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Short Cruise Report RV SONNE cruise SO296/2

Talcahuano (Chile) - San Vicente (Chile)

21.01.2023 - 21.02.2023

Chief Scientist: Heide Schulz-Vogt

Captain: Oliver Meyer

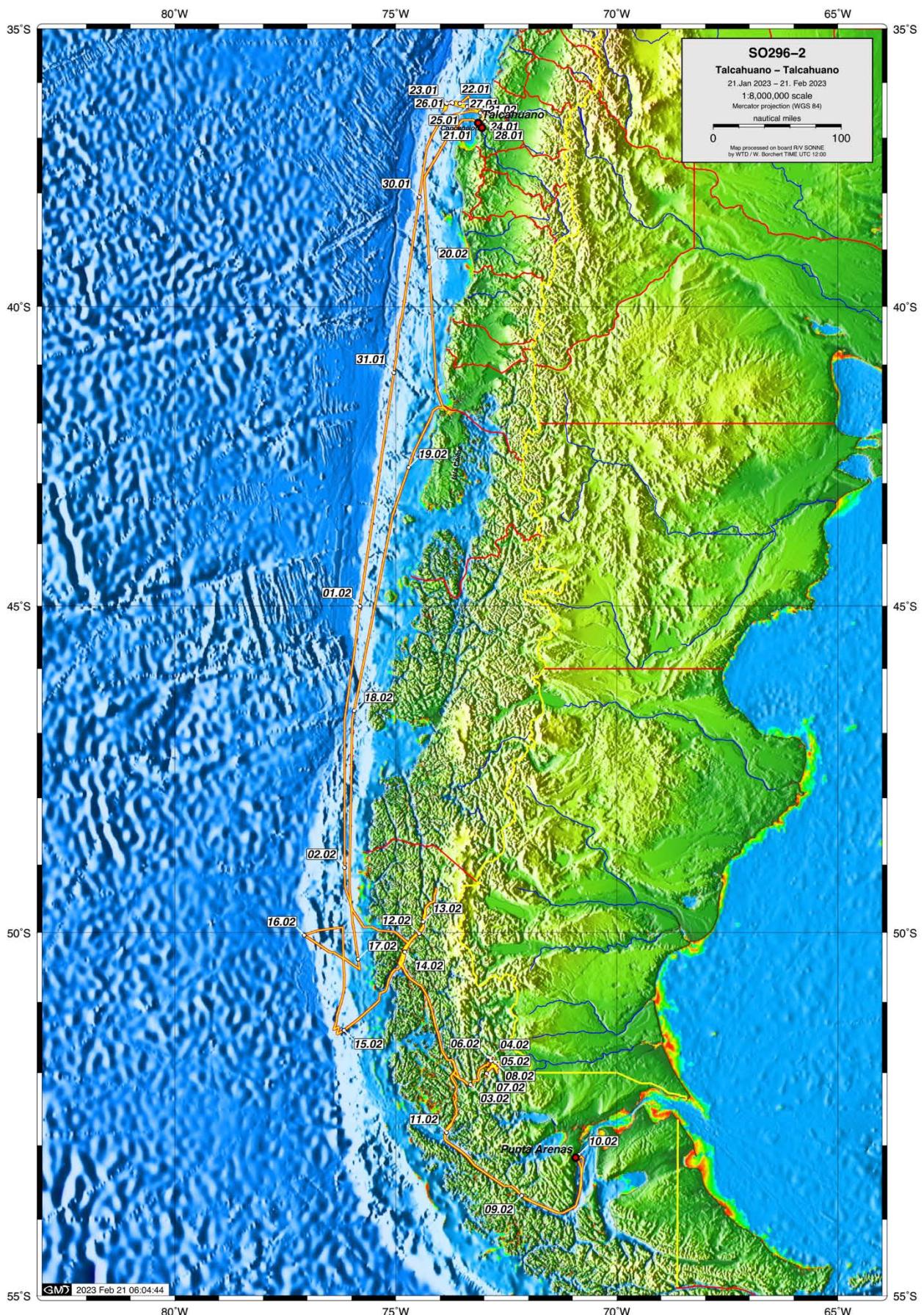


Fig.1: Cruise track and stations of RV SONNE cruise SO296/2.

Objectives

The RV SONNE cruise SO296/2 addressed two central questions:

1. What is the impact of oxygen-depleted to oxygen-free conditions in the water column on biogeochemical cycles? The focus was on the transformation and degradation of organic matter and the impact of water column anoxia on the affected habitats and food chains, and biodiversity. An important focus was also the investigation of the oceanographic situation, especially concerning micro turbulence.
2. How was the postglacial development of the Patagonian fjord region? The influence of postglacial changes in the atmospheric and oceanic current regime in the southeastern Pacific on two very different fjord systems was investigated by way of example. In addition, the importance of eustatic sea-level rise as well as regional isostatic uplift and glacier dynamics on the fjord systems was assessed.

In total, three working areas were chosen along the Chilean coast:

Working Area 1: The coastal upwelling area off Concepción is an upwelling area at higher latitudes, which is therefore seasonal, in contrast to the upwelling area off Peru. Here we wanted to fill specific gaps of knowledge concerning the impact of the oxygen minimum zone on organic and inorganic geochemistry, microbiology, food webs, and diversity to contribute to our research question 1.

Working area 2: The Golfo Almirante Montt is a Patagonian fjord with a stratified water column, where both research topics were addressed. This area was so far almost unexplored and offered the unique opportunity to study the impact of naturally occurring water column anoxia, with low human impact. Here we aimed to combine biogeochemical, oceanographic, and paleoceanographic investigations to gain a comprehensive understanding of recent and past biogeochemical processes in the fjord to improve our understanding of how a system like the Baltic Sea might have functioned before the coastal areas became densely populated by humans.

