded.

Table 1

N	Track Num.	Description	Start Date Time (GMT)	End Date Time (GMT)	Start Lat. S	Start Long. W	End Lat. S	End Long. W
1	1_1	*Scotia Sea* E. Falkland Is. - S. Georgia Is.	05.11.18 22:10	08.11.18 10:20	51°39.44	57°40.92	54°11.49	37°32.22
2	1_2	*Scotia Sea* S. Georgia Is. - E. Falkland Is.	13.11.18 23:02	16.11.18 21:39	53°54.59	38°15.10	51°39.58	57°40.29
3	2_1	*Scotia Sea* E. Falkland Is. - S. Georgia Is.	17.11.18 22:17	20.11.18 08:57	51°39.92	57°36.64	54°09.42	37°29.08
4	2_2	*Scotia Sea* S. Georgia Is. - E. Falkland Is.	26.11.18 20:34	30.11.18 09:45	53°55.24	38°11.12	51°39.76	57°45.07
5	2_3	*Scotia Sea* W. Falkland Is. - Nueva Is.	01.12.18 23:32	03.12.18 02:41	51°14.93	60°58.29	55°06.56	66°25.87
6	3_1	*Drake Passage* Is. Nueva – Melchior Is.	04.12.18 03:40	06.12.18 04:02	55°13.44	66°21.23	64°19.65	63°3.96
7	3_2	*Bransfield Strait* Cierva Cove – Deception Is.	11.12.18 00:07	11.12.18 08:22	64°04.22	61°04.67	62°59.18	60°30.78
8	3_3	*Bransfield Strait* Deception Is. - Robert Point	11.12.18 12:32	11.12.18 16:24	62°59.54	60°28.94	62°27.39	59°22.56
9	3_4	*Bransfield Strait* Robert Point – Brown Bluff	11.12.18 21:32	12.12.18 10:58	62°27.69	59°22.16	63°30.60	56°51.21
10	3_5	*Bransfield Strait* Hope Bay – Maxwell Bay	12.12.18 15:42	13.12.18 11:03	63°23.02	56°58.04	62°12.12	58°55.87
11	4_1	*Bransfield Strait* Maxwell Bay – Ronge Is.	13.12.18 22:23	14.12.18 17:11	62°12.15	58°55.77	64°38.21	62°43.85
12	4_2	*Bransfield Strait* Trinity Is. - Deception Is.	16.12.18 13:31	16.12.18 18:45	63°56.51	60°49.79	62°59.68	60°29.72
13	4_3	*Bransfield Strait* Deception Is. - Paulet Is.	16.12.18 23:20	17.12.18 11:39	62°59.48	60°29.11	63°34.10	55°45.67
14	4_4	*Bransfield Strait*	17.12.18	18.12.18	63°22.85	56°56.31	61°10.18	54°38.39

		Hope Bay – Elephant Is.	19:01	14:28				
15	4_5	*Scotia Sea* Elephant Is. - S. Georgia Is.	18.12.18 16:52	21.12.18 07:00	61°04.46	54°50.01	54°53.87	35°55.63
16	4_6	*Scotia Sea* S. Georgia – Falkland Is.	24.12.18 12:11	27.12.18 20:15	53°55.79	37°46.52	51°19.84	57°52.34
17	5_1	*Drake Passage* Falkland Is. - Nelson Strait	30.12.18 21:56	02.01.19 04:36	51°29.84	57°38.20	62°16.24	59°19.62
18	5_2	*Bransfield Strait + South Polar Circle* Deception Is. - Bismarck Strait	02.01.19 22:15	05.01.19 06:01	63°00.16	60°30.65	64°52.35	64°13.36
19	5_3	*Bransfield Strait* Cierva Cove – Maxwell Bay	07.01.19 16:54	08.01.19 09:11	64°04.89	61°04.50	62°12.27	58°54.60
20	6_1	*Bransfield Strait* Maxwell Bay – Small Is.	08.01.19 18:29	09.01.19 07:19	62°13.21	58°51.22	64°01.96	61 21.02
21	6_2	*Bransfield Strait* Trinity Is. - Half Moon Is.	13.01.19 00:25	13.01.19 09:56	63°50.65	61°10.58	62°35.16	59°53.25
22	7_1	*Bransfield Strait* Half Moon Is. - Deception Is.	15.01.19 14:43	15.01.19 17:13	62°35.06	59°52.73	62°54.62	60°17.04
23	7_2	*Bransfield Strait* Deception Is. - Spert Is.	15.01.19 21:33	16.01.19 10:00	63°00.27	60°30.85	63°52.41	61°00.21
24	7_3	*Drake Passage* Bismarck Strait – Cabo de Hornos	18.01.19 19:42	20.01.19 17:30	64°53.73	64°22.57	56°33.28	67°18.84
25	8_1	*Drake Passage* Nueva Is. - Melchior Is.	22.01.19 05:26	24.01.19 04:35	55°26.47	66°16.34	64°15.40	63°06.71
26	8_2	*Bransfield Strait* Cierva Cove – Deception Is.	26.01.19 23:10	27.01.19 11:26	64°07.40	60°58.44	63°00.00	60°30.54
27	8_3	*Bransfield Strait* Deception Is. - Greenwich Is.	27.01.19 15:28	27.01.19 18:30	62°59.17	60°28.95	62°33.28	59°35.13
28	8_4	*Bransfield Strait* Greenwich Is. - Antarctic Sound	27.01.19 21:25	28.01.19 10:33	62°33.44	59°34.32	63°09.25	57°00.27
29	8_5	*Bransfield Strait* Antarctic Sound – Elephant Is.	28.01.19 22:49	29.01.19 12:29	63°02.95	57°05.88	61°04.18	54°36.83
30	8_6	*Scotia Sea*	29.01.19	01.02.19	61°02.43	54°49.92	54°50.30	35°38.17

		Elephant Is. - South Georgia Is.	14:06	08:01				
31	8_7	*Scotia Sea* S. Georgia – Falkland Is.	04.02.19 19:42	08.02.19 08:56	53°56.21	38°05.16	52°28.83	58°53.26
32	9_1	*Drake Passage* Falkland Is. - King George Is.	09.02.19 23:20	12.02.19 14:59	51°40.30	57°38.15	62°06.28	57°35.289
33	9_2	*Bransfield Strait* Penguin Is. - Small Is.	12.02.19 20:31	13.02.19 08:48	62°06.47	57°53.79	64°00.94	61°19.60
34	9_3	*Polar Circle* Bismarck Strait – Matha Strait	14.02.19 00:42	15.02.19 16:46	64°51.95	64°10.36	66°34.42	67°25.34
35	9_4	*Bransfield Strait* Cierva Cove – Deception Is.	18.02.19 13:45	18.02.19 19:32	64°07.21	60°58.80	62°59.57	60°29.59
36	9_5	*Bransfield Strait* Deception Is. - Maxwell Bay	19.02.19 00:29	19.02.19 11.09	62°59.55	60°29.27	62°12.01	58°55.53
37	10_1	*Bransfield Strait* Maxwell Bay – Intercurrence Is.	19.02.19 23:00	20.02.19 09:46	62°12.08	58°54.86	63°56.04	61°11.50
38	10_2	*Polar Circle* French Passage – Matha Strait	22.02.19 22:31	23.02.19 10:37	65°10.21	64°20.43	66°33.81	67°36.71
39	10_3	*Deep South* Matha Strait – Gremlin Is.	23.02.19 12:14	24.02.19 11:33	66°25.41	67°50.78	68°16.54	67°14.14
40	10_4	*Deep South* Porquoi Pas Is. - Bismarck Strait	25.02.19 22:04	27.02.19 01:27	67°44.85	67°54.05	64°52.78	63°47.73
41	10_5	*Bransfield Strait* Two Hummok Is. - Livingston Is.	27.02.19 23:16	28.02.19 11:08	64°11.34	61°31.82	62°39.35	60°38.29
42	10_6	*Drake Passage* Deception Is. - Cape Horne	28.02.19 21:43	02.03.19 10:14	63°00.15	60°30.28	56°19.62	67°18.30
43	11_1	*Drake Passage* Nueva Is. - Melchior Is.	04.03.19 04:53	06.03.19 10:01	55°31.65	66°11.12	64°26.70	63°00.69
44	11_2	*Bransfield Strait* Cierva Cove – Deception Is.	09.03.19 22:00	10.03.19 09:19	64°06.80	61°00.15	62°59.55	60°29.62
45	11_3	*Bransfield Strait* Deception Is. - Half Moon Is.	10.03.19 14:49	10.03.19 17:52	62°59.33	60°29.12	62°35.21	59°53.32
46	11_4	*Drake Passage* Nelson Strait – Nueva Is.	11.03.19 00:11	12.03.19 19:49	62°14.35	59°21.73	55°19.93	66°12.59

47	12_1	*Drake Passage* Nueva Is. - Nelson Strait	14.03.19 09:00	15.03.19 20:03	55°45.31	65°50.34	62°17.47	59°18.37
48	12_2	*Bransfield Strait* Maxwell Bay – Mikkelsen Harbour	17.03.19 23:16	18.03.19 12:16	62°12.05	58°55.16	63°54.32	60°46.51
49	12_3	*Drake Passage* Melchior Is. - Nueva Is.	20.03.19 21:15	22.03.19 23:23	64°17.26	63°05.34	55°38.99	66°14.86

1.2.2. Equipment

Upper-layer currents were measured using vessel mounted ADCP (VMADCP) TRDI OS75 kHz (S/N 2140) installed at the central point of the ship hall at depth 5.8 m. Surface temperature and conductivity were logged every 3 seconds. The equipment consisted of an SBE 21 (S/N 3251) temperature and conductivity sensors mounted in an SBE housing in the pump room located in the central part of the ship. A ship pump was used to provide a constant flow of non-toxic water.

Navigation information was provided by an Aquarius^2 Thales receiver and every second was recorded on the PC. Additional measurements were made with an EA600 12 kHz and Aanderaa meteorological package.

1.3 Scientific Objectives

The cruise objectives were to:

1. To collect surface temperature and conductivity underway in Drake Passage and in the Scotia Sea.
2. To collect upper-layer currents underway in Drake Passage and in the Scotia Sea to estimate short-term variability of the Antarctic Circumpolar Current transport and relative contribution of its main jets.
3. To collect a depth to refine bottom releief features in the region.

1.4 Narrative

Beginning from January 2010 we started to collect a large velocity set related to the Antarctic Circumpolar Current (ACC) in Drake Passage, where a few main jets squeezed by continents and flowing over sills strongly meander and detach a number of mesoscale eddies. Our plan to continue these measurements each year when our ships carry out touristic trips crossing Drake Passage up to 30-40 times per austral summer. To date we made 270 crossings by two our ships in Drake Passage for last 9.5 years (in austral summer seasons). Average observational frequency is 28.5 crossings per summer or 6-7 crossings per month or one crossing each 4-5 days and a short crossing time (about 40-50 hours - close to a true snapshot) with initial resolution 600 m (2-minute averaging) is quite sufficient to monitor the changing seasonality of the upper ACC transport (*Meredith and Hughes, 2005*). We intend to analyze it possible dependence on SAM index or influence of the short-term wind-forced variability (*Meredith et al. 2004, Meredith et al. 2011*) to better understand its dynamical nature.

Globally the ACC is a main link of the interocean circulation in the Southern Ocean. The absence of land barriers in the latitude band of Drake Passage has a profound influence on the dynamics of currents in the Southern Ocean and, more generally, on the earth's climate. Within

this band, the strong eastward flow of the ACC connects each of the ocean basins. Sverdrup dynamics in their usual form cannot be applied to flows within a zonally unbounded ocean, and as a consequence the dynamics of the ACC have long been a topic of debate. Eddy fluxes are believed to play a more central role in both the dynamical and thermodynamical balances of the Southern Ocean than in other areas of the world ocean. The interbasin connection provided by the ACC permits a global overturning circulation to exist; the overturning circulation, in turn, dominates the global transport of heat, fresh water and other properties that influence climate. The vigorous interbasin exchange accomplished by the ACC also admits the possibility of oceanic teleconnections, where anomalies formed in one basin may be carried around the globe to influence climate at remote locations. The fact that no net meridional geostrophic flow can exist across the unblocked latitudes isolates the Antarctic continent from the warmer waters at lower latitudes to some extent, contributing to the glacial climate of Antarctica; what heat does get carried poleward to balance the heat lost to the atmosphere must be carried by eddies.

Processes of air-sea interaction in this region cause the cooling and consequent sinking of surface waters and thus result in formation of the water masses. Complex of the South Atlantic deep waters formed spreads northward. According to the «global conveyor» concept (*Broecker*, 1991), cold deep waters formed in the South Atlantic, propagate throughout the entire Atlantic ocean and initiate the compensating return flow at shallow levels, which carries warmer water southward. The deep convection intensity variations cause the substantial interannual and long-term changes in properties of the deep and intermediate water masses and thus impact the global overturning circulation, which in turn influences the atmospheric circulation and the state of the climate system. For this reason, annual monitoring of the ACC in Drake Passage and in the Scotia Sea is essential.

RV ***Akademik Sergey Vavilov*** Cruise 47 was a contribution to the RUSSIA CLIVAR Community Research Programme. Underway measurements were designed to enable the ocean circulation in Drake Passage and in the Scotia Sea to be mapped and in particular the course of its main jets (Subantarctic, Polar and ACC Southern Front currents) within the region to be determined. The Drake Passage crossings aimed to provide estimates of the upper layer volume transport and its short-term variability including possible redistribution of mass between the main jets.

The first underway current observations in Drake Passage were started by US researchers in 1999 (*Lenn et al., 2007*) and continue to be carried out at the present time (*Firing et al. 2011*). For these purposes, the ship *Laurence M. Gould* (LMG) is used that regularly (about once a

month) supplies the Antarctic Palmer Station on the Antarctic Peninsula, as well as conducts scientific studies in this area. Prior to 2004, the observations of currents were carried in the upper 300-m layer of the ocean (153.6 kHz, RD Instruments ADCP). In late 2004, the ship was installed with a new system of transducers (38 kHz, TRD Instruments ADCP) that measures the currents to depths of about 1000 m in the Drake Passage.

Unlike that of the US, the IO RAS program of underway observations is carried out only in summer season of the Southern Hemisphere but the intensity of our observations is significantly higher (up to 6-8 strait crossings a month vs. 2 crossings per month by the LMG). Increasing the observational frequency can confidently allow for the synoptic time scales, and thus offer prospects for obtaining reliable estimates of meridional transfer of mass, heat, and momentum by the eddies that are considered as one of the main sources of the meridional transfer through the ACC. In addition, the IO RAS program of the underway observations spans over a more western region in the northern part of the strait—the area of Cape Horn, which is characterized by a sharp change in the direction of the isobaths of the continental slope. Since the ACC jets propagate to the bottom and, hence, are topographically controlled (*Rintoul et al., 2001*), there is an abrupt change of the northern jet direction when it simultaneously interacts with the SFZ. Thus, the data in this area will help us to investigate the mechanisms that influence the behavior of the current as it interacts with the continental slope of complex configuration.

1.5 Preliminary Results

Figure 3 shows the main features of Drake Passage bottom relief. The ACC meets large-scale submerged barrier Phoenix Antarctic Ridge (PAR) at the western entrance of the Drake Passage (Figure 3). PAR consists of a few almost parallel submarine mountain chains splitting by deep passages and confluences with narrow Shackleton Fracture Zone (SFZ) near South American continental slope extension

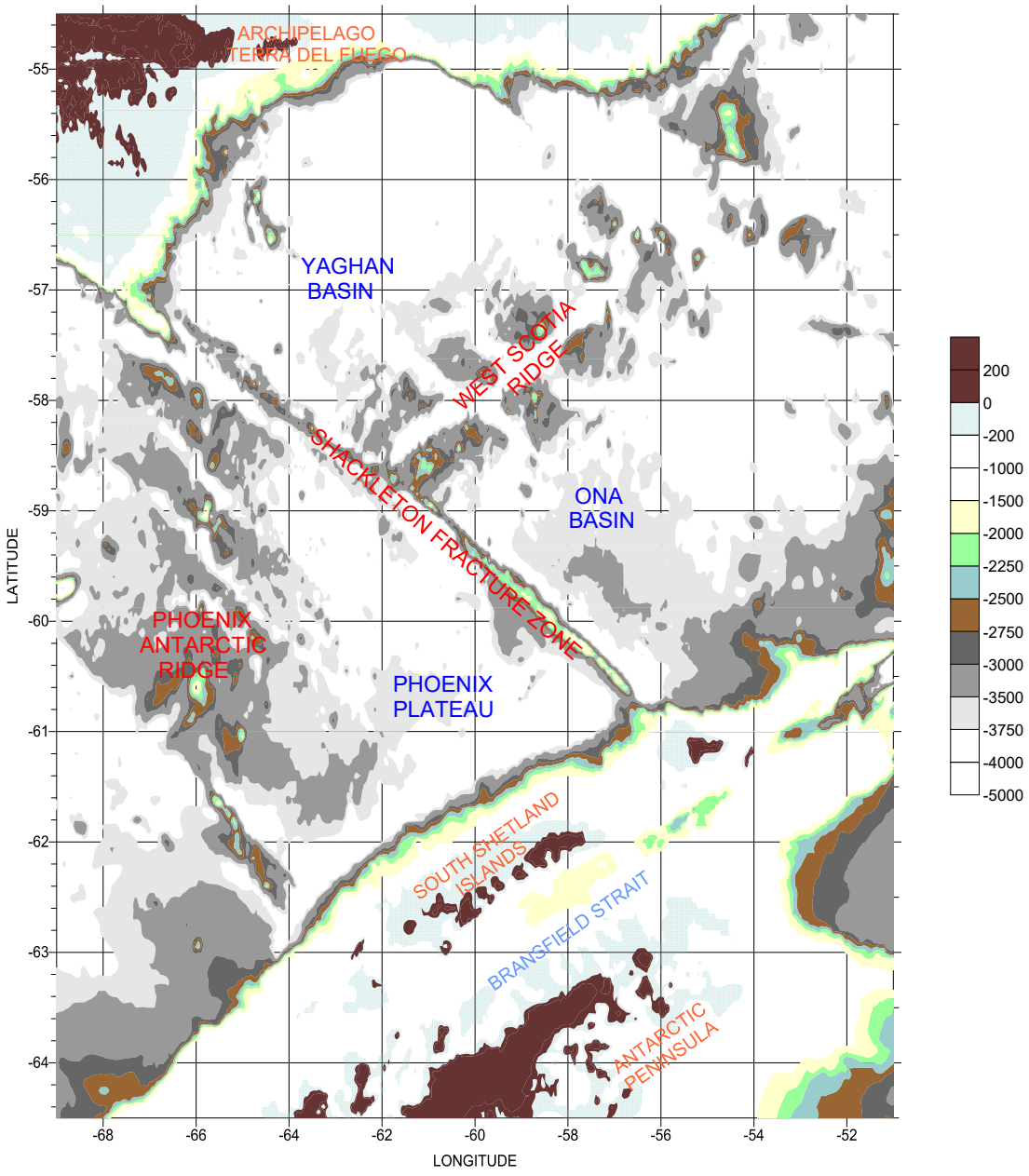

Figure 3. Drake Passage bottom relief based on the 0.8' GEBCO data.