Working area 3: In the Patagonian fjord system Canal Concepción/Canal Wide/Seno Eyre mainly question 2 and the oceanographic situation was addressed by studying the interaction between offshore postglacial currents and water mass dynamics and the fjords glaciation and sedimentation history in detail.

Narrative

In the first working area, we started our investigation on January 21, 2023 at noon with the station closest to the coast (Station 14) by deploying the CTD-rosette to get a first impression of the hydrographic situation and a phytoplankton net followed by the first sampling of benthos, which was always conducted by taking 3 casts with the Van Veen grab and one haul with a small dredge. After that, we continued on the offshore transect towards the most offshore station (Station 39) taking phytoplankton net samples twice on the way on Station 16 and 18, to search for phytoplankton blooms infected with fungi. We reached station 39 shortly after midnight and deployed the MOCNESS net and two times the multinet followed by a dredge. After this, we moved to the Station Methane seep where we arrived around noon on January 22 and deployed a CTD-rosette followed by three casts of the Van Veen grab and the dredge. After that, we moved back to Station 39 to sample again the Zooplankton and fish larvae with the multinet and the MOCNESS net this time during daylight. This was followed by another phytoplankton net and 4 casts of the CTD-rosette to get sufficient water for all groups measuring various chemical parameters and starting incubation experiments. Around noon on January 23 we then started to move on our station line back inshore while deploying the microstructure probe on a total of 19 stations, to have a detailed impression of the current situation in the water column. This profile was interrupted once at Station 22 to take water samples with the CTD-rosette for incubation experiments with infected phytoplankton. At noon on January 24, we arrived back at station 14 where we deployed the multicorer and then moved on to Station 18, which was our first main station, where all equipment was deployed to gain samples for all working groups. This consisted of 4 CTD-rosettes for water samples, a cast of the pump-CTD for high-resolution nutrient profiles with one cast of the microstructure probe before and afterward, a deployment of the AFIS system, which fixes water samples in situ for later sequencing of RNA, two multinet hauls and 3 Van Veen grabs followed by a dredge and a cast of the multicorer. We finished this sampling program on the morning of January 25 and moved on to Station 23 for benthos sampling. After that, we steamed to station 26 where again all equipment was deployed as described above for Station 18. This was interrupted by an unsuccessful attempt to release the drifter, which turned out to be not sending data after being deployed and therefore had to get recovered again. We finished our second main station on the morning of January 26 and moved on to Station 28 where we released the drifter this time successfully. After that, we moved on to Station 35 for a CTD-rosette cast and benthos sampling and further on to Station 39 for a multicorer cast and an AFIS deployment in the very deep water masses. After that, we had another CTD-rosette followed by phytoplankton and benthos sampling on Station 32. After that, we moved on to Station 31 which was our 3rd main station where all the equipment was deployed as described above. We finished with this station on the evening of January 27 and moved to Station 14 for the last deployment of the pump-CTD together with a microstructure probe and two CTD-rosette casts and a multicorer which took until the early morning of 28.1. After that, we went back to the harbor, this time Lirquén, where a large part of the scientific crew was exchanged. The departure from Lirquén into the 2nd working area was delayed until the evening of January 29 due to a missing container and the two pilots were arriving later than expected. After the departure, we had a transit of 3 days before arriving in our 2nd working area the Golfo Almirante Montt on February 3. We passed into the Golfo at midday via the Angostura White, a very narrow entrance, which can only be passed during high tides and daylight, and started our working program in the Golfo with the deployment of the drifter changed to a mooring as requested by the authorities. After a first CTD-rosette cast for incubations to determine methane oxidation rates, we profiled the western side of the working area up to station 15 with multibeam and parasound to find adequate stations for the deployment of the gravity corer. This survey ended at midnight on February 3 and

two stations (NGAM-14 and N-Gam 16) were selected for gravity coring together with the multicorer and surface water pumping deployment for the later detection of biomarkers. In between, we deployed the CTD-Rosette on 3 additional stations to get a profile of oxygen and nutrients across the western basin. Back at Station GAM-21 at noon on February 4 we again started deploying all the equipment on this main station except sediment coring because of the nearby mooring that had a sediment trap attached to it. In the early morning of February 5 the work at station GAM-21 ended and we took a gravity and multicorer sample from station NGAM-25 before starting again a survey of the sediments with multibeam and parasound on the eastern part of the Golfo. This survey ended on the evening of February 5 and the station NGAM-3 was selected for gravity coring. Along the eastern part, we took several CTD-rosette samples again for retrieving a profile of oxygen and nutrients along the transect. After that, we measured two profiles in the east-west direction with the microstructure probe to understand the mixing processes between the western and the eastern part of the basin. At noon of February 6 we deployed one CTD-Rosette cast at the deepest part of the western basin at station NGAM-26. After that, we returned to our main station GAM-21 for additional water sampling. In the afternoon of the February 6 the winds, which were formally blowing very strongly, calmed down somewhat and we used this opportunity to recover the mooring and after that resumed our activity at station GAM-21 with sediment coring. On the night of February 6 to 7 we took additional water samples at stations that had shown pockmark structures in the multibeam survey before moving on to station NGAM-14 in the southwestern part, where we again made a detailed sampling of the water column including a pump-CTD cast. This work ended on the evening of February 7 and was continued with a series of microstructure probe measurements from the south towards the northern part of the western basin crossing the sill in between to understand the mixing processes between these two parts of the basin. After this, we continued to station NGAM-16, which is at the edge of the northwestern basin, and again made detailed investigations of the water column including high-resolution profiles of nutrients with the pump-CTD. With this, we finished our work in the Golfo Almirante Montt on the morning of February 8 and left the Golfo again via the Angostura White. After a change of the scientific crew in Punta Arenas where we arrived on February 9 and left at February 10 we had a transit of 2 days to our 3rd working area: the fjord system Canal Concepción/Canal Wide/Seno Eyre. Arriving on the inner fjord route in the Canal Concepcion/Canal Wide/Seno Eyr Fjord system we started work with hydroacoustic investigations during the night of February 11 to 12 to determine suitable stations for sediment sampling. The following day, three stations of water and sediment sampling could be worked through and then the hydroacoustic survey of the innermost fjord section continued to the mouth of the Brüggen/Pius XI called glacier in the Seno Eyre. Arriving at the northern end on February 13, the hydrographic situation was investigated from the workboat using a microstructure probe. Three more geological stations followed in the Seno Eyre to finally work on the last two fjord stations after a third mapping interval on February 14 in the Canal Concepción. With calming weather conditions, work on the offshore continental slope could be carried out during the remaining two days. Following an extensive hydroacoustic pre-site survey, several stations for water and sediment sampling were determined along a depth transect on February 16. Work was concluded on the morning of February 17 to reach the final destination port in San Vicente on time on February 21.

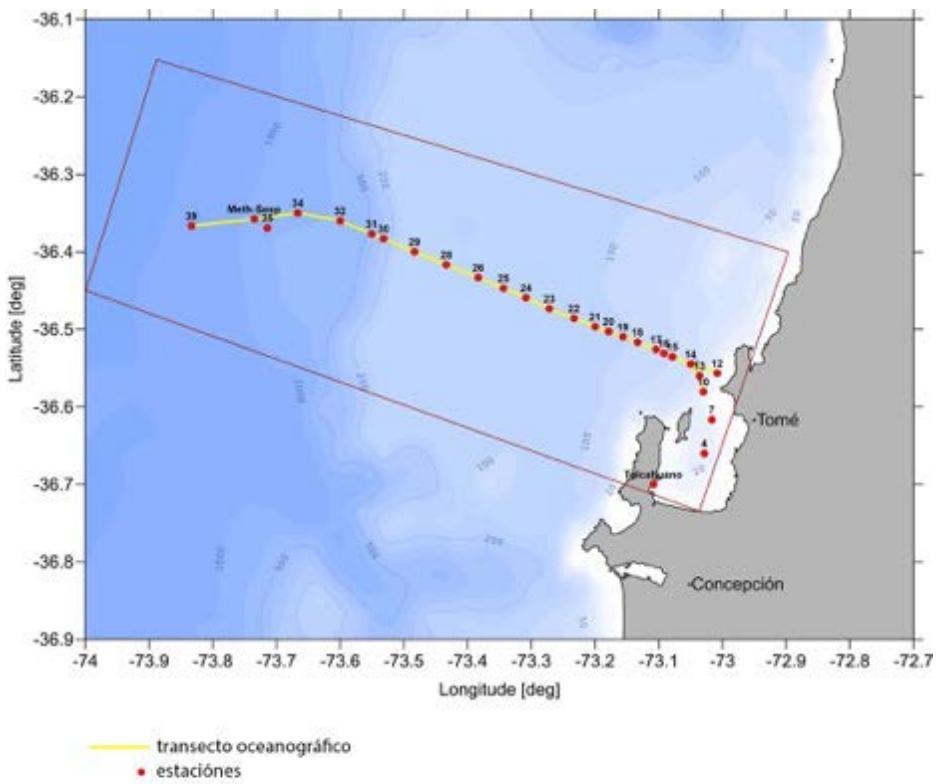


Fig. 2: Working area 1 of RV SONNE cruise SO296/2.

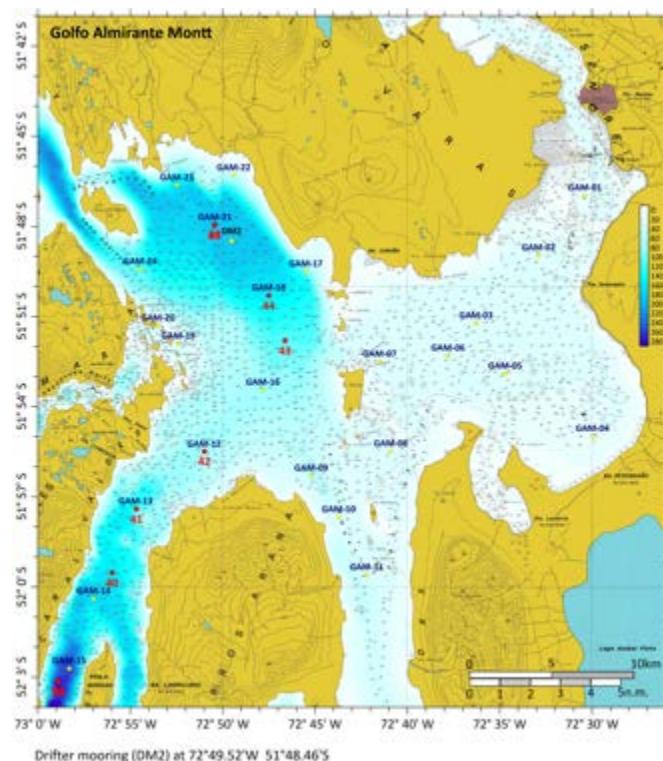


Fig. 3: Working area 2 of RV SONNE cruise SO296/2.