Deep Phoenix Plateau separates these bottom disturbances and provides contrasting background conditions for the meandering ACC. Most of the ship tracks lie over these bottom relief features (Figure 4) and give us an excellent chance to study a role of the bottom topography in ACC variability.

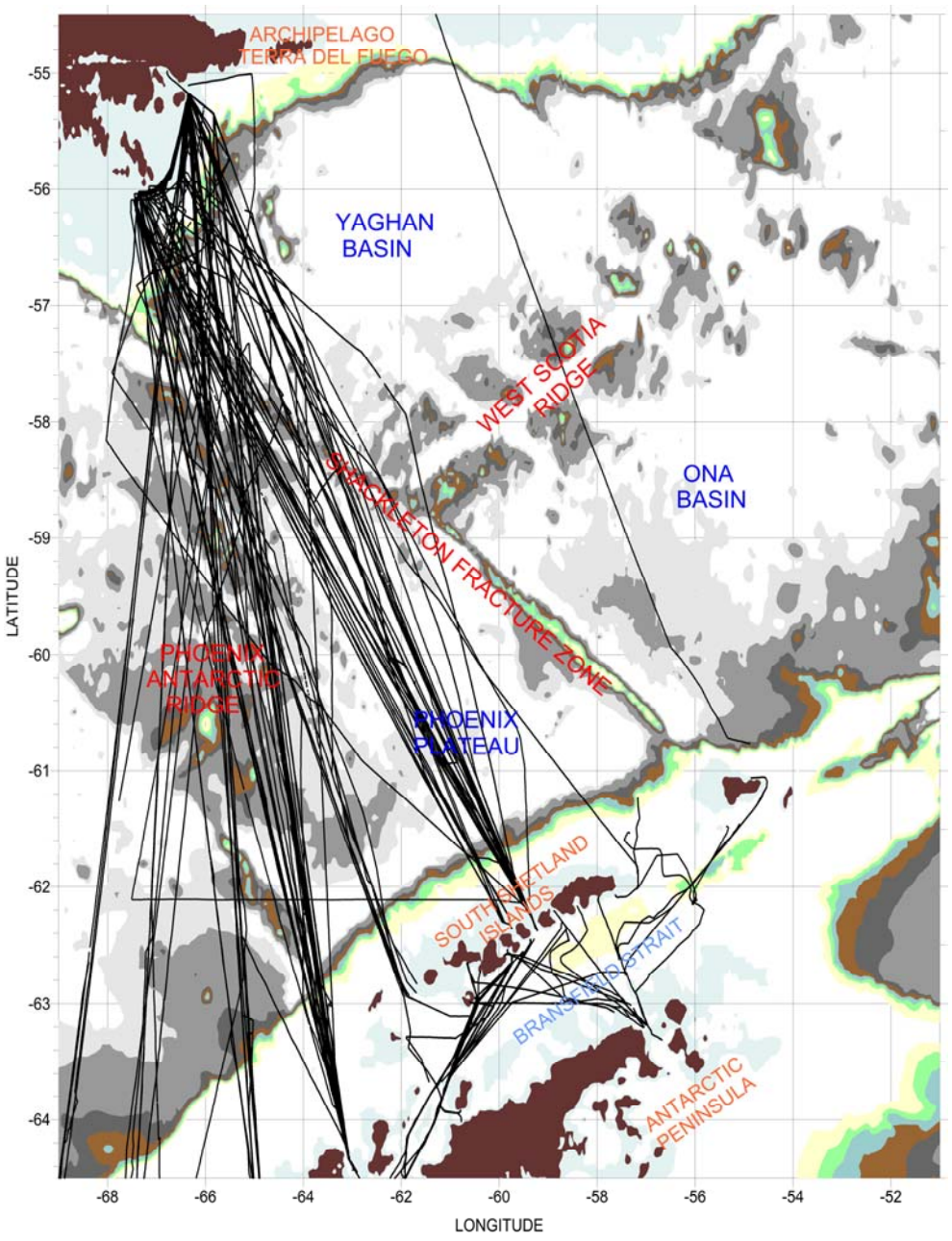

Figure 4. Position of crossings carried out by two IO RAS ships between January 2010 and March 2014.

1.5.1 Mean Circulation in Drake Passage

To obtain an average property field using data irregularly distributed in space and time, it is necessary to use statistical approaches. To build mean summer circulation in Drake Passage the data of each velocity track collected by two our ships *Akademik Ioffe* and *Akademik Sergey Vavilov* in 2010-2014 were interpolated into grid nodes with a resolution of 0.2° latitude horizontally and 20 m depth vertically. Segments of the tracks with missing data were excluded. Figure 5 shows observational frequency or number of tracks per 0.2° × 0.5° square of latitude and longitude with horizontal scales an order of 22 × 28 km, respectively. For the construction of the mean current field at different levels, only those squares were used in which the number of crossings exceeded three. The velocity vector components were interpolated into the central points of these squares followed by averaging. The described method is not perfectly fitted to average variable and meandering object like the ACC. It should be clear that although each individual track shows a variety of meandering well-defined and periodically confluent jets comprising the ACC their temporal geographical averaging produces not well structured "cloud" of currents only.

As an example of such a construction, Figure 6 shows an average map of the current vectors at a depth of 200 m. For convenience, Figure 6 also includes contours of the absolute dynamic topography (ADT) of the sea surface that correspond to the axes of individual ACC jets (*Sokolov and Rintoul, 2009*). Figure 6 shows the average position of the "axial" ACC (ADT) jet contours for the entire period of observations in the austral summers of 2010–2014. The distribution of the ADT in Drake Passage is uploaded from the site www.aviso.oceanobs.com. This product (ADT DT-UPD) is a synthesis of the altimetry observations of the satellites TOPEX/Poseidon, ERS, GFO, JASON, and Envisat, which are interpolated to the nodes of the Mercator projection map with a resolution of 1/3°.

The current system in Drake Passage is quite complicated, though largely coherent in the upper 500-m layer. The Southern ACC Front (SACCF) jet or its northern branch according to the Sokolov's marker envelopes Antarctic continental slope and its FAR extension at the entrance of Drake Passage. Measurements reveal that interaction of the jet with southern part of the FAR often causes formation of the cold cyclonic eddies. The SACCF jet extending to the bottom crosses FAR through two deep southern passages oriented at the right angle to each other. The

bottom relief forces the jet to turn sharply to follow configuration of the passages. The map also shows that the SACCF jet accelerates in this region. It loses intensity over deep Phoenix Plateau and continues to flow close to the continental slope.

The strongest currents observed in the northern part of the Drake and are shown in red (Figure 6). This "cloud" of currents includes two Subantarctic ACC and two Polar ACC jets. Sokolov's Subantarctic ACC jet markers drawn as thick green lines in Figure 6 are not well fitted the jets in Drake Passage. Single wide and strong Subantarctic ACC jet flows between two green markers in Yagan Basin generally following along isobaths as was already described by *Firing et al (2011)*. The Polar ACC jets shown in dark blue lines in ADT field are better characterized by these markers. It looks like the most intense ACC jets have a tendency to coalesce crossing PAR at the entrance of the Drake Passage and sharply separate after passing SFR. The Subantarctic ACC jets are more intensive at the Drake entrance while the Polar ACC jets accelerate after crossing PAR and especially SFR. The latter becomes even stronger than the former over West Scotia Ridge. Three Polar ACC jets form the single powerful jet in the vicinity of SFR. Apparent reason of this acceleration is displacement of the southern Polar ACC jet to the north over PAR in accordance with configuration of the ADT contours. The southern and central Polar jets generally follow f/H contours (decreasing in H over PAR have to be compensated by decreasing in planetary vorticity f that is less equatorward). As will be shown later this quasi stationary meander plays very important role to bring fresh melted Antarctic surface water into the Polar jet area to cause a low salinity belt formation south of the sharp polar thermohaline front. As follows from *Close et al., 2013* further subduction of this low salinity water contribute to Subantarctic Mode Water (SAMW) and Antarctic Intermediate water (AAIW) variability. Using our underway salinity data and full depth CTD sections in Drake Passage we intend to investigate the relation between the surface salinity of the low salinity belt and salinity of SAMW and AAIW and their interannual variability in Drake Passage.

1.5.2 Mean surface temperature and salinity in Drake Passage and Bransfield Strait

To build mean sea surface temperature (SST) and sea surface salinity (SSS) maps in Drake Passage and in Bransfield Strait shown in Figure 7 and Figure 8 we averaged data of 216 tracks in 0.2x0.5° squares with equal weights and then objectively interpolated the averaged data

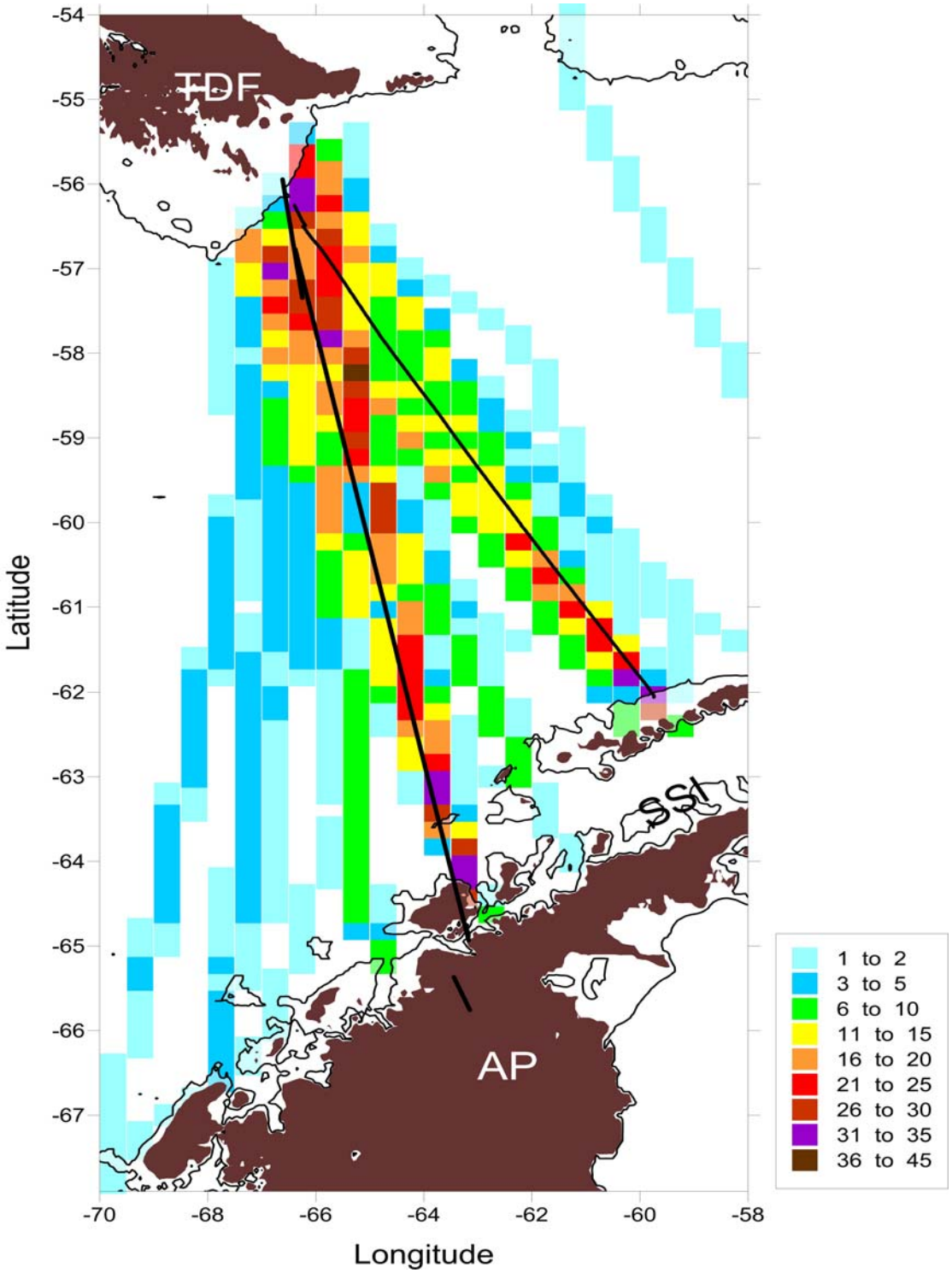

Figure 5. Data statistics for 0.2 x 0.5° geographical squares with horizontal scales 22 x 28 km respectively in Drake Passage. Number of tracks per square is color coded with a legend in the right lower corner. Black thick lines show most frequently visited areas.

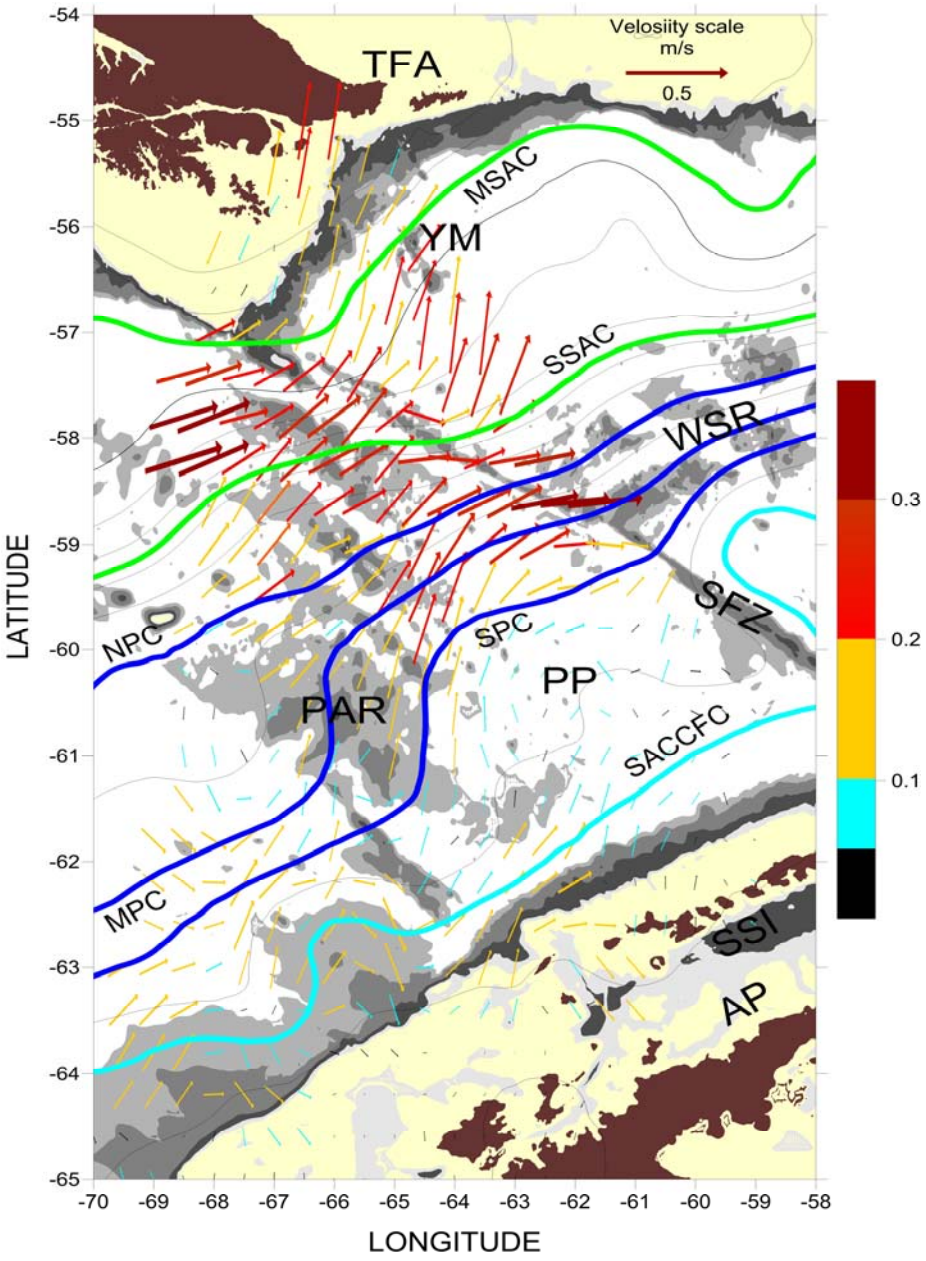

Figure 6. Mean circulation at 200 m based on the data of 134 crossings collected in 2010-2014 in Drake Passage. Thick lines show axial streamlines of the main ACC jets (Subantarctic jets in green, Polar jets in dark blue and SACCF jet in light blue) drawn using AVISO data according to Sokolov and Rintoul (2009). Main bathymetry features are shown in grey. TFA denotes Terra del Fuego, PAR – Phoenix Antarctic Ridge, PP – Phoenix Plateau, SFZ – Shackletone Fracture Zone, YM – Yagan mountains, WSR – West Scotia Ridge, AP – Antarctic Peninsula, SSI – South Shetland Islands, MSAC and SSAC – middle and south Subantarcic Currents, NPC, MPC and SPC – north middle and south Polar Currents, SACCFC – southern ACC front Current.

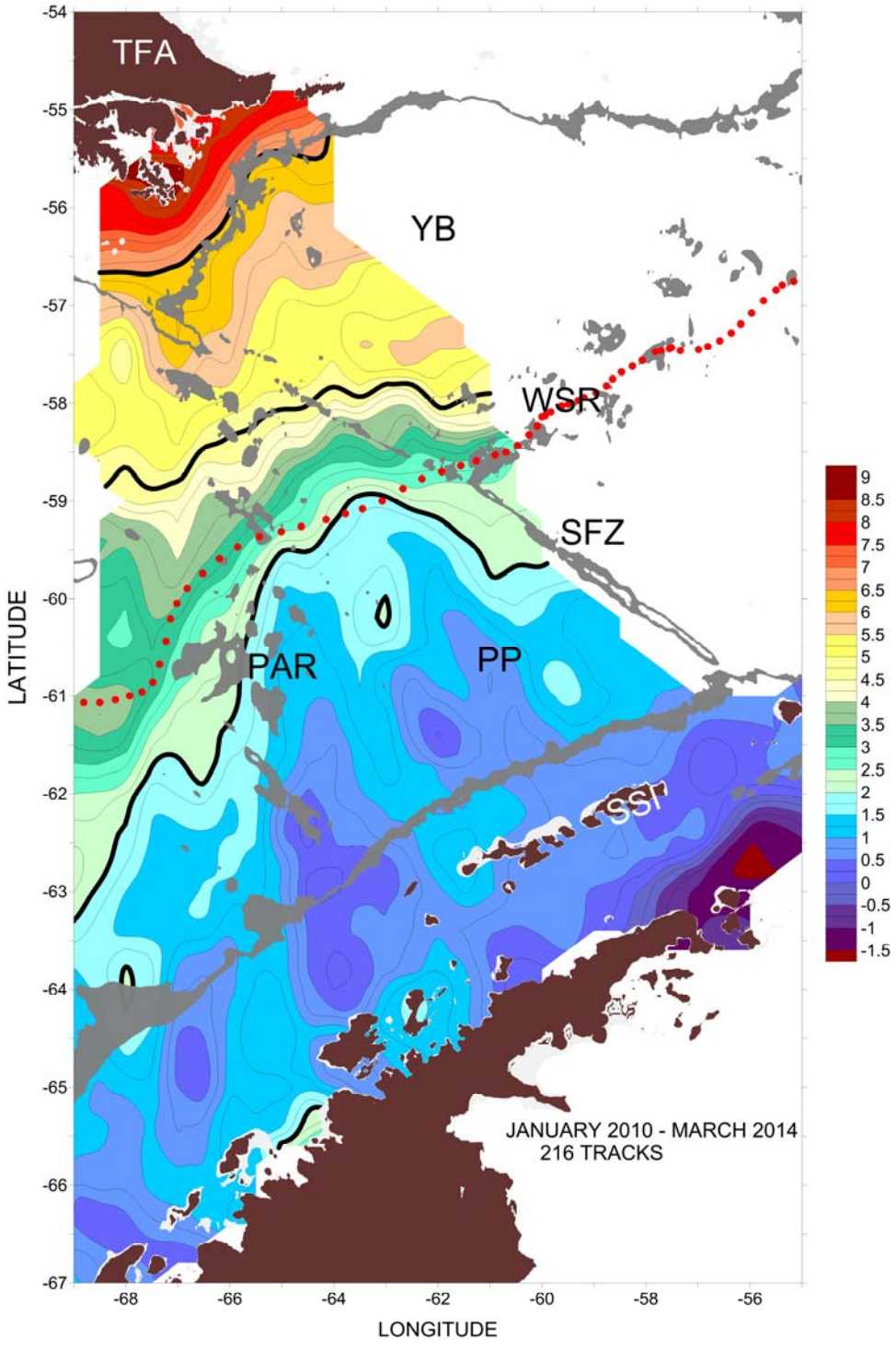

Figure 7 Mean sea surface temperature based on the data of 216 tracks collected in 2010-2014 in Drake Passage and in Bransfield Strait. Thick lines limit the location of the Antarctic Polar thermohaline front (APF) and southern boundary of the Slope Front (SF). Depth range 2000-3000 m is shaded. Abbreviations are shown in Figure 6. The APF position according *to Orsi et al (1995)* is shown by red circles.

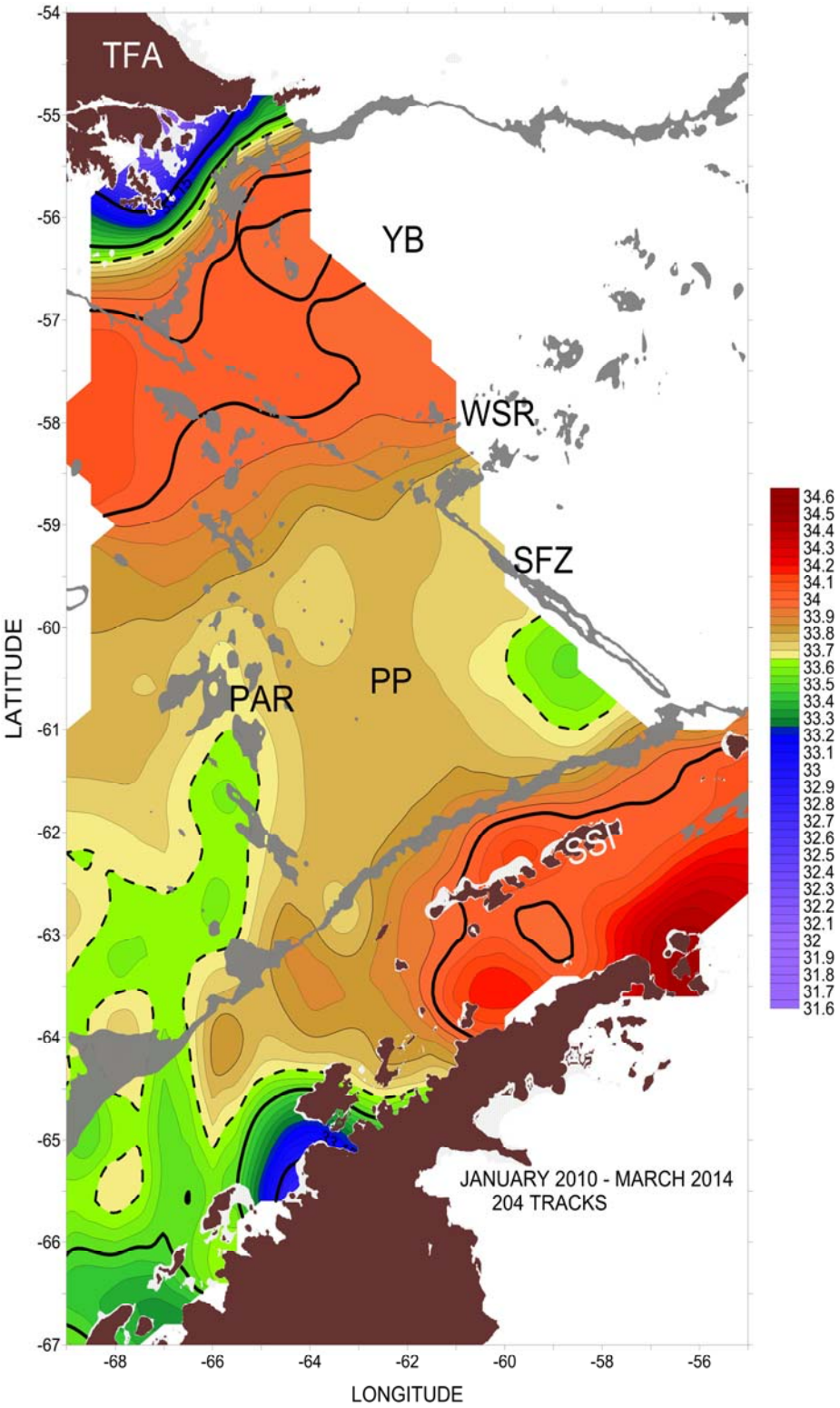

Figure 8. Mean sea surface salinity based on the data of 204 tracks collected in 2010-2014 in Drake Passage and in Bransfield Strait. Depth range 2000-3000 m is shaded. Abbreviations are shown in Figure 6.

using the same grid with radii interpolation of 0.5 -1° in latitude and longitude correspondingly.

Strong SST and SSS gradients delineate Antarctic Polar Front (APF) position in the central part of the Drake Passage. Its average summer surface range is 2-5°C in temperature (thick isotherms in Figure 7) and 33.8-33.95 in salinity (Figure 8). The surface APF location corresponds well to the position of front derived from historical hydrographic data (red circles) by *Orsi et al. (1995)* although the latter are close to its southern boundary. The APF follows the path of the Polar jets (Figure 6) and generally has a variable and complex structure due to frequent meandering and eddy formation. The SST and SSS have a strong seasonal cycle (not shown) as well as the APF itself. Month to month warming ceases in February and the SST starts to decrease in March. SST warming rate is the highest at the APF area and southward in November-January and reaches 1.5°C per month. North of the APF SST maximal warming is delayed about one month and occurs in December-January. It does not exceed 1.0° C per month. The strongest horizontal gradients of SST and SSS across the APF is in November and the weakest in February in concert with the result published by *Dong et al. (2006)*.

The SSS gradually decreases in Drake Passage due to ice melting and excess of precipitation over evaporation in summer. Maximum salinity decrease rate occurs south of the APF in November-December. In contrast to the SST it has no reverse tendency in March. Figure 8 shows strong advection of the low SSS (~33.6) by the southern Polar jet meander south of the APF. Obviously this low salinity water is the source of SAMW and AAIW interannual variability.

The SST and SSS horizontal gradients are mutually compensated across the APF and there is no horizontal density gradient at the surface in Drake Passage. Thus Ekman forcing can efficiently move cold and low salinity Antarctic surface water northward together with the ACC itself to contribute to SAMW and AAIW formation (Figure 7, *Close et al., 2013).*

There is another front in the northernmost part of Drake Passage that *Dong et al. (2006)* erroneously called SAF (Figure 7 and 8 in this report and their Figure 2). Indeed this is the Slope Front (SF) located north of the Subantarctic jets and it separates warmer and low salinity shelf water due to river run off and continental snow melting from slope one. The SF has about doubly lower SST horizontal gradient and much stronger SSS one comparing to the APF. It has clear surface manifestation in density field.

Remarkable feature of the SSS field in Drake Passage is a high salinity area in Bransfield Strait and at the South Shetlands shelf (Figure 8). Enhanced SSS exceeds 34.4 at the tip of the Antarctic Peninsula and originates from the Weddell Sea.

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1.6 Major Problems and Goals Not Achieved

Aquarius^2 Thales GPS periodically lost heading data. ADCP data partially missed because of absence of GPS heading data and due to the weather conditions. Meteorological station was out of range during the whole season.

2. CONTINUOUS MEASUREMENTS (underway)

2.1 Navigation

Navigation data from Aquarius^2 Thales GPS was recorded every 1 second and was stored on the PC in binary format.

2.2 Meteorological Measurements

Meteorological station was out of range.

2.3 Thermosalinograph

Underway temperature and conductivity were continuously logged using the SBE acquisition program Seasave. The equipment consisted of an SBE 21 S/N 3251 temperature and conductivity sensors mounted in an SBE housing in the pump room. A ship pump was used to provide a constant flow of non-toxic water.

TSG salinity is usually calculated from the measured conductivity and temperature at the instrument housing. Surface bottle samples from CTD casts taking during previous cruise were used as true conductivity (salinity) from which to calculate an offset to be applied to the TSG salinities. CTD bottle samples were selected from a .btl sample files. We selected only CTD sample data from 0-10 dbars.

The CTD surface samples had their time added to the data file, and were then merged with the underway samples. The file was sorted on ascending time.

The new temperature and conductivity (salinity) were calculated and temperature, conductivity calibration was derived from the bottle samples. The data were merged on time and a linear regression used to derive A and B coefficients (TSG temperature against bottle temperature) and A1 and B1 coefficients (TSG conductivity against bottle conductivity). Prior to this, the difference between the bottle temperatures (salinities) and the TSG temperatures (salinities) was plotted to establish that there was no substantial drift with time or temperature. After calibration new residuals were calculated and the mean and standard deviation of the differences found. Based on the standard deviation of 33 data points accuracy of the TSG measurements is equaled 0.03 °C in temperature and 0.03 mSm/cm in conductivity.

Each time (during each trip) SBE 21 S/N 3251 data were collected along the ship track. Data acquisition was stopped in Drake Passage on 22th March. Totally forty nine tracks were made and ten of them were in Drake Passage. Nine tracks were in the Scotia Sea along the track the Beagle – Falklands – South Georgia. Thirty trips were carried out in Bransfield Strait or south of the South Shetland Islands. The data acquisition was stopped each time when the ship arrived at Shetlands, Falklands and South Georgia or at the Antarctic Peninsula.

The data processing takes the following steps:

DATCNV Converts the raw data to physical parameters.

WILDEDIT For every block of 100-300 scans, flags all scans whose pressure, temperature, conductivity and oxygen values differ from the mean by more than 2 standard deviations. Recomputes mean from unflagged data then marks as bad all scans exceeding 20 standard deviations from these new values. When the data consists of too much spikes we repeat this procedure a few times.

WINDOW FILTER cosine and median filters temperature and conductivity with various window sizes are applied.

DERIVE Computes salinity, sigma-t.

BINAVG Averages into time bins taking into account window filter size applied.

2.4 Echosounding

The bathymetric equipment aboard during RV Akademik Sergey Vavilov Cruise 47 consists of an EA600 12 kHz hydrographic echosounder. Data were collected for most of the cruise simultaneously with TSG and VMADCP data. The hull mounted transducer is located 5.8 metres below the sea surface and this value was entered to estimate the depth.

Depth was indicated on the echosounder display and stored on the PC together with the navigation.

Files with extension NAV with maximum size 256032 kb were created. File name corresponded to GMT time when the file was opened for records.

The data processing takes the following steps:

Removing repeated records with equaled coordinates and depth.

Excluding neighbor records with depth difference more than 300 - 500 m.

Comparison with existing bathymetry (GEBCO, ETOPO, Sandwell/Smith) to eliminate false peaks.

Correction due to sound speed changes across Drake Passage based on the comparison of historical CTD altimeter data and Echosounder records.

2.5 Vessel mounted Acoustic Doppler Current Profiler (VMADCP) OS 75 kHz

The Ocean Surveyor 75 kHz is designed for vessel-mount current profile measurement in the upper ocean water from depths greater than 50 meters. The system consists of a transducer and electronics chassis connected to PC.

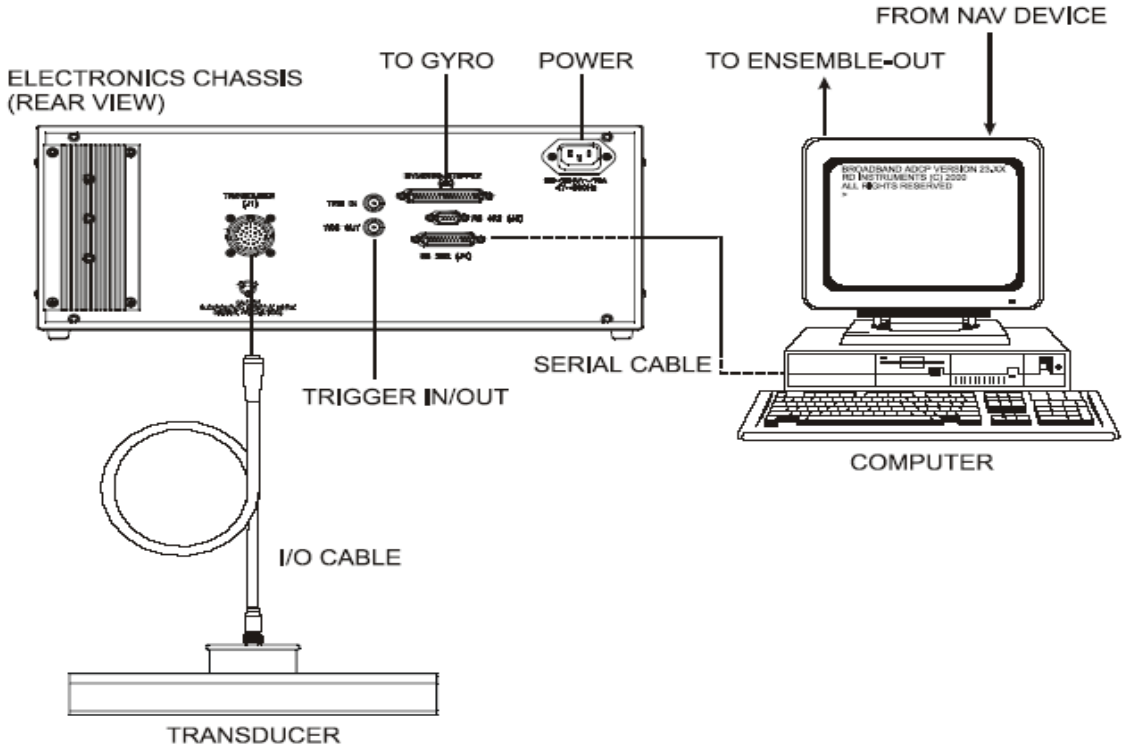


Figure 9. Ocean Surveyor 75 kHz Interface Cable Layout.