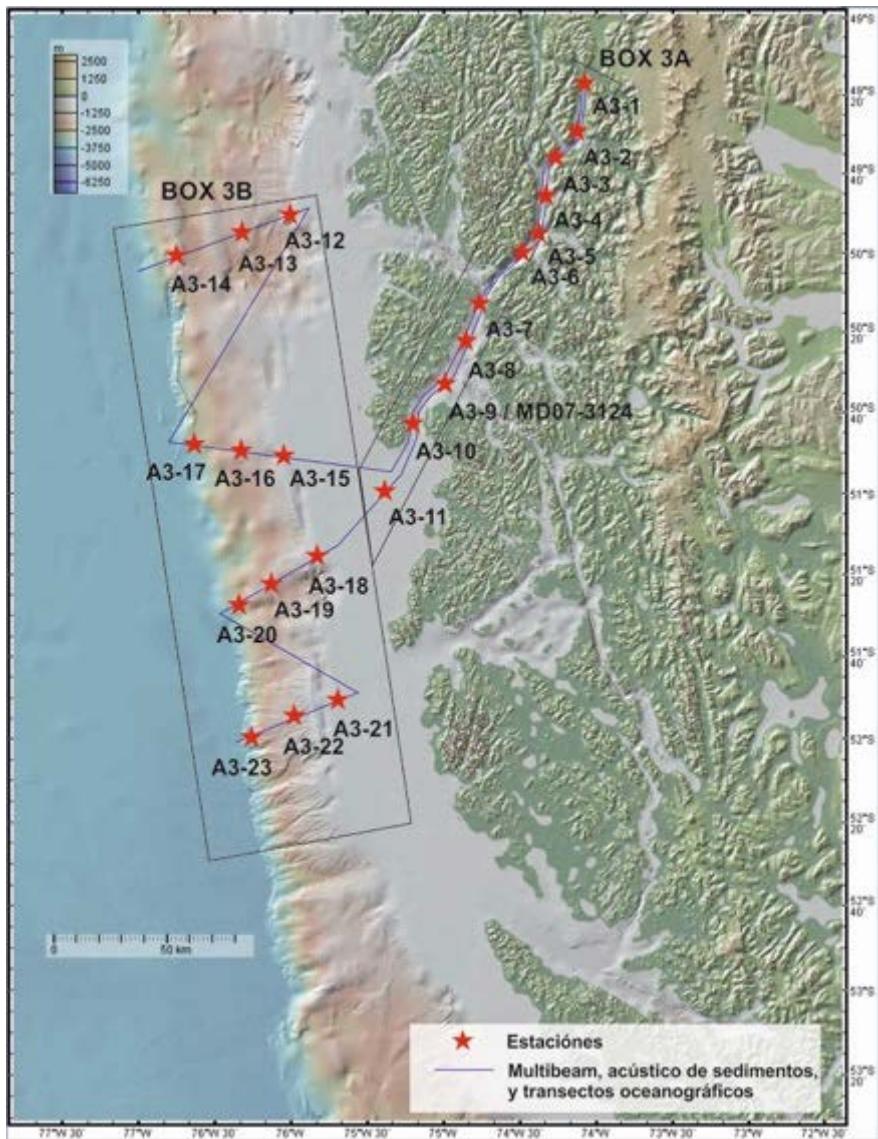


Fig. 4: Working area 3 of RV SONNE cruise SO296/2.

Acknowledgment

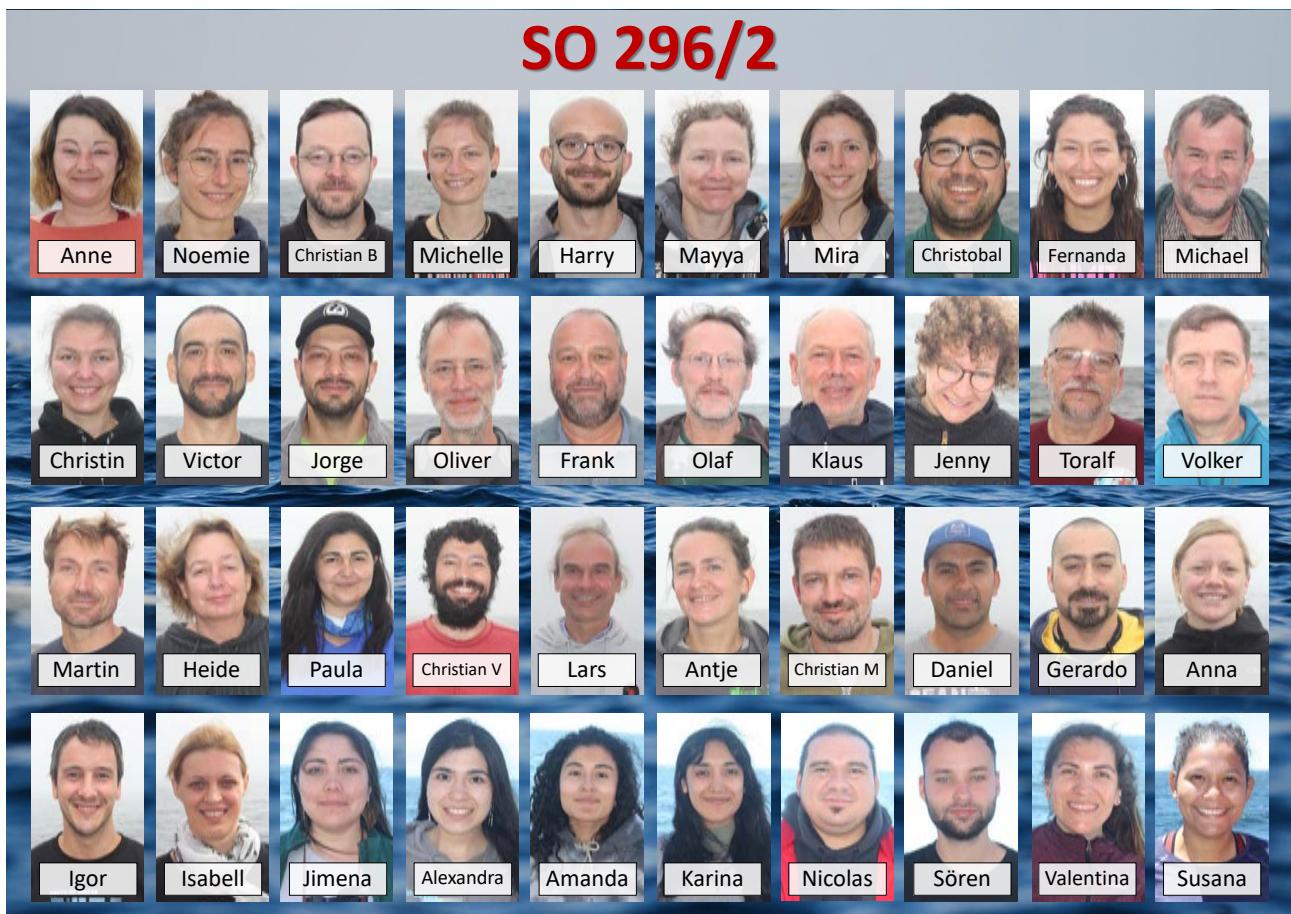
We are deeply thankful to the Chilean authorities for permitting us to work in Chilean waters, especially for the permission to work within the fjords. We are aware that this complicated cruise was only possible due to the help of many people that did all they could to solve our many problems before and during the cruise. This is especially true for the members of the German Research Fleet Coordination Centre, Universität Hamburg, the shipping company Briese Research, and LPL-Logistics.