Data are transmitted in binary format through the I/O cable. GPS data in NMEA format are transmitted separately to another PC COM – port. The VMADCP can operate in two regimes (Narrow Bandwith and Broad Bandwith Profiling). Its main specifications are shown below.

To collect OS 75 kHz data we used *VmDas* software (version 1.46). The NMEA messages *VmDas* reads are standard GGA, HDG, HDT, VTG messages.

Table 1

	Bin size	Maximum range	Accuracy $(cm/s)^2$
NarrowBand (long-range mode)	16 m	750-800 m	17
BroadBand (high-precision mode)	8 m	310-430 m	12
	16 m	600 m	9

The following configuration file was mainly used to collect the data.

Deep water (>500 m):

NP00001 – Narrow Bandwidth profiling

NN060 – number of bins 60

NS1600 – cell size 16 m

NF0800 - blanking size 8 m

BP000 - disable single-ping bottom track (BP),

VmDas saves data in a few files with extension ENX, ENS, ENR (raw data with and without navigation), NR – NMEA messages, STA and LTA averaged data. Misalignment angle equaled 47.39° was introduced in configuration file and was used by VmDas for data correction.

Data processing performed STA files with 40-profile averaging. Taking into account that single ping takes about 3 seconds, one 40-profile ensemble lasts near 120 seconds in Narrow Bandwidth and slightly different time in Broad Bandwidth regime.

Data processing consists of data conversion in NetCDF format with extension NC and further cleaning, filtering, detiding (using barotropic tidal model TPXO 7.2) and averaging. The standard averaging is 1 km. IFREMER software was used to process OS 75 kHz data.

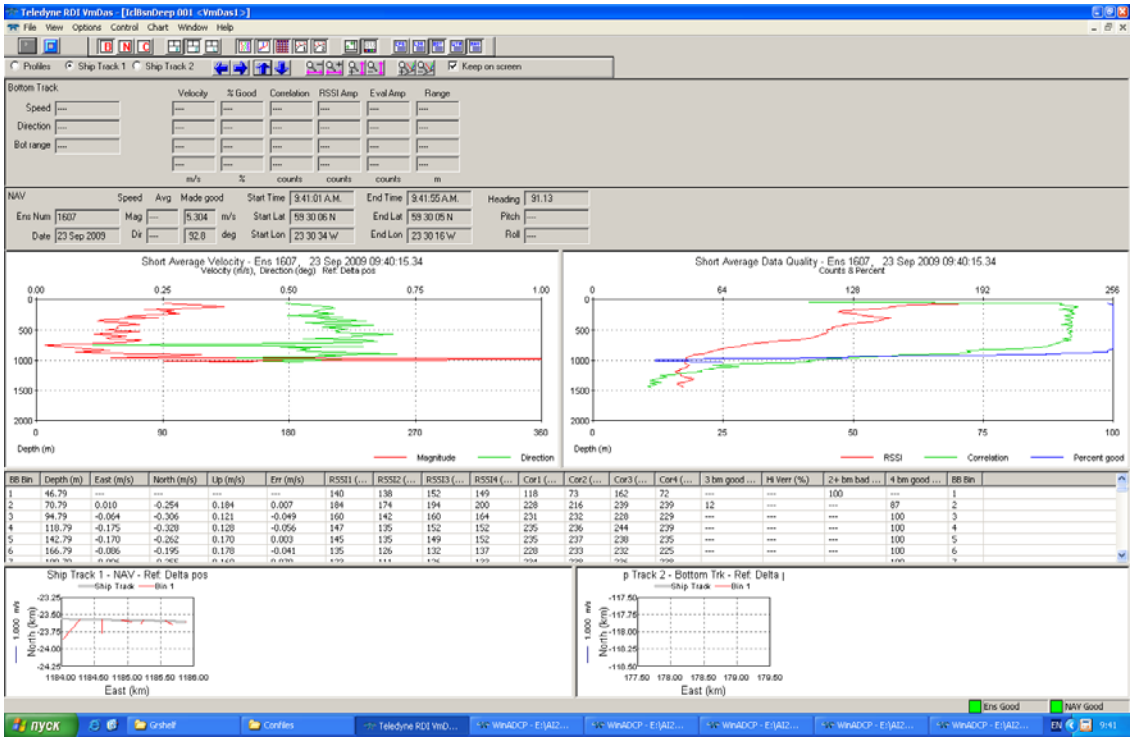


Figure 10. The VM DAS main window.

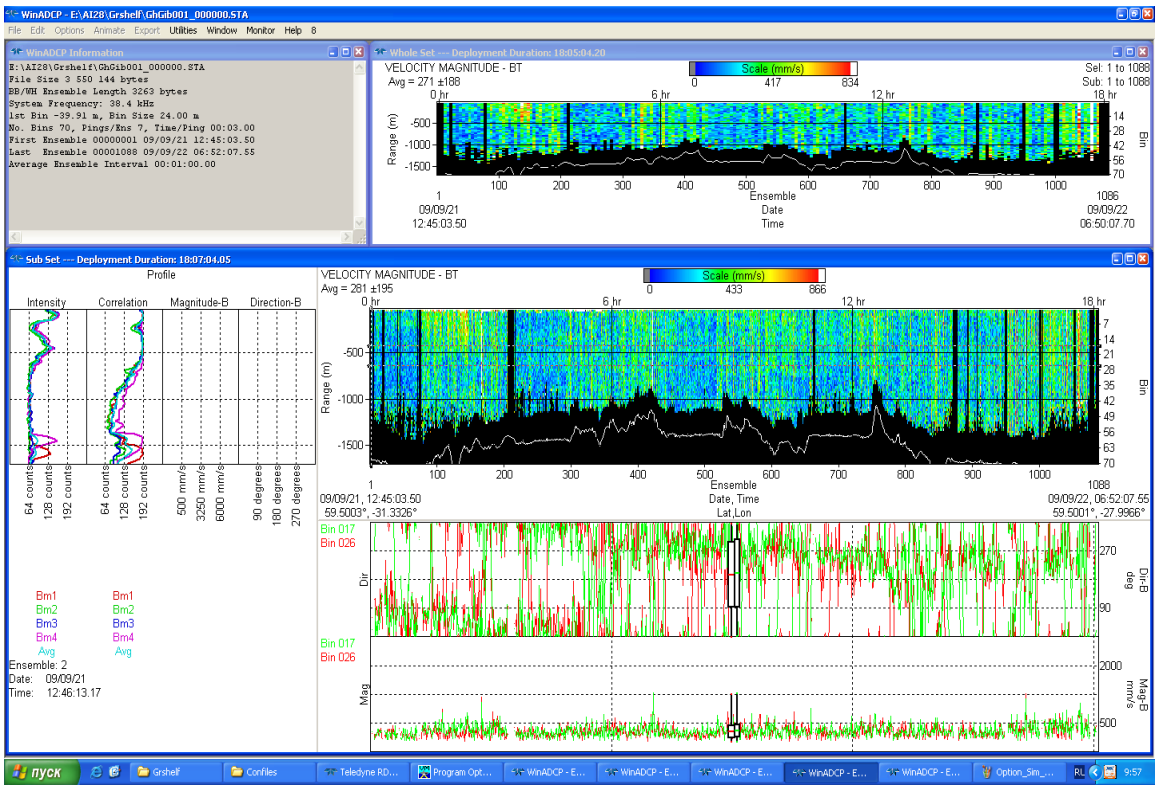


Figure 11. The WinADCP main window.

3. CRUISE LOGISTICS

Mobilization

Mobilization for the cruise took place when the vessel was in Stanley. We had about twelve hours to complete all our preparations. When we finished the cruise twelve hours was necessary to pack the equipment when the ship embarked Ushuaia.

4. **Cruise Diary (GMT)**

Mo 05.11.18
2140 **Depart Stanley (Falkland Islands)**
2200 Wind Dir. - 220, Wind Speed – 10 m/s, Slight
2210 start the track 1_1, start ADCP, Echosounding logging, 51°39.44'S, 57°40.92'W, 40 m, **E. Falkland Is.**

Tu 06.11.18
0200 Wind Dir. - 220, Wind Speed – 13 m/s, Slight
0600 Wind Dir. - 240, Wind Speed – 8 m/s, Slight
0900 Wind Dir. - 230, Wind Speed – 8 m/s, Slight
1300 Wind Dir. - 230, Wind Speed – 11 m/s, Slight
1504 Exit Falkland EEZ 52°17.59'S, 052°22.53'W, 2562 m
1700 Wind Dir. - 270, Wind Speed – 11 m/s, Slight
2100 Wind Dir. - 270, Wind Speed – 10 m/s, Slight

We 07.11.18
0100 Wind Dir. - 270, Wind Speed – 10 m/s, Slight
0400 Wind Dir. - 280, Wind Speed – 11 m/s, Slight
0800 Wind Dir. - 280, Wind Speed – 10 m/s, Slight
1200 Wind Dir. - 280, Wind Speed – 15 m/s, Slight
1600 Wind Dir. - 280, Wind Speed – 13 m/s, Slight
1623 Entering South Georgia EEZ 53 ° 17.99'S, 043 ° 47.11'W, 1427 m
2000 Wind Dir. - 280, Wind Speed – 12 m/s, Slight

Th 08.11.18
0000 Wind Dir. - 280, Wind Speed – 12 m/s, Slight
0400 Wind Dir. - 340, Wind Speed – 15 m/s, Slight
0800 Wind Dir. - 340, Wind Speed – 10 m/s, Slight
1020 **Stop data logging, end of the track 1_1,** 54°11.49'S, 37°32.22'W, 196 m, **S. Georgia Is.**

Tu 13.11.18
2302 start the track 1_2, start ADCP, SBE, Echosounding logging, 53°54.59' S, 38°15.10' W, 112 m, **S. Georgia Is.**

We 14.11.18
0000 Wind Dir. - 280, Wind Speed – 18 m/s, Slight
0400 Wind Dir. - 280, Wind Speed – 18 m/s, Moderate
0800 Wind Dir. - 280, Wind Speed – 14 m/s, Moderate
1200 Wind Dir. - 280, Wind Speed – 13 m/s, Moderate
1600 Wind Dir. - 300, Wind Speed – 12 m/s, Moderate
2000 Wind Dir. - 310, Wind Speed – 12 m/s, Slight
2010 Exit South Georgia EEZ 53°17.74'S, 043°47.04'W, 1203 m

Th 15.11.18
0000 Wind Dir. - 310, Wind Speed – 10 m/s, Slight
0400 Wind Dir. - 320, Wind Speed – 8 m/s, Slight
0800 Wind Dir. - 320, Wind Speed – 8 m/s, Slight
1200 Wind Dir. - 320, Wind Speed – 7 m/s, Slight
1600 Wind Dir. - 190, Wind Speed – 12 m/s, Slight
2000 Wind Dir. - 220, Wind Speed – 12 m/s, Slight

Fr 16.11.18
0000 Wind Dir. - 220, Wind Speed – 12 m/s, Slight
0043 Entering Falkland EEZ 52°17.36'S, 052°22.45'W, 2526 m
0500 Wind Dir. - 260, Wind Speed – 12 m/s, Moderate
0900 Wind Dir. - 270, Wind Speed – 14 m/s, Moderate
1300 Wind Dir. - 270, Wind Speed – 15 m/s, Moderate
1700 Wind Dir. - 260, Wind Speed – 15 m/s, Moderate
2100 Wind Dir. - 260, Wind Speed – 14 m/s, Slight
2139 Stop data logging, end of the track 1_2, 51°39.58'S, 57°40.29'W, 48 m, **E. Falkland Is.**

Sa 17.11.18
2217 start the track 2_1, start ADCP, SBE, Echosounding logging, 51°39.92'S, 57°36.64'W, 72 m, **E. Falkland Is.**

Su 18.11.18
0100 Wind Dir. - 170, Wind Speed – 7 m/s, Slight
0500 Wind Dir. - 330, Wind Speed – 6 m/s, Slight
0900 Wind Dir. - 340, Wind Speed – 7 m/s, Slight
1300 Wind Dir. - 340, Wind Speed – 10 m/s, Slight
1425 Exit Falkland EEZ 52°17.40'S, 052°22.48'W, 2528 m
1700 Wind Dir. - 330, Wind Speed – 11 m/s, Slight
2100 Wind Dir. - 330, Wind Speed – 11 m/s, Slight

Mo 19.11.18
0100 Wind Dir. - 330, Wind Speed – 12 m/s, Slight
0500 Wind Dir. - 280, Wind Speed – 10 m/s, Slight
0900 Wind Dir. - 280, Wind Speed – 10 m/s, Slight
1300 Wind Dir. - 280, Wind Speed – 10 m/s, Slight
1505 Entering South Georgia EEZ 53°17.85'S, 043°47.06'W, 1475 m
1700 Wind Dir. - 280, Wind Speed – 8 m/s, Smooth
2100 Wind Dir. - 270, Wind Speed – 7 m/s, Smooth

Tu 20.11.18
0100 Wind Dir. - 270, Wind Speed – 10 m/s, Smooth
0500 Wind Dir. - 300, Wind Speed – 10 m/s, Smooth
0857 **Stop data logging, end of the track 2_1,** 54°09.42'S, 37°29.08'W, 99 m, **S. Georgia Is.**

Mo 26.11.18
2034 start the track 2_2, start ADCP, SBE, Echosounding logging, 53°55.24' S, 38°11.12' W, 103 m, **S. Georgia Is.**

Tu 27.11.18
0000 Wind Dir. - 230, Wind Speed – 18 m/s, Moderate
0500 Wind Dir. - 270, Wind Speed – 14 m/s, Moderate
0900 Wind Dir. - 270, Wind Speed – 15 m/s, Moderate
1300 Wind Dir. - 270, Wind Speed – 20 m/s, Moderate
1700 Wind Dir. - 280, Wind Speed – 18 m/s, Moderate
2100 Wind Dir. - 280, Wind Speed – 18 m/s, Rough

We 28.11.18
0100 Wind Dir. - 280, Wind Speed – 18 m/s, Rough
0455 Exit South Georgia EEZ 53°23.05'S, 043°49.20'W, 1661 m

0500 Wind Dir. - 270, Wind Speed – 16 m/s, Rough
0900 Wind Dir. - 270, Wind Speed – 16 m/s, Moderate
1300 Wind Dir. - 270, Wind Speed – 17 m/s, Moderate
1700 Wind Dir. - 270, Wind Speed – 12 m/s, Moderate
2100 Wind Dir. - 270, Wind Speed – 12 m/s, Moderate

Th 29.11.18
0100 Wind Dir. - 270, Wind Speed – 10 m/s, Moderate
0600 Wind Dir. - 280, Wind Speed – 7 m/s, Slight
1000 Wind Dir. - 280, Wind Speed – 10 m/s, Slight
1400 Wind Dir. - 290, Wind Speed – 9 m/s, Slight
1503 Entering Falkland EEZ 52°19.55'S, 052°23.09'W, 2615 m
1800 Wind Dir. - 350, Wind Speed – 7 m/s, Slight
2200 Wind Dir. - 350, Wind Speed – 7 m/s, Slight

Fr 30.11.18
0200 Wind Dir. - 350, Wind Speed – 13 m/s, Slight
0600 Wind Dir. - 340, Wind Speed – 15 m/s, Moderate
0945 Stop data logging, end of the track 2_2, 51°39.76'S, 57°45.07'W, 25 m, **E. Falkland Is.**

Sa 01.12.18
2332 start the track 2_3, start ADCP, Echosounding logging, 51°14.93'S, 60°58.29'W, 58 m, **W. Falkland Is.**

Su 02.12.18
0200 Wind Dir. - 230, Wind Speed – 9 m/s, Smooth
0600 Wind Dir. - 300, Wind Speed – 10 m/s, Smooth
0841 Exit Falkland EEZ, Entering Argentinian EEZ 52°48.26'S, 062°42.74'W, 333 m
1000 Wind Dir. - 300, Wind Speed – 11 m/s, Smooth
1400 Wind Dir. - 300, Wind Speed – 11 m/s, Smooth
1800 Wind Dir. - 320, Wind Speed – 13 m/s, Slight
2200 Wind Dir. - 240, Wind Speed – 13 m/s, Slight

Mo 03.12.18
0200 Wind Dir. - 245, Wind Speed – 14 m/s, Slight
0241 **Stop data logging, end of the track 2_3,** 55°06.56'S, 66°25.87'W, 65 m, **Nueva Is.**

Tu 04.12.18
0600 Wind Dir. - 140, Wind Speed – 15 m/s, Rough
1000 Wind Dir. - 160, Wind Speed – 15 m/s, Rough