We also want to express our deep thankfulness to Captain Oliver Meyer and his excellent crew for their enormous support and the very friendly atmosphere on board. The cruise and scientific work was financed by the Federal Ministry of Education and Research (BMBF) under grant 03G0296A (MAPUCHE).

Participant Lists

Leg1: 21.1. - 28.1.2023

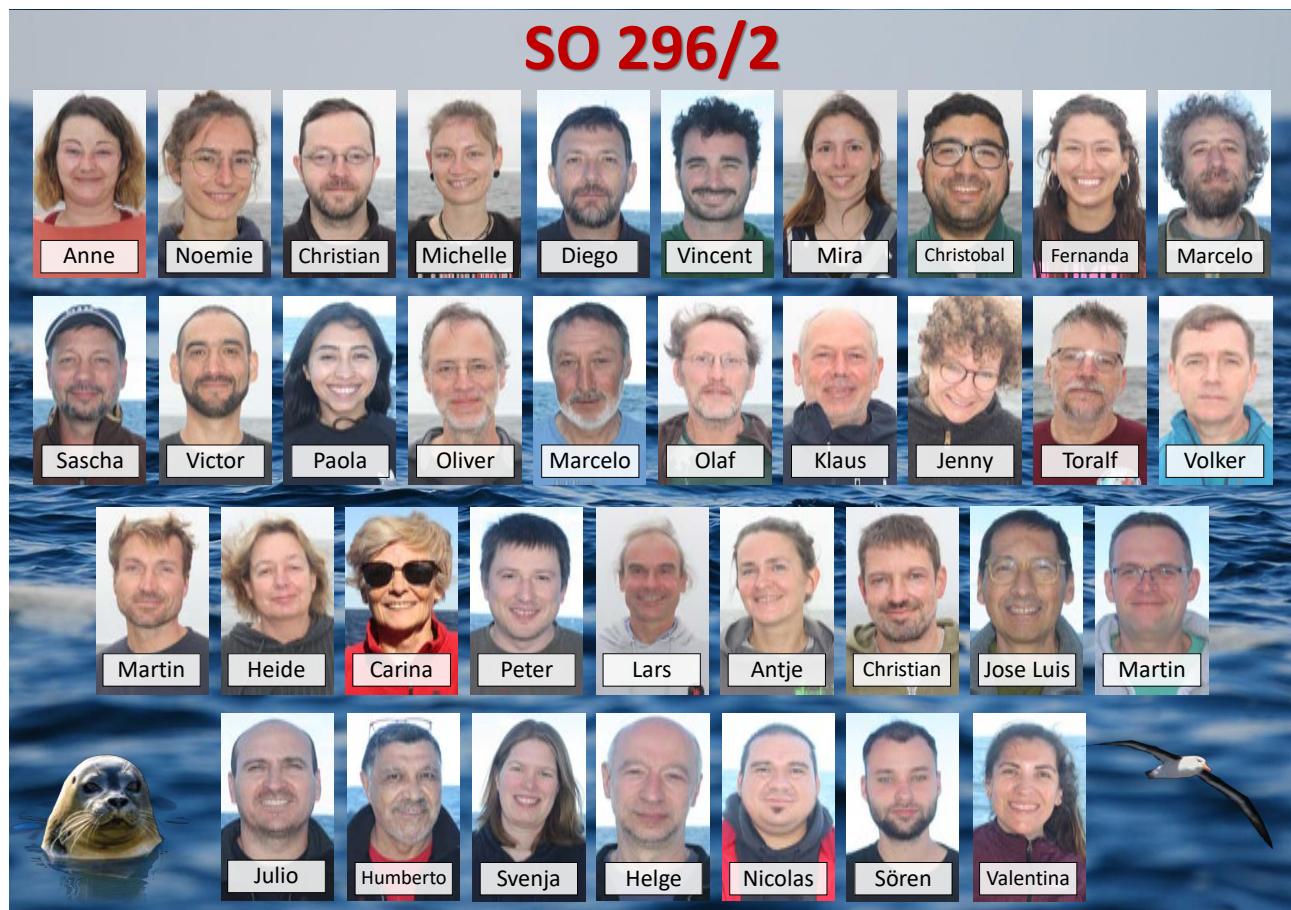
1	Heide Schulz-Vogt	Chief scientist	IOW
2	Volker Mohrholz	Oceanography	IOW
3	Toralf Heene	CTD, MSS	IOW
4	Michelle Albinus	FDOM	ICBM
5	Christian Burmeister	Nutrients	IOW
6	Christian Meeske	Microbiology	IOW
7	Noémie Choisnard	Nitrification rates	IOW
8	Olaf Dellwig	Trace metals	IOW
9	Anne Köhler	Trace metals	IOW
10	Antje Wegwerth	Trace metals	IOW
11	Cristóbal Castillo	Geochemistry	UdeC
12	Víctor Acuña	Multicorer	UdeC
13	Lars Umlauf	Oceanography	IOW
14	Valentina Valdés	N-cycling	UdeC
15	Martin Kolbe	Pump-CTD	IOW
16	Jenny Fabian	Pump-CTD	IOW
17	Klaus Jürgens	Microbiology	IOW
18	Oliver Schmale	Methane	IOW
19	Sören Iwe	Methane	IOW
20	Nicolás Mayorga	Cytobot	UdeC
21	Mira Schmitt	Oceanography	IOW
22	Karina Fuentes	Biogeochemistry	UdeC
23	Amanda Paredes	Biogeochemistry	UdeC
24	Alexandra Pereira	Biogeochemistry	UdeC
25	Jimena González	Biogeochemistry	UdeC
26	Igor Fernández	Zooplankton	UdeC
27	Daniel Toledo	Zooplankton	UdeC
28	Susana Cabrera	Zooplankton	UdeC
29	Gerardo García	Flowcytometer	UdeC
30	Paula Ruiz	Microbiology	UdeC
31	Christian Venegas	Flowcytometer	UdeC
32	Isabell Klawonn	Fungi	IOW
33	Anna Feuring	Fungi	IOW
34	Michael Zettler	Benthos	IOW
35	Mayya Gogina	Benthos	IOW
36	Frank Pohl	Benthos	IOW
37	Christin Laudan	Benthos	IOW
38	Jorge Henríquez	Multicorer	UdeC
39	Harry Allbrook	Biogeochemistry	UCB
40	Fernanda Fuentes	Observer	UdeV



Leg2: 29.1. - 9.2.2023

1	Heide Schulz-Vogt	Chief scientist	IOW
2	Volker Mohrholz	Oceanography	IOW
3	Toralf Heene	CTD, MSS	IOW
4	Michelle Albinus	FDOM	ICBM
5	Christian Burmeister	Nutrients	IOW
6	Christian Meeske	Microbiology	IOW
7	Noémie Choisnard	Nitrification rates	IOW
8	Olaf Dellwig	Trace metals	IOW
9	Anne Köhler	Trace metals	IOW
10	Antje Wegwerth	Trace metals	IOW
11	Cristóbal Castillo	Geochemistry	UdeC
12	Víctor Acuña	Multicorer	UdeC
13	Lars Umlauf	Oceanography	IOW
14	Valentina Valdés	N-cycling	UdeC
15	Martin Kolbe	Pump-CTD	IOW
16	Jenny Fabian	Pump-CTD	IOW
17	Klaus Jürgens	Microbiology	IOW
18	Oliver Schmale	Methane	IOW

19	Sören Iwe	Methane	IOW
20	Nicolás Mayorga	Cytobot	UdeC
21	Mira Schmitt	Oceanography	IOW
22	Julio Sepúlveda	Geochemistry	UCB
23	Helge Arz	Paleooceanography	IOW
24	Sascha Plewe	Gravity corer, MUC	IOW
25	Peter Feldens	Hydroarcustics	IOW
26	Svenja Papenmeier	Hydroarcustics	IOW
27	Martin Karallus	Gravity corer, MUC	IOW
28	Marcelo Arevalo	Gravity corer, MUC	UdeC
29	Carina Lange	Paleooceanography	UdeC
30	Paola Cárdenas	Paleooceanography	UdeC
31	Vincent Rigalleau	Paleooceanography	AWI
32	Diego Narváez	Oceanography	UdeC
33	Humberto González	benthic pelagic coupling	UACCh
34	Marcelo Gutiérrez	Phytoplankton	IOW
35	José Luis Iriarte	Phytoplankton	UACCh
36	Fernanda Fuentes	Observer	UdeV
37		Pilot	
38		Pilot	