1055 Start track 3_1, start ADCP/SBE/EA600 logging, 56°22.07'S, 65°58.90'W, entering Argentinian EEZ
1400 Wind Dir. - 160, Wind Speed – 7 m/s, Moderate
1800 Wind Dir. - 270, Wind Speed – 5 m/s, Smooth
2200 Wind Dir. - 270, Wind Speed – 6 m/s, Slight
2302 Exit Argentinian EEZ 58°30.00'S, 65o16.46'W, entering international waters

We 05.12.18
0200 Wind Dir. - 270, Wind Speed – 12 m/s, Rather Rough
0600 Wind Dir. - 270, Wind Speed – 12 m/s, Rather Rough
1000 Wind Dir. - 270, Wind Speed – 15 m/s, Rough

1400 Wind Dir. - 270, Wind Speed – 13 m/s, Rather Rough
1800 Wind Dir. - 220, Wind Speed – 12 m/s, Rather Rough
2200 Wind Dir. - 270, Wind Speed – 10 m/s, Moderate

Th 06.12.18
0200 Wind Dir. - 270, Wind Speed – 10 m/s, Moderate

0402 Stop data logging, end of the track 3_1, 64°19.65'S, 63°03.96'W, 674 m, **Melchior Is.**

Tu 11.12.18
0007 start track 3_2, start ADCP/SBE/EA600 logging, 64°04.22'S, 61°04.67'W, 261 m, **Cierva Cove**

0200 Wind Dir. - nd, Wind Speed – nd, Calm
0600 Wind Dir. - nd, Wind Speed – nd, Calm

0822 Stop data logging, end of the track 3_2, 62°59.58\S, 60°30.78'W, 35 m, **Deception Is.**

1232 start track 3_3, start ADCP/SBE/EA600 logging, 62°59.54'S, 60°28.94'W, 115 m, **Deception Is.**

1400 Wind Dir. - 260, Wind Speed – 7 m/s, Slight

1624 Stop data logging, end of the track 3_3, 62°27.39'S, 59°22.56'W, 75 m, **Robert Point**

2132 Start track 3_4, start ADCP/SBE/EA600 logging, 62°27.69'S, 59°22.16'W, 137 m, **Robert Point**

2200 Wind Dir. - 280, Wind Speed – 9 m/s, Moderate

We 12.12.18
0200 Wind Dir. - nd, Wind Speed – nd, Calm
0600 Wind Dir. - 300, Wind Speed – 5 m/s, Smooth
1000 Wind Dir. - 300, Wind Speed – 14 m/s, Rough

1058 Stop data logging, end of the track 3_4, 63°30.60'S, 56°51.21'W, 101 m, **Brown Bluff**

1542 Start track 3_5, start ADCP/SBE/EA600 logging, 63°23.02'S, 56°58.04'W, 270 m, **Hope Bay**

1800 Wind Dir. - 360, Wind Speed – 9 m/s, Moderate
2200 Wind Dir. - 350, Wind Speed – 14 m/s, Rough

Th 13.12.18
0200 Wind Dir. - 350, Wind Speed – 14 m/s, Rough
0600 Wind Dir. - 310, Wind Speed – 16 m/s, Rough
1000 Wind Dir. - 310, Wind Speed – 12 m/s, Rather Rough

1103 Stop data logging, end of the track 3_5, 62°12.12'S, 58°55.87'W, 81 m, **Maxwell Bay**

2236 Start track 4_1, start ADCP/SBE/EA600 logging, 62°12.15'S, 58°55.77'W, 86 m, **Maxwell Bay**

Fr 14.12.18
0200 Wind Dir. - 310, Wind Speed – 12 m/s, Rather Rough
0600 Wind Dir. - 270, Wind Speed – 8 m/s, Moderate
1000 Wind Dir. - 250, Wind Speed – 7 m/s, Slight
1400 Wind Dir. - 250, Wind Speed – 10 m/s, Moderate

1711 Stop data logging, end of the track 4_1, 64°38.21'S, 62°43.85'W, 163 m, **Ronge Is.**

Su 16.12.18
1331 Start track 4_2, start ADCP/SBE/EA600 logging, 63°56.51'S, 60°49.79'W, 379 m, **Trinity Is.**

1400 Wind Dir. - nd, Wind Speed – nd, Calm
1800 Wind Dir. - nd, Wind Speed – nd, Calm

1845 Stop data logging, end of the track4_2, 62°59.68'S, 60°29.72'W, 45 m, **Deception Is.**

2320 Start track 4_3, start ADCP/SBE/EA600 logging, 62°59.48'S, 60°29.11'W, 53 m, **Deception Is.**

Mo 17.12.18
0200 Wind Dir. - 250, Wind Speed – 11 m/s, Rather Rough
0600 Wind Dir. - 150, Wind Speed – 5 m/s, Smooth
1000 Wind Dir. - 190, Wind Speed – 8 m/s, Moderate

1139 Stop data logging, end of the track4_3, 63°34.10'S, 55°45.67'W, 94 m, **Paulet Is.**

1901 Start track 4_4, start ADCP/SBE/EA600 logging, 63°22.85'S, 56°56.31'W, 100 m, **Hope Bay**

2200 Wind Dir. - 220, Wind Speed – 12 m/s, Rather Rough

Tu 18.12.18
0200 Wind Dir. - 210, Wind Speed – 7 m/s, Slight
0600 Wind Dir. - 290, Wind Speed – 8 m/s, Moderate
1000 Wind Dir. - 300, Wind Speed – 8 m/s, Moderate
1400 Wind Dir. - 300, Wind Speed – 5 m/s, Smooth

1428 Stop data logging, end of the track 4_4, 61°09.04'S, 54°34.39'W, 288 m, **Elephant Is.**

1652 Start track 4_5, start ADCP/SBE/EA600 logging, 61°04.46'S, 54°50.01'W, 140 m, **Elephant Is.**

1800 Wind Dir. - 250, Wind Speed – 6 m/s, Slight
2200 Wind Dir. - 230, Wind Speed – 7 m/s, Slight

We 19.12.18
0200 Wind Dir. - 230, Wind Speed – 8 m/s, Moderate
0600 Wind Dir. - 230, Wind Speed – 9 m/s, Moderate
1000 Wind Dir. - 230, Wind Speed – 10 m/s, Moderate
1400 Wind Dir. - 230, Wind Speed – 10 m/s, Moderate
1800 Wind Dir. - 240, Wind Speed – 7 m/s, Slight

2200 Wind Dir. - 240, Wind Speed – 7 m/s, Slight

Th 20.12.18
0200 Wind Dir. - 240, Wind Speed – 8 m/s, Moderate
0600 Wind Dir. - 230, Wind Speed – 8 m/s, Moderate
0731 Entering South Georgia EEZ
1000 Wind Dir. - 230, Wind Speed – 7 m/s, Slight
1400 Wind Dir. - 230, Wind Speed – 8 m/s, Moderate
1800 Wind Dir. - 220, Wind Speed – 8 m/s, Moderate
2200 Wind Dir. - 230, Wind Speed – 8 m/s, Moderate

Fr 21.12.18
0100 Wind Dir. - 230, Wind Speed – 7 m/s, Slight
0500 Wind Dir. - 230, Wind Speed – 10 m/s, Moderate
0731 Stop data logging, end of the track 4_5, 54°53.87'S, 35°55.63'W, 286 m, **S. Georgia Is.**

Mo 24.12.18
1211 Start track 4_6, start ADCP/SBE/EA600 logging, 53°55.79'S, 37°29.78'W, 102 m, **S.Georgia Is.**

1300 Wind Dir. - 260, Wind Speed – 16 m/s, Rough
1700 Wind Dir. - 300, Wind Speed – 10 m/s, Moderate
2100 Wind Dir. - 300, Wind Speed – 11 m/s, Rather Rough

Tu 25.12.18
0200 Wind Dir. - 300, Wind Speed – 9 m/s, Moderate
0600 Wind Dir. - 270, Wind Speed – 7 m/s, Slight
0951 Exit SG EEZ 53°15.66'S, 43°47.84'W, entering internationals waters
1000 Wind Dir. - 280, Wind Speed – 8 m/s, Moderate
1400 Wind Dir. - 280, Wind Speed – 10 m/s, Moderate
1800 Wind Dir. - 300, Wind Speed – 9 m/s, Moderate
2200 Wind Dir. - 340, Wind Speed – 5 m/s, Smooth

We 26.12.18
0200 Wind Dir. - 330, Wind Speed – 12 m/s, Rather Rough
0600 Wind Dir. - 230, Wind Speed – 14 m/s, Rough
1000 Wind Dir. - 270, Wind Speed – 14 m/s, Rough
1400 Wind Dir. - 270, Wind Speed – 15 m/s, Rough
1616 Exit international waters 52°06.02'S, 52°20.31'W, entering Falkland EEZ
1800 Wind Dir. - 290, Wind Speed – 14 m/s, Rough
2200 Wind Dir. - 290, Wind Speed – 12 m/s, Rather Rough

Th 27.12.18
0200 Wind Dir. - 290, Wind Speed – 10 m/s, Moderate
0600 Wind Dir. - 300, Wind Speed – 10 m/s, Moderate
1000 Wind Dir. - 340, Wind Speed – 11 m/s, Rather Rough
1400 Wind Dir. - 030, Wind Speed – 8 m/s, Moderate
1800 Wind Dir. - 320, Wind Speed – 7 m/s, Slight

2015 Stop data logging, end of the track 4_6, 51°19.84'S, 57°52.34'W, 64 m, **Falkland Is.**

Su 30.12.18
2156 Start track 5_1, start ADCP/EA600 logging, 51°39.84'S, 57°38.20'W, 61 m, **Falkland Is.**
2221 Start SBE logging, 51°44.50'S, 57°37.95'W, 88 m

Mo 31.12.18
0200 Wind Dir. - 210, Wind Speed – 5 m/s, Smooth
0600 Wind Dir. - 360, Wind Speed – 11 m/s, Rather Rough
1000 Wind Dir. - 360, Wind Speed – 11 m/s, Rather Rough
1400 Wind Dir. - 360, Wind Speed – 11 m/s, Rather Rough
1636 Exit Falkland EEZ 56°12.80'S, 58°18.30'W, entering international waters
1800 Wind Dir. - 300, Wind Speed – 10 m/s, Moderate
2200 Wind Dir. - 300, Wind Speed – 10 m/s, Moderate

Tu 01.01.19
0200 Wind Dir. - 300, Wind Speed – 6 m/s, Slight
0600 Wind Dir. - 310, Wind Speed – 6 m/s, Slight
1000 Wind Dir. - 150, Wind Speed – 8 m/s, Moderate
1400 Wind Dir. - 150, Wind Speed – 7 m/s, Moderate
1800 Wind Dir. - 250, Wind Speed – 5 m/s, Smooth
2200 Wind Dir. - 210, Wind Speed – 6 m/s, Slight

We 02.01.19
0200 Wind Dir. - 210, Wind Speed – 5 m/s, Smooth

0436 Stop data logging, end of the track 5_1, 62°16.24'S, 59°19.62'W, 113 m, **Nelson Strait**

2215 Start track 5_2, start ADCP/SBE21/EA600 logging, 63°00.16'S, 60°30.65'W, 50 m, **Deception Is.**

Th 03.01.19
0200 Wind Dir. - 240, Wind Speed – 9 m/s, Moderate
0600 Wind Dir. - 220, Wind Speed – 10 m/s, Moderate
1000 Wind Dir. - 230, Wind Speed – 11 m/s, Rather Rough
1400 Wind Dir. - 230, Wind Speed – 14 m/s, Rough
1800 Wind Dir. - 210, Wind Speed – 8 m/s, Moderate
2200 Wind Dir. - 250, Wind Speed – 7 m/s, Moderate

Fr 04.01.19
0200 Wind Dir. - n/d, Wind Speed – 0 m/s, Calm
0600 Wind Dir. - 060, Wind Speed – 10 m/s, Moderate
1000 Wind Dir. - 060, Wind Speed – 12 m/s, Rather Rough
1400 Wind Dir. - 060, Wind Speed – 13 m/s, Rather Rough
1800 Wind Dir. - 050, Wind Speed – 15 m/s, Rough
2200 Wind Dir. - 060, Wind Speed – 17 m/s, Rough

Sa 05.01.19
0200 Wind Dir. - 060, Wind Speed – 15 m/s, Rough
0600 Wind Dir. - 070, Wind Speed – 9 m/s, Moderate

0601 Stop data logging, end of the track 5_2, 64°52.35'S, 64°13.36'W, 823 m, **Bismarck Strait**

Mo 07.01.19
1654 Start track 5_3, start ADCP/SBE21/EA600 logging, 64°04.89'S, 61°04.50'W, 336 m, **Cierva Cove**

1800 Wind Dir. - 040, Wind Speed – 10 m/s, Moderate
2200 Wind Dir. - 340, Wind Speed – 7 m/s, Slight

Tu 08.01.19
0200 Wind Dir. - 340, Wind Speed – 6 m/s, Slight
0600 Wind Dir. - 280, Wind Speed – 5 m/s, Smooth

0911 Stop data logging, end of the track 5_3, 62°12.27'S, 58°54.60'W, 134 m, **Maxwell Bay**

1829 Start track 6_1, start ADCP/SBE21/EA600 logging, 62°13.21'S, 58°51.22'W, 189 m, **Maxwell Bay**

2200 Wind Dir. - 230, Wind Speed – 7 m/s, Slight

We 09.01.19
0200 Wind Dir. - 230, Wind Speed – 6 m/s, Slight
0600 Wind Dir. - n/d, Wind Speed – n/d, Calm

0719 Stop data logging, end of the track 6_1, 64°01.96'S, 61°21.02'W, 307 m, **Small Is.**

Su 13.01.19
0025 Start track6_2, start ADCP/SBE21/EA600 logging, 63°50.65'S, 61°10.58, 330m, **Trinity Is.**

0200 Wind Dir. - n/d, Wind Speed – n/d, Calm
0600 Wind Dir. - n/d, Wind Speed – n/, Calm

0956 Stop data logging, end of the track 6_2, 62°35.16'S, 59°53.25'W, 47 m, **Half Moon Is.**

Tu 15.01.19
1443 Start track 7_1, start ADCP/SBE21/EA600 logging, 62°35.06'S, 59°52.73'W, 66 m, **Half Moon Is.**

1751 Stop data logging, end of the track 7_1, 62°59.53'S, 60°29.50'W, 49 m, **Deception Is.**

2133 Start track 7_2, start ADCP/SBE21/EA600 logging, 63°00.27'S, 60°30.85'W, 68 m, **Deception Is.**

2200 Wind Dir. - 260, Wind Speed – 3, Smooth

We 16.01.19
0200 Wind Dir. - n/d, Wind Speed – n/d, Calm
0600 Wind Dir. - n/d, Wind Speed – n/d, Calm
1000 Wind Dir. - 210, Wind Speed – 9, Moderate

1000 Stop data logging, end of the track 7_2, 63°52.41'S, 61°00.21'W, 212 m, **Spert Is.**

Fr 18.01.19
1942 Start track 7_3, start ADCP/SBE21/EA600 logging, 64°53.73'S, 64°22.57'W, 638 m, **Bismarck Strait**

2200 Wind Dir. - 60, Wind Speed – 12, Rather Rough

Sa 19.01.19
0200 Wind Dir. - 60, Wind Speed – 25, Very High
0600 Wind Dir. - 50, Wind Speed – 17, Rough
1000 Wind Dir. - 310, Wind Speed – 14, Rough
1800 Wind Dir. - 70, Wind Speed – 12, Rather Rough
2200 Wind Dir. - 300, Wind Speed – 14, Rough

Su 20.01.19
0200 Wind Dir. - 290, Wind Speed – 16, Rough
0600 Wind Dir. - 290, Wind Speed – 20, High, **58°31.22'S, 66°48.43'W Entering Argentinian EEZ, exit International waters**
1000 Wind Dir. - 280, Wind Speed – 20, High
1400 Wind Dir. - 290, Wind Speed – 20, Rough
1639 **Stop data logging, end of the track 7_3, exit Argentinian EEZ**

Tu 22.01.19

0600 Wind Dir. - 350, Wind Speed – 10, Moderate
1000 Wind Dir. - 210, Wind Speed – 8, Moderate

1021 **Start track 8_1, start ADCP/SBE21/EA600 logging, 56°23.35'S, 65°58.19'W Entering Argentinian EEZ**

1400 Wind Dir. - 070, Wind Speed – 5, Smooth
1800 Wind Dir. - 060, Wind Speed – 7, Slight

2052 **58 29.82'S, 65 16.13'W Entering Internationals Waters, exit Argentinian EEZ**

2200 Wind Dir. - 230, Wind Speed – 9, Moderate

We 23.01.19
0200 Wind Dir. - 230, Wind Speed – 9, Moderate
0600 Wind Dir. - 240, Wind Speed – 10, Moderate
1000 Wind Dir. - 240, Wind Speed – 7, Slight
1400 Wind Dir. - n/d, Wind Speed – 0, Calm
1800 Wind Dir. - 290, Wind Speed – 7, Slight
2200 Wind Dir. - n/d, Wind Speed – 0, Calm

Th 24.01.19
0200 Wind Dir. - 065, Wind Speed – 15, Rough

0435 Stop data logging, end of the track 8_1, 64°15.40'S, 63°06.71'W, 359 m, **Melchior Is.**

Fr 26.01.19
2310 Start track 8_2, start ADCP/SBE21/EA600 logging, 64°07.40'S, 60°58.44'W, 279 m, **Cierva Cove**

Su 27.01.19
0200 Wind Dir. - 355, Wind Speed – 8, Moderate
0600 Wind Dir. - 080, Wind Speed – 11, Rather Rough
1000 Wind Dir. - 050, Wind Speed – 11, Rather Rough

1126 Stop data logging, end of the track 8_2, 63°00.00'S, 60°30.54'W, 38 m, **Deception Is.**

1528 Start track 8_3, start ADCP/SBE21/EA600 logging, 62°59.17'S, 60°28.95'W, 62 m, **Deception Is.**

1800 Wind Dir. - 330, Wind Speed – 10, Moderate

1830 Stop data logging, end of the track 8_3, 62°33.28'S, 59°35.13'W, 175 m, **Greenwich Is.**

2125 Start track 8_4, start ADCP/SBE21/EA600 logging, 62°33.44'S, 59°34.32'W, 344 m, **Greenwich Is.**

2200 Wind Dir. - 330, Wind Speed – 12, Rather Rough

Mo 28.01.19
0200 Wind Dir. - 330, Wind Speed – 10, Moderate
0600 Wind Dir. - 300, Wind Speed – 5, Smooth
1000 Wind Dir. - 040, Wind Speed – 4, Smooth

1033 Stop data logging, end of the track 8_4, 63° 09.25'S, 57°00.27'W, 102 m, **Antarctic Sound**

2249 Start track 8_5, start ADCP/SBE21/EA600 logging, 63°02.95'S, 57°05.88'W, 99 m, **Antarctic Sound**

Tu 29.01.19
0200 Wind Dir. - 350, Wind Speed – 5, Smooth
0600 Wind Dir. - 100, Wind Speed – 9, Slight
1000 Wind Dir. - 070, Wind Speed – 8, Smooth

1229 Stop data logging, end of the track8_5, 61°04.18'S, 54°36.83'W, 179 m, **Elephant Is.**

1406 Start track 8_6, start ADCP/SBE21/EA600 logging, 61°02.43'S, 54°49.92'W, 406 m, **Elephant Is.**

1800 Wind Dir. - 100, Wind Speed – 7, Smooth
2200 Wind Dir. - 090, Wind Speed – 6, Smooth

We 30.01.19
0200 Wind Dir. - 090, Wind Speed – 5, Smooth
0600 Wind Dir. - n/d, Wind Speed – 0, Very Smooth
1000 Wind Dir. - 050, Wind Speed – 5, Very Smooth
1400 Wind Dir. - n/d, Wind Speed – 0, Very Smooth
1800 Wind Dir. - 270, Wind Speed – 7, Slight
2200 Wind Dir. - 040, Wind Speed – 7, Smooth

Th 31.01.19

0200 Wind Dir. - n/d, Wind Speed – 0, Smooth
0500 Wind Dir. - 150, Wind Speed – 6, Smooth
0900 Wind Dir. - 150, Wind Speed – 7, Smooth
1300 Wind Dir. - 150, Wind Speed – 6, Smooth
1700 Wind Dir. - 210, Wind Speed – 11, Slight
2100 Wind Dir. - 210, Wind Speed – 11, Slight

Fr 01.02.19
0100 Wind Dir. - 200, Wind Speed – 13, Slight
0500 Wind Dir. - 270, Wind Speed – 15, Moderate

0801 Stop data logging, end of the track 8_6, 54°50.30'S, 35°38.17'W, 83 m, **South Georgia Is.**

Mo 04.02.19

1942 Start track 8_7, start ADCP/SBE21/EA600 logging, 53°56.21'S, 38°05.16'W, 112 m, **S. Georgia Is.**

2100 Wind Dir. - 270, Wind Speed – 9, Slight

Tu 05.02.19
0100 Wind Dir. - 275, Wind Speed – 13, Slight
0500 Wind Dir. - 260, Wind Speed – 18, Rough
0900 Wind Dir. - 270, Wind Speed – 17, Rather Rough
1300 Wind Dir. - 270, Wind Speed – 18, Rather Rough
1700 Wind Dir. - 270, Wind Speed – 13, Rather Rough
2100 Wind Dir. - 290, Wind Speed – 12, Rather Rough

We 06.02.19
0100 Wind Dir. - 290, Wind Speed – 17, Rather Rough
0600 Wind Dir. - 330, Wind Speed – 20, Rough
1000 Wind Dir. - 330, Wind Speed – 19, Rough
1400 Wind Dir. - 330, Wind Speed – 20, Rough
1800 Wind Dir. - 260, Wind Speed – 12, Rather Rough
1905 52°47.10'S, 52°34.20'W **Entering Falkland Is. EEZ, exit International Waters**
2200 Wind Dir. - 230, Wind Speed – 18, Rather Rough

Th 07.02.19
0200 Wind Dir. - 240, Wind Speed – 15, Rather Rough
0600 Wind Dir. - 310, Wind Speed – 13, Rather Rough
1000 Wind Dir. - 300, Wind Speed – 15, Moderate
1400 Wind Dir. - 300, Wind Speed – 13, Moderate
1800 Wind Dir. - 270, Wind Speed – 12, Moderate
2200 Wind Dir. - 270, Wind Speed – 14, Moderate

Fr 08.02.19
0200 Wind Dir. - 270, Wind Speed – 12, Moderate
0600 Wind Dir. - 320, Wind Speed – 16, Rather Rough

0856 Stop data logging, end of the track 8_7, 52°28.83'S, 58°53.26'W, 54 m, **Falkland Is.**

Sa 09.02.19

2320 Start track 9_1, start ADCP/SBE21/EA600 logging, 51°40.30'S, 57°38.15'W, 64 m, **Falkland Is.**

Su 10.02.19
0200 Wind Dir. - 260, Wind Speed – 13, Slight
0600 Wind Dir. - 260, Wind Speed – 15, Rather Rough
1000 Wind Dir. - 210, Wind Speed – 14, Moderate
1000 53°41.10'S, 57°04.20'W **Entering International Waters, exit Falkland EEZ**
1400 Wind Dir. - 210, Wind Speed – 13, Moderate
1800 Wind Dir. - 200, Wind Speed – 18, Rather Rough
2200 Wind Dir. - 200, Wind Speed – 18, Rather Rough

Mo 11.02.19
0200 Wind Dir. - 200, Wind Speed – 19, Rather Rough
0600 Wind Dir. - 230, Wind Speed – 18, Rough
1000 Wind Dir. - 230, Wind Speed – 22, Rough
1400 Wind Dir. - 230, Wind Speed – 20, Rough
1800 Wind Dir. - 240, Wind Speed – 16, Rather Rough
2200 Wind Dir. - 240, Wind Speed – 16, Rather Rough

Tu 12.02.19
0200 Wind Dir. - 280, Wind Speed – 10, Rather Rough
0600 Wind Dir. - 290, Wind Speed – 14, Rather Rough
1000 Wind Dir. - 290, Wind Speed – 10, Moderate
1400 Wind Dir. - 290, Wind Speed – 10, Slight

1459 Stop data logging, end of the track 9_1, 62°06.28'S, 57°35.28'W, 301 m, **King George Is.**

2031 Start track 9_2, start ADCP/SBE21/EA600 logging, 62°06.47'S, 57°53.79'W, 58 m, **Penguin Is.**

2200 Wind Dir. - 250, Wind Speed – 14, Smooth

We 13.02.19
0200 Wind Dir. - 260, Wind Speed – 20, Slight
0600 Wind Dir. - 270, Wind Speed – 15, Moderate

0848 Stop data logging, end of the track 9_2, 64°00.94'S, 61°19.60'W, 311 m, **Small Is.**

Th 14.02.19
0042 Start track 9_3, start ADCP/SBE21/EA600 logging, 64°51.95'S, 64°10.36'W, 510 m, **Bismarck Strait**

0200 Wind Dir. - 030, Wind Speed – 16, Very Smooth (Ice)
0600 Wind Dir. - 040, Wind Speed – 15, Rather Rough
1000 Wind Dir. - 040, Wind Speed – 12, Moderate
1400 Wind Dir. - 090, Wind Speed – 25, Rather Rough

1646 Stop data logging, end of the track 9_3, 66°34.45'S, 67°25.34'W, 333 m, **Matha Strait**
Mo 18.02.19
1345 Start track 9_4, start ADCP/SBE21/EA600 logging, 64°07.21'S, 60°58.80'W, 267 m, **Cierva Cove**

1400 Wind Dir. - n/d, Wind Speed – 0, Calm
1800 Wind Dir. - 300, Wind Speed – 8, Smooth

1932 Stop data logging, end of the track 9_4, 62°59.57'S, 60°29.59'W, 50 m, **Deception Is.**

Tu 19.02.19
0029 Start track 9_5, start ADCP/SBE21/EA600 logging, 62°59.55'W, 60°29.27'W, 54 m. **Deception Is.**

0200 Wind Dir. - 240, Wind Speed – 8, Smooth
0600 Wind Dir. - 210, Wind Speed – 8, Smooth
1000 Wind Dir. - 210, Wind Speed – 7, Smooth

1109 Stop data logging, end of the track 9_5, 62°12.01'S, 58°55.53'W, 74 m, **Maxwell Bay**

2300 Start track 10_1, start ADCP/SBE21/EA600 logging, 62°12.08'S, 58°54.86'W, 110 m, **Maxwell Bay**

We 20.02.19
0200 Wind Dir. - 160, Wind Speed – 10, Smooth
0600 Wind Dir. - 080, Wind Speed – 5, Smooth

0946 Stop data logging, end of the track 10_1, 63°56.04'S, 61°11.50'W, 162 m, **Intercurrence Is.**

Fr 22.02.19
2231 Start track 10_2, start ADCP/SBE21/EA600 logging, 65°10.21'S, 64°20.43'W, 387 m, **French Passage**

Sa 23.02.19
0200 Wind Dir. - 240, Wind Speed – 10, Smooth
0600 Wind Dir. - 210, Wind Speed – 11, Smooth
1000 Wind Dir. - 220, Wind Speed – 12, Smooth

1037 Stop data logging, end of the track 10_2, 66°33.81'S, 67°36.71'W, 135 m, **Matha Strait**

1214 Start track 10_3, start ADCP/SBE21/EA600 logging, 66°25.41'S, 67°50.78'W, 347 m, **Matha Strait**

1400 Wind Dir. - 220, Wind Speed – 14, Smooth
1800 Wind Dir. - 150, Wind Speed – 14, Very Smooth
2200 Wind Dir. - 200, Wind Speed – 11, Very Smooth

Su 24.02.19
0200 Wind Dir. - 190, Wind Speed – 6, Very Smooth
0600 Wind Dir. - 160, Wind Speed – 12, Smooth
1000 Wind Dir. - 180, Wind Speed – 9, Smooth

1133 Stop data logging, end of the track 10_3, 68°16.54'S, 67°14.14'W, 91 m, **Gremlin Is.**
Mo 25.02.19

2204 Start track 10_4, start ADCP/SBE21/EA600 logging, 67°44.85'S, 67°54.05, 567 m, **Porquoi Pas Is.**

Tu 26.02.19
0200 Wind Dir. - n/d, Wind Speed – 0, Very Smooth
0600 Wind Dir. - 200, Wind Speed – 7, Smooth
1000 Wind Dir. - 030, Wind Speed – 7, Smooth
1400 Wind Dir. - 240, Wind Speed – 14, Smooth
1800 Wind Dir. - 210, Wind Speed – 15, Moderate
2200 Wind Dir. - 210, Wind Speed – 9, Slight

We 27.02.19
0127 Stop data logging, end of the track 10_4, 64°52.78'S, 63°47.73'W, 678 m, **Bismarck Strait**

2316 Start track 10_5, start ADCP/SBE21/EA600 logging, 64°11.34'S, 61°31.82'W, 149 m, **Two Hummok Is.**

Th 28.02.19
0200 Wind Dir. - 220, Wind Speed – 8, Smooth
0600 Wind Dir. - 120, Wind Speed – 3, Smooth
1000 Wind Dir. - 120, Wind Speed – 4, Smooth

1108 Stop data logging, end of the track10_5, 62°39.35'S, 60°38.29'W, 129 m, **Livingston Is.**

2143 Start track 10_6, start ADCP/SBE21/EA600 logging, 63°00.15'S, 60°30.28'W, 51 m, **Deception Is.**

2200 Wind Dir. - 270, Wind Speed – 8, Smooth

Fr 01.03.19
0200 Wind Dir. - 200, Wind Speed – 10, Smooth
0600 Wind Dir. - 250, Wind Speed – 9, Slight
1000 Wind Dir. - 230, Wind Speed – 8, Slight
1400 Wind Dir. - 270, Wind Speed – 8, Slight
1800 Wind Dir. - 300, Wind Speed – 8, Slight
2200 Wind Dir. - 040, Wind Speed – 7, Slight
2305 58°29.98'S, 65°38.67'W **Entering Argentinian EEZ, exit Internationals Waters**

Sa 02.03.19
0200 Wind Dir. - 005, Wind Speed – 13, Slight
0600 Wind Dir. - 050, Wind Speed – 11, Slight
1000 Wind Dir. - 290, Wind Speed – 12, Smooth

1014 Stop data logging, end of the track 10_6, 56°19.62'S, 67°18.30'W, 115 m, **Cape Horne**

Mo 04.03.19

0600 Wind Dir. - 310, Wind Speed – 7, Slight
0902 **Start track 11_1, start ADCP/SBE21/EA600 logging,** 56°22.07'S, 65°56.63'W **Entering Argentinian EEZ**
1000 Wind Dir. - n/d, Wind Speed – 0, Calm
1400 Wind Dir. - 050, Wind Speed – 9, Moderate

1800 Wind Dir. - 320, Wind Speed – 10, Moderate
2000 58°30.00'S, 65°15.45'W **Entering International Waters, exit Argentinian EEZ**
2200 Wind Dir. - 180, Wind Speed – 5, Moderate

Tu 05.03.19
0200 Wind Dir. - 330, Wind Speed – 8, Moderate
0600 Wind Dir. - 040, Wind Speed – 5, Slight
1000 Wind Dir. - 120, Wind Speed – 7, Moderate
1400 Wind Dir. - 050, Wind Speed – 8, Slight
1800 Wind Dir. - 100, Wind Speed – 12, Slight
2200 Wind Dir. - 070, Wind Speed – 14, Slight

We 06.03.19
0200 Wind Dir. - 110, Wind Speed – 14, Slight
0600 Wind Dir. - 040, Wind Speed – 5, Very Smooth

1001 Stop data logging, end of the track 11_1, 64°26.70'S, 63°00.69'W, 419 m, **Melchior Is.**

Sa 09.03.19
2200 Start track 11_2, start ADCP/SBE21/EA600 logging, 64°06.80'S, 61°00.15'W, 243 m, **Cierva Cove**

Su 10.03.19
0200 Wind Dir. - 040, Wind Speed – 10, Very Smooth
0600 Wind Dir. - 050, Wind Speed – 7, Smooth

0919 Stop data logging, end of the track 11_2, 62°59.55'S, 60°29.62'W, 50 m, **Deception Is.**

1449 Start track 11_3, start ADCP/SBE21/EA600 logging, 62°59.33'S, 60°29.12'W, 50 m, **Deception Is.**

1449 GPS Heading Error, No ADCP Data
1601 62°48.99'S, 60°05.38'W GPS Heading OK, ADCP Data On

1752 Stop data logging, end of the track 11_3, 62°35.21'S, 59 53.32'W, 46 m, **Half Moon Is.**

Mo 11.03.19
0011 Start track 11_4, start ADCP/SBE21/EA600 logging, 62°14.35'S, 59°21.73'W, 54 m, **Nelson Strait**

0200 Wind Dir. - 270, Wind Speed – 10, Slight
0600 Wind Dir. - 270, Wind Speed – 16, Rather Rough
1000 Wind Dir. - 270, Wind Speed – 10, Rough
1400 Wind Dir. - 270, Wind Speed – 15, Rough
1800 Wind Dir. - 230, Wind Speed – 18, High
2200 Wind Dir. - 230, Wind Speed – 18, High
2231 58°31.11'S, 63°13.54'W **Entering Argentinian EEZ, exit International Waters**

Tu 12.03.19
0200 Wind Dir. - 230, Wind Speed – 18, High
0600 Wind Dir. - 230, Wind Speed – 18, High

1000 Wind Dir. - 230, Wind Speed – 16, Rough
1400 Wind Dir. - 240, Wind Speed – 15, Rough
1532 **Stop data logging, end of the track11_4,** 55°52.75'S, 65 43.57'W
1800 Wind Dir. - 270, Wind Speed – 14, Moderate

Th 14.03.19

0940 **Start track 12_1, start ADCP/EA600/SBE21 logging,** 55°52.50'S, 65°43.80'W **Entering Argentinian EEZ**
1000 Wind Dir. - 030, Wind Speed – 5, Slight
1400 Wind Dir. - 320, Wind Speed – 8, Slight
1800 Wind Dir. - 310, Wind Speed – 13, Moderate
2200 Wind Dir. - 310, Wind Speed – 16, Rather Rough
2339 58°29.97'S, 63°14.35'W **Entering International Waters, Exit Argentinian EEZ**

Fr 15.03.19
0200 Wind Dir. - 310, Wind Speed – 16, Rather Rough
0600 Wind Dir. - 300, Wind Speed – 18, Rough
1000 Wind Dir. - 300, Wind Speed – 17, Rough
1400 Wind Dir. - 300, Wind Speed – 18, Rough
1800 Wind Dir. - 300, Wind Speed – 18, Rough

2003 Stop data logging, end of the track 12_1, 62°17.47'S, 59°18.37'W, 154 m, **Nelson Strait**

Su 17.03.19
2316 Start track 12_2, start ADCP/EA600/SBE logging, 62°12.05'S, 58°55.16'W, 90 m, **Maxwell Bay**

Mo 18.03.19
0200 Wind Dir. - 250, Wind Speed – 15, Slight
0600 Wind Dir. - 260, Wind Speed – 15, Moderate
1000 Wind Dir. - 230, Wind Speed – 12, Moderate

1216 Stop data logging, end of the track 12_2, 63°54.32'S, 60°46.51'W, 128 m, **Mikkelsen Harbour**

We 20.03.19
2115 Start track12_3, start ADCP/EA600/SBE logging, 64°17.26'S, 63°05.34'W, 557 m, **Melchior Is.**

2200 Wind Dir. - 050, Wind Speed – 18, Rough

Th 21.03.19
0200 Wind Dir. - 270, Wind Speed – 17, Rough
0600 Wind Dir. - 280, Wind Speed – 15, Rather Rough
1000 Wind Dir. - 280, Wind Speed – 20, High
1400 Wind Dir. - 280, Wind Speed – 14, Rough
1800 Wind Dir. - 300, Wind Speed – 15, Rather Rough
2200 Wind Dir. - 300, Wind Speed – 11, Rather Rough

Fr 22.03.19
0113 58°29.51'S, 65°27.41'W, **Entering Argentinian EEZ, Exit International Waters**

0200 Wind Dir. - 300, Wind Speed – 10, Moderate
0600 Wind Dir. - 280, Wind Speed – 12, Moderate
1000 Wind Dir. - 280, Wind Speed – 11, Rather Rough
1400 Wind Dir. - 280, Wind Speed – 6, Moderate
1407 **Stop data logging, end of the track 12_3,** 56°22.99'S, 66°02.24'W**, Exit Argentinian EEZ**
1800 Wind Dir. - 080, Wind Speed – 7, Smooth

5. ACKNOWLEDGEMENTS

The principal scientists would like to thank the Master, officers and crew of the RV Akademik Sergey Vavilov for making this such an enjoyable, as well as successful cruise.