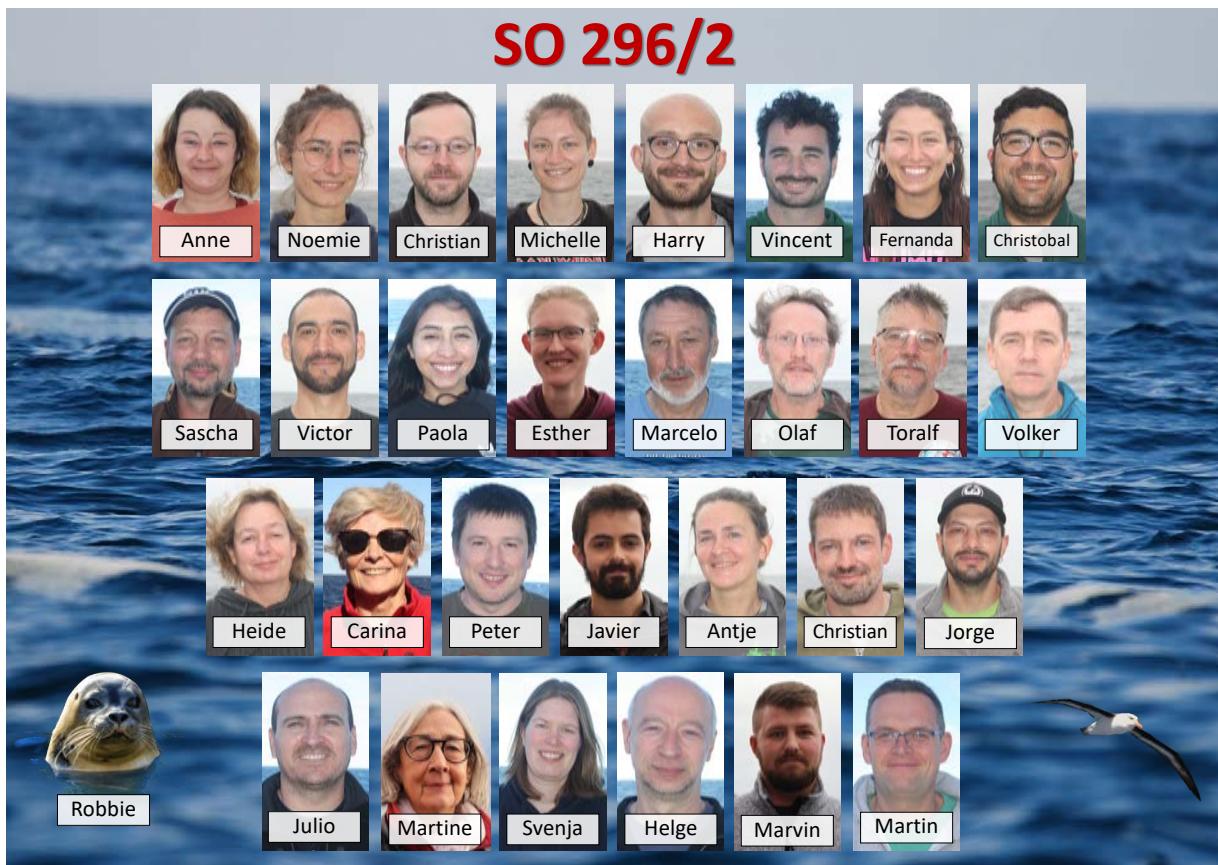


Leg3: 10.2. - 21.2.2023

1	Heide Schulz-Vogt	Chief scientist	IOW
2	Volker Mohrholz	Oceanography	IOW
3	Toralf Heene	CTD, MSS	IOW
4	Michelle Albinus	FDOM	ICBM
5	Christian Burmeister	Nutrients	IOW
6	Christian Meeske	Microbiology	IOW
7	Noémie Choisnard	Nitrification rates	IOW
8	Olaf Dellwig	Trace metals	IOW
9	Anne Köhler	Trace metals	IOW
10	Antje Wegwerth	Trace metals	IOW
11	Cristóbal Castillo	Geochemistry	UdeC
12	Víctor Acuña	Multicorer	UdeC
13	Julio Sepúlveda	Geochemistry	UCB
14	Helge Arz	Paleooceanography	IOW
15	Sascha Plewe	Gravity corer, MUC	IOW
16	Peter Feldens	Hydroarcustics	IOW
17	Svenja Papenmeier	Hydroarcustics	IOW
18	Martin Karallus	Gravity corer, MUC	IOW
19	Marcelo Arevalo	Gravity corer, MUC	UdeC
20	Carina Lange	Paleooceanography	UdeC
21	Paola Cárdenas	Paleooceanography	UdeC
22	Vincent Rigalleau	Paleooceanography	AWI
23	Martine Devic	Phytoplankton	SU
24	Javier Maldonado	Paleooceanography	UdeC
25	Esther-Charlott Kiel	student	UG
26	Marvin Schmitz	student	UG
27	Jorge Henríquez	Multicorer	UdeC
28	Harry Allbrook	Biogeochemistry	UCB
29	Fernanda Fuentes	Observer	UdeV
30	Pilot		
31	Pilot		

Institutes

IOW: Leibniz Institute for Baltic Sea Research Warnemünde, **UdeC:** Universidad de Concepción, **ICBM:** Institute for Chemistry and Biology of the Marine Environment, Oldenburg, **UdeV:** Universidad de Valparaíso, **UCB:** University of Colorado Boulder, **AWI:** Alfred Wegener Institute for Polar and marine Research, **UACh:** Universidad Austral de Chile, **SU:** Sorbonne Université