FIGURES

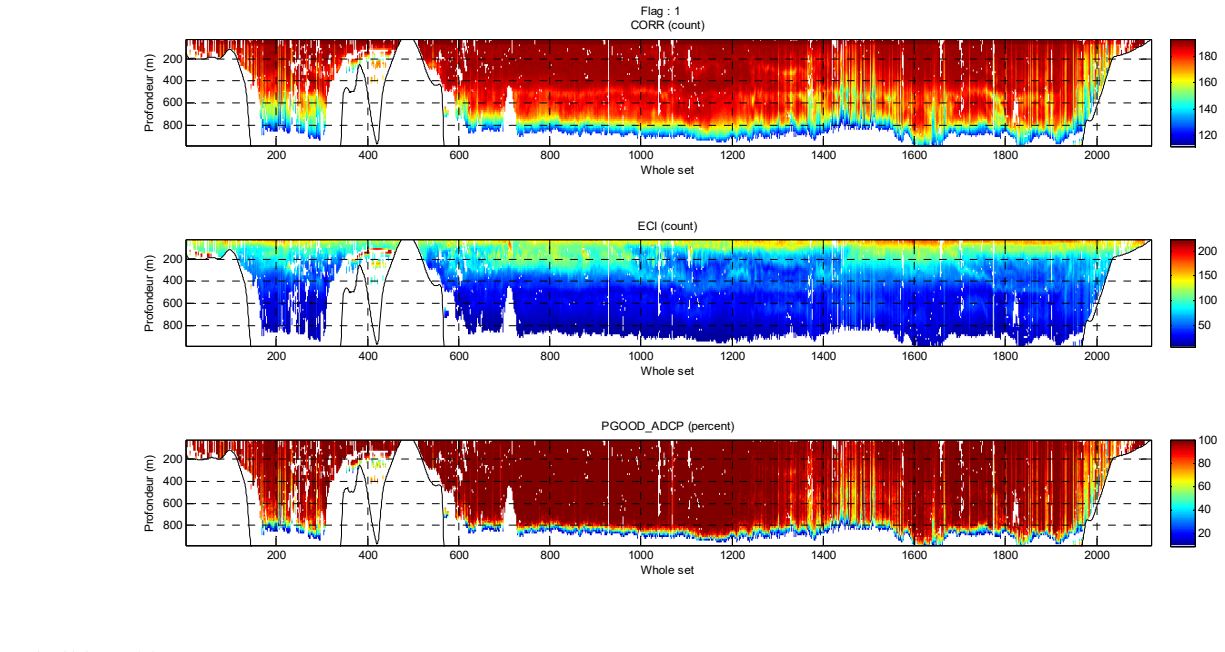


Fig.12 Correlation, echo intensity and percent good of the processed VMADCP data during the track 1_2 between South Georgia and East Falklands (13-16 November 2018).

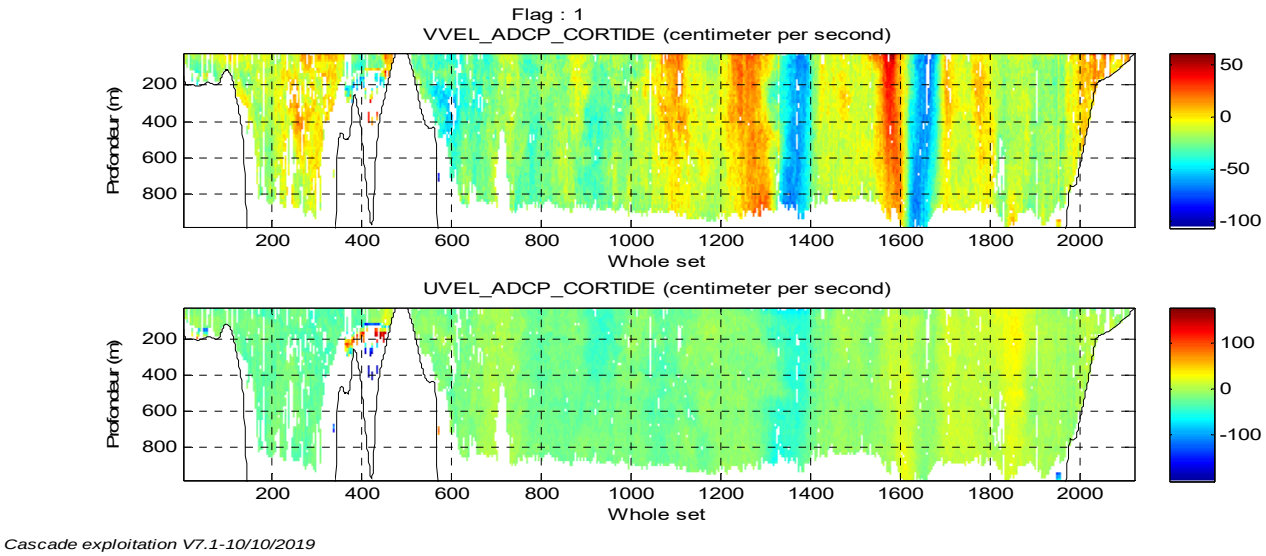
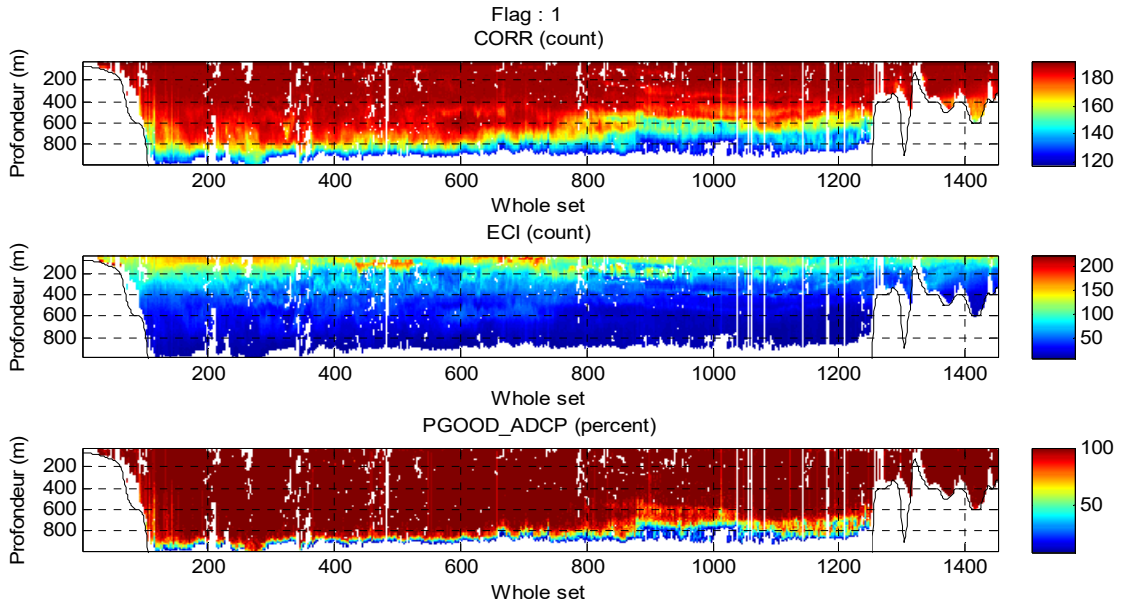
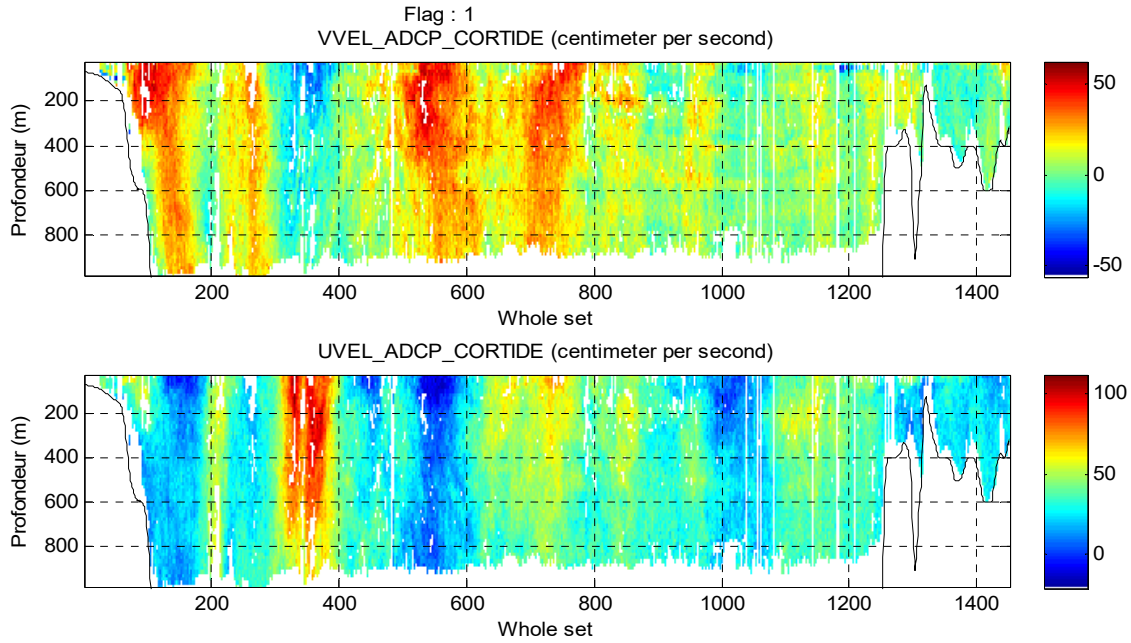


Fig.13 Processed U and V components of the ADCP during the track 1_2 between South Georgia and East Falklands (13-16 November 2018).



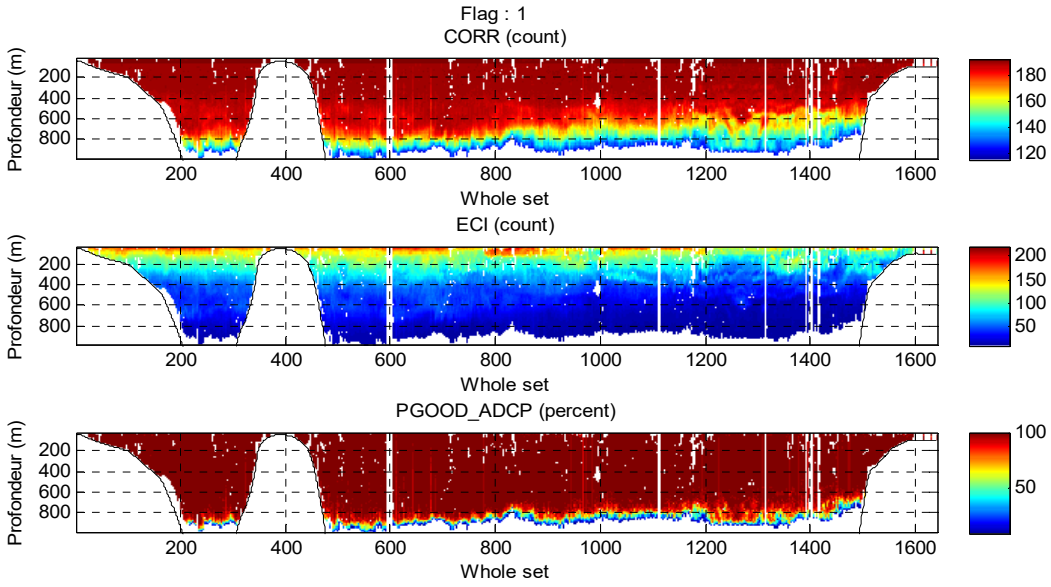
Cascade exploitation V7.1-10/10/2019

Fig.14 Correlation, echo intensity and percent good of the processed VMADCP data during the track 3_1 between Nueva I and Melchior I in Drake Passage (04-06 December 2018).



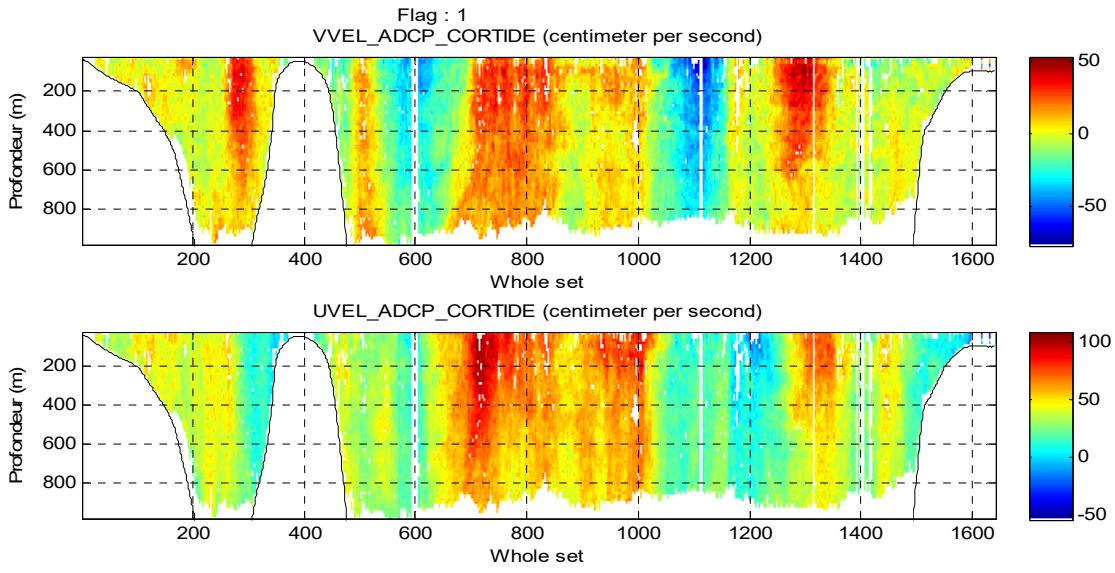
Cascade exploitation V7.1-10/10/2019

Fig.15 Processed U and V components of the ADCP during the track 3_1 between Nueva I and Melchior I in Drake Passage (04-06 December 2018).



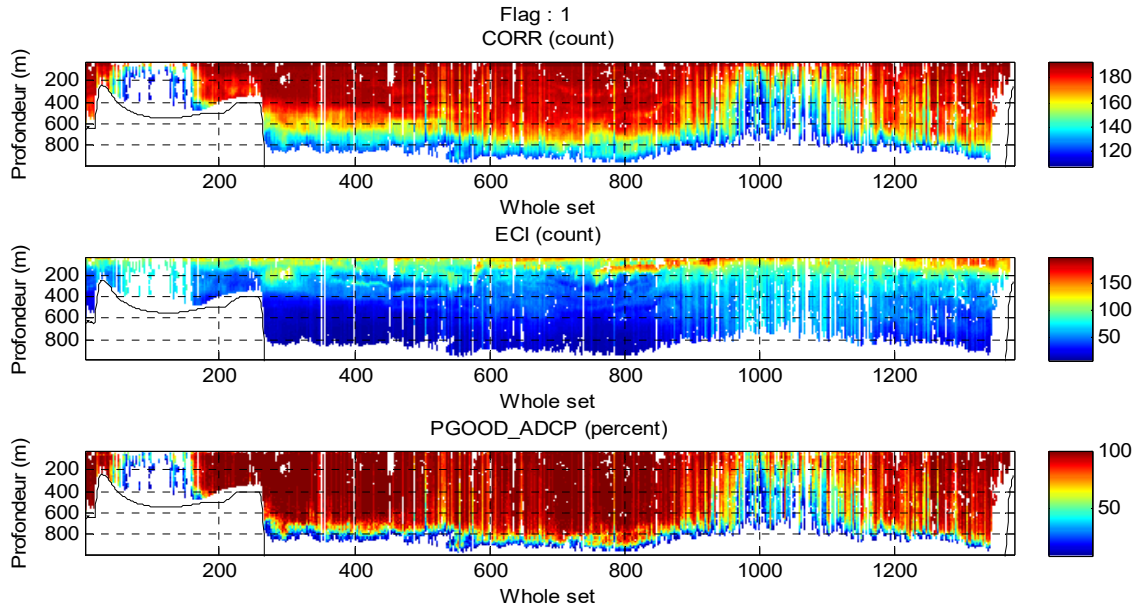
Cascade exploitation V7.1-10/10/2019

Fig.16 Correlation, echo intensity and percent good of the processed VMADCP data during the track 5_1 between Falkland Is. and Nelson St. in Drake Passage (30 December 2018 - 02 January 2019).



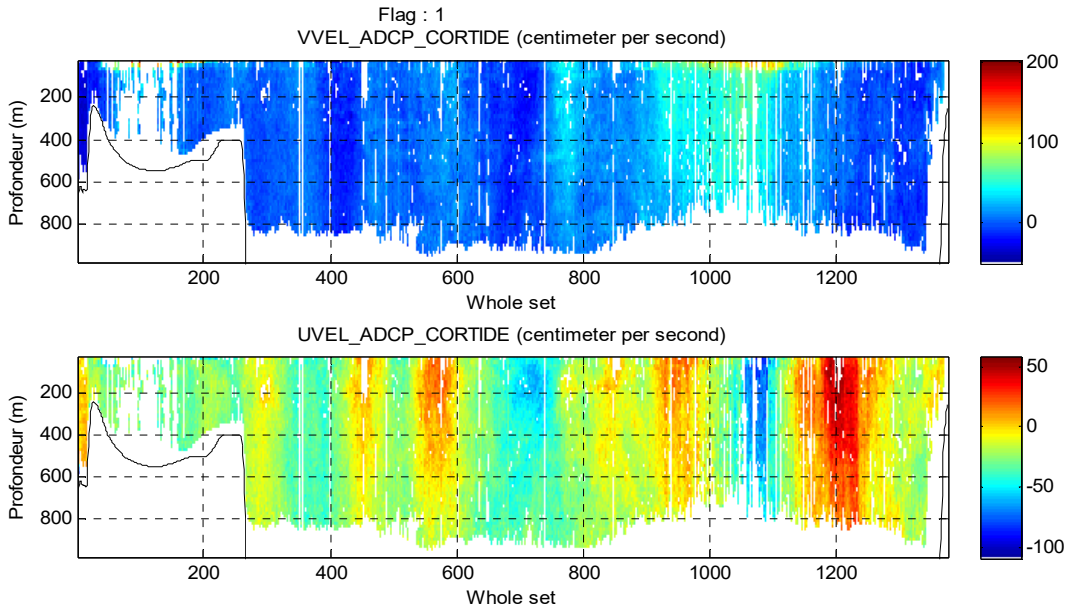
Cascade exploitation V7.1-10/10/2019

Fig.17 Processed U and V components of the ADCP during the track 5_1 between Falkland Is. and Nelson St. in Drake Passage (30 December 2018 - 02 January 2019).



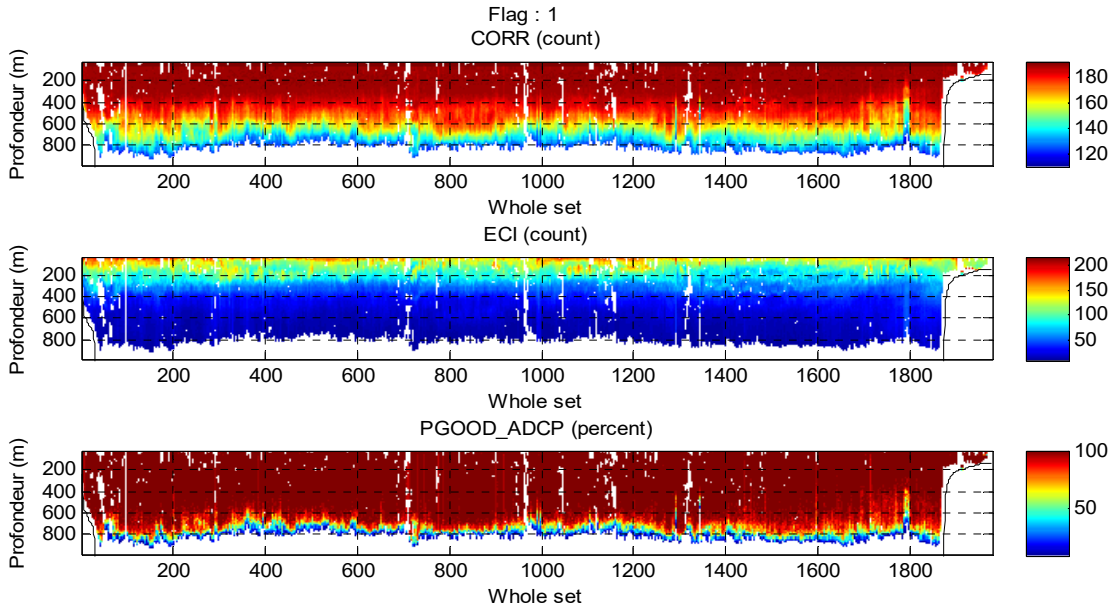
Cascade exploitation V7.1-10/10/2019

Fig.18 Correlation, echo intensity and percent good of the processed VMADCP data during the track 7_3 between Bismarck St. and Cabo de Hornos (18-20 January 2019).



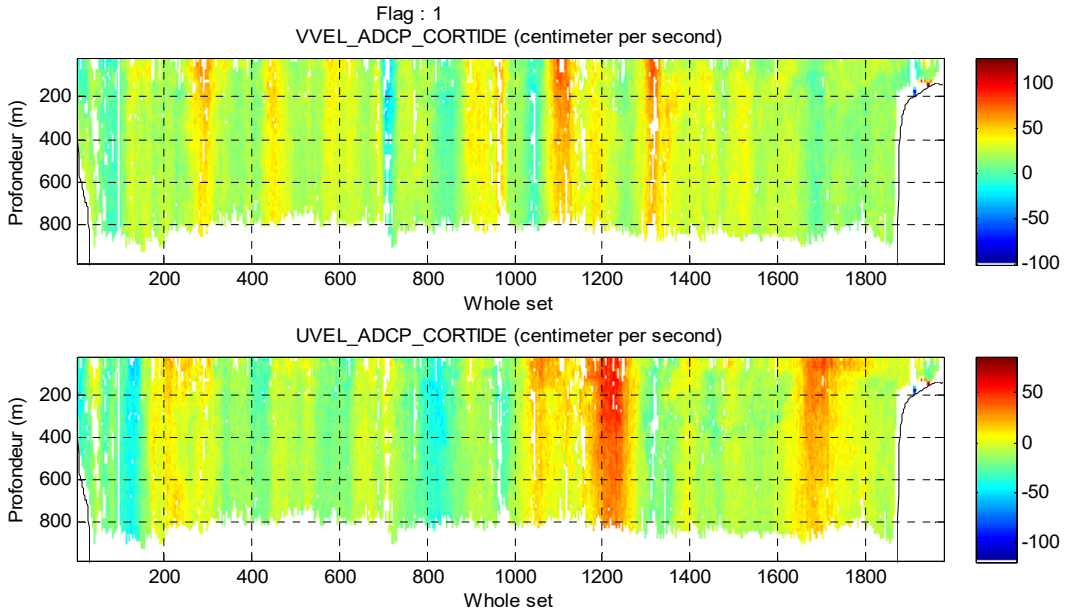
Cascade exploitation V7.1-10/10/2019

Fig.19 Processed U and V components of the ADCP during the track 7_3 between Bismarck St. and Cabo de Hornos (18-20 January 2019).



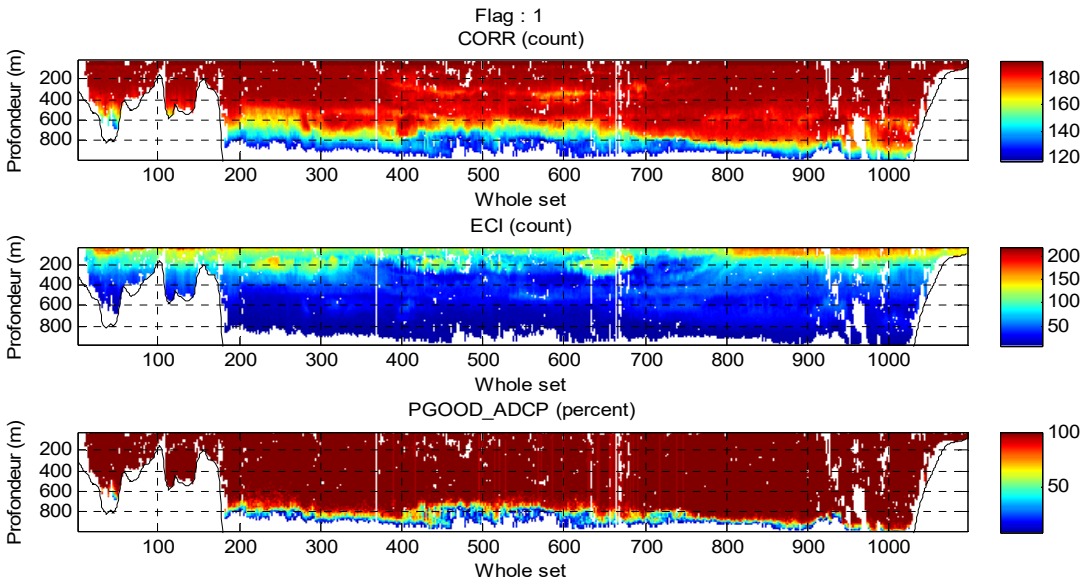
Cascade exploitation V7.1-10/10/2019

Fig.20 Correlation, echo intensity and percent good of the processed VMADCP data during the track 8_6 between Elephant Is. and South Georgia (29 January-02 February 2019).



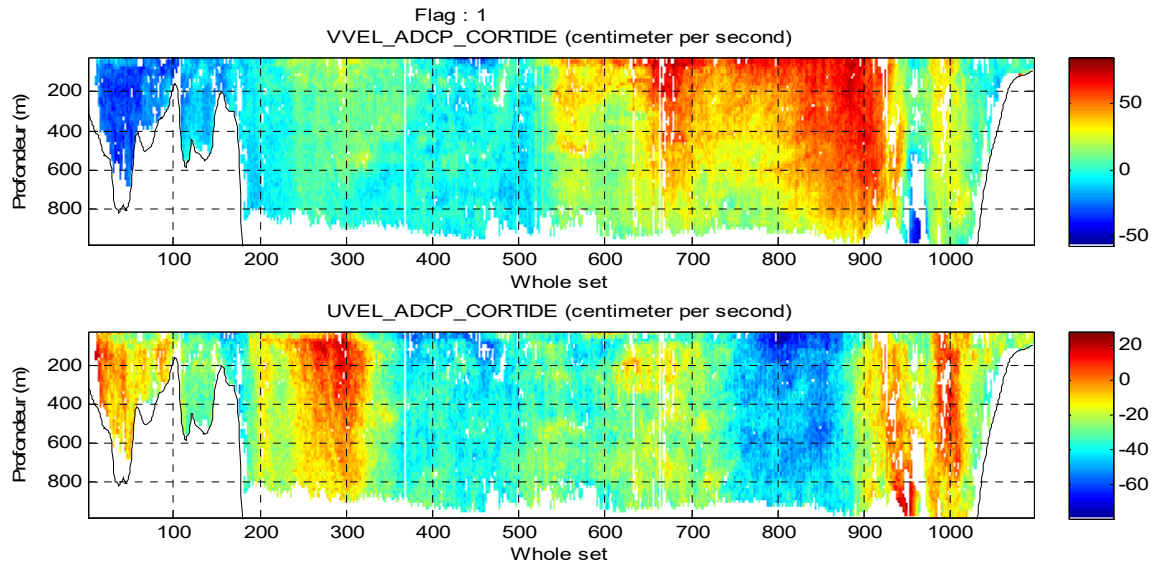
Cascade exploitation V7.1-10/10/2019

Fig.21 Processed U and V components of the ADCP during track 8_6 between Elephant Is. and South Georgia (29 January-02 February 2019).



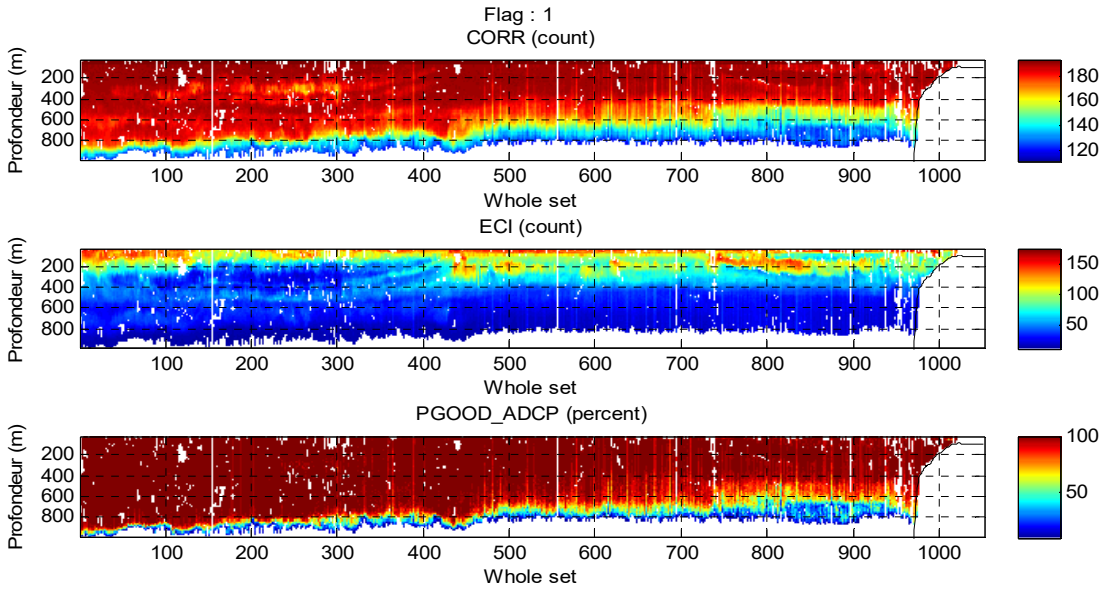
Cascade exploitation V7.1-10/10/2019

Fig.22 Correlation, echo intensity and percent good of the processed VMADCP data during the track 10_6 between Deception I. and Cape Horn in Drake Passage (28 February-2 March 2019).



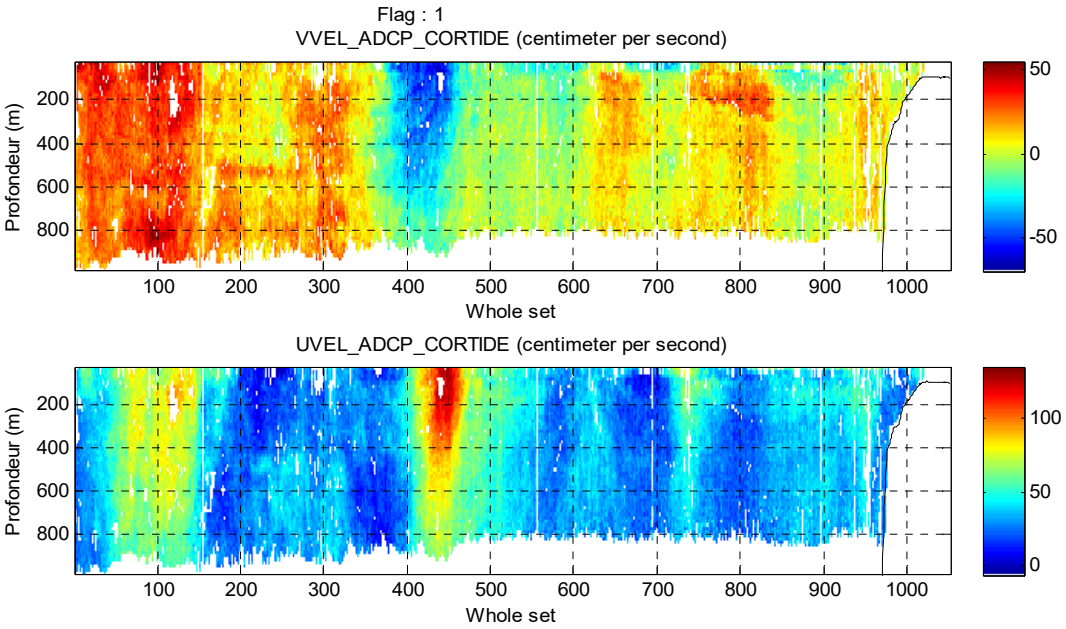
Cascade exploitation V7.1-10/10/2019

Fig.23 Processed U and V components of the ADCP during the track 10_6 between Deception I. and Cape Horn in Drake Passage (28 February-2 March 2019).



Cascade exploitation V7.1-10/10/2019

Fig.24 Correlation, echo intensity and percent good of the processed VMADCP data during the track 12_1 between Nueva I. and Nelson St. in Drake Passage (14-15 March 2019).



Cascade exploitation V7.1-10/10/2019

Fig.25 Processed U and V components of the ADCP during the track 12_1 between Nueva I. and Nelson St. in Drake Passage (14-15 March 2019).