Stationlist

Date and Time	Station No.	Latitude	Longitude	Depth (m)	Device
21.01.23 13:33	SO296/2_1-1	36° 32,675' S	073° 02,987' W	56	CTD-Rosette
21.01.23 14:14	SO296/2_1-2	36° 32,695' S	073° 03,003' W	55	Phytoplankton net
21.01.23 15:41	SO296/2_1-3	36° 32,695' S	073° 03,005' W	53	Van Veen grab
21.01.23 16:15	SO296/2_1-4	36° 32,699' S	073° 03,004' W	55	Van Veen grab
21.01.23 16:25	SO296/2_1-5	36° 32,699' S	073° 02,999' W	54	Van Veen grab
21.01.23 16:35	SO296/2_1-6	36° 32,695' S	073° 03,004' W	54	Dredge
21.01.23 18:01	SO296/2_2-1	36° 31,865' S	073° 05,541' W	74	Phytoplankton net
21.01.23 18:41	SO296/2_3-1	36° 30,964' S	073° 07,941' W	85	Phytoplankton net
21.01.23 19:24	SO296/2_4-1	36° 29,811' S	073° 11,983' W	103	Phytoplankton net
22.01.23 01:01	SO296/2_5-1	36° 21,908' S	073° 50,137' W	1845	MOCNESS net
22.01.23 06:04	SO296/2_5-2	36° 21,933' S	073° 50,063' W	1830	Multinet
22.01.23 07:28	SO296/2_5-3	36° 21,974' S	073° 50,024' W	1821	Multinet
22.01.23 09:01	SO296/2_5-4	36° 21,999' S	073° 50,003' W	1812	Dredge
22.01.23 12:05	SO296/2_6-1	36° 21,427' S	073° 44,106' W	905	CTD-Rosette
22.01.23 13:47	SO296/2_6-2	36° 21,461' S	073° 44,079' W	903	Van Veen grab
22.01.23 14:57	SO296/2_6-3	36° 21,461' S	073° 44,086' W	904	Van Veen grab
22.01.23 16:03	SO296/2_6-4	36° 21,462' S	073° 44,080' W	906	Van Veen grab
22.01.23 17:00	SO296/2_6-5	36° 21,461' S	073° 44,085' W	907	Dredge
22.01.23 18:49	SO296/2_7-1	36° 22,028' S	073° 49,981' W	1811	Multinet

22.01.23 20:07	SO296/2_7-2	36° 22,030' S	073° 49,980' W	1807	Multinet
22.01.23 21:36	SO296/2_7-3	36° 22,028' S	073° 49,986' W	1812	MOCNESS net
23.01.23 04:04	SO296/2_7-4	36° 22,001' S	073° 50,001' W	1812	Phytoplankton net
23.01.23 04:30	SO296/2_7-5	36° 22,000' S	073° 49,998' W	1820	CTD-Rosette
23.01.23 06:10	SO296/2_7-6	36° 22,001' S	073° 50,003' W	1821	CTD-Rosette
23.01.23 07:59	SO296/2_7-7	36° 21,999' S	073° 50,005' W	1817	CTD-Rosette
23.01.23 09:04	SO296/2_7-8	36° 21,998' S	073° 50,001' W	1813	CTD-Rosette
23.01.23 11:21	SO296/2_7-9	36° 22,020' S	073° 50,026' W	1817	Microstructure probe
23.01.23 13:21	SO296/2_8-1	36° 21,404' S	073° 44,080' W	910	Microstructure probe
23.01.23 15:05	SO296/2_9-1	36° 20,982' S	073° 39,991' W	804	Microstructure probe
23.01.23 16:47	SO296/2_10-1	36° 21,631' S	073° 36,021' W	658	Microstructure probe
23.01.23 18:03	SO296/2_11-1	36° 22,684' S	073° 33,105' W	304	Microstructure probe
23.01.23 19:16	SO296/2_12-1	36° 22,996' S	073° 31,877' W	181	Microstructure probe
23.01.23 20:48	SO296/2_13-1	36° 23,995' S	073° 28,996' W	123	Microstructure probe
23.01.23 21:58	SO296/2_14-1	36° 25,001' S	073° 25,991' W	122	Microstructure probe
23.01.23 23:20	SO296/2_15-1	36° 25,981' S	073° 23,015' W	121	Microstructure probe
24.01.23 00:36	SO296/2_16-1	36° 26,805' S	073° 20,642' W	120	Microstructure probe
24.01.23 01:44	SO296/2_17-1	36° 27,584' S	073° 18,529' W	117	Microstructure probe
24.01.23 03:29	SO296/2_18-1	36° 28,511' S	073° 16,289' W	117	Microstructure probe
24.01.23 04:40	SO296/2_19-1	36° 29,137' S	073° 13,952' W	113	CTD-Rosette
24.01.23 05:16	SO296/2_19-2	36° 29,128' S	073° 13,945' W	113	Microstructure probe
24.01.23 06:32	SO296/2_20-1	36° 29,848' S	073° 12,042' W	108	Microstructure probe
24.01.23 07:49	SO296/2_21-1	36° 30,604' S	073° 09,344' W	99	Microstructure probe
24.01.23 09:02	SO296/2_22-1	36° 30,993' S	073° 07,995' W	92	Microstructure probe
24.01.23 10:13	SO296/2_23-1	36° 31,562' S	073° 06,241' W	85	Microstructure probe
24.01.23 11:16	SO296/2_24-1	36° 32,119' S	073° 04,677' W	74	Microstructure probe
24.01.23 12:24	SO296/2_25-1	36° 32,706' S	073° 03,058' W	57	Microstructure probe
24.01.23 13:22	SO296/2_25-2	36° 32,648' S	073° 02,978' W	58	Multicorer
24.01.23 14:24	SO296/2_26-1	36° 30,979' S	073° 08,043' W	91	CTD-Rosette
24.01.23 15:30	SO296/2_26-2	36° 30,998' S	073° 08,002' W	91	Microstructure probe
24.01.23 16:27	SO296/2_26-3	36° 30,950' S	073° 08,078' W	94	Pump-CTD
24.01.23 21:35	SO296/2_26-4	36° 30,986' S	073° 08,020' W	89	Microstructure probe
24.01.23 22:45	SO296/2_26-5	36° 30,994' S	073° 08,020' W	93	AFIS
24.01.23 23:27	SO296/2_26-6	36° 30,996' S	073° 08,007' W	92	CTD-Rosette
25.01.23 01:05	SO296/2_26-7	36° 30,993' S	073° 08,010' W	93	CTD-Rosette
25.01.23 02:34	SO296/2_26-8	36° 30,992' S	073° 08,011' W	93	CTD-Rosette
25.01.23 03:03	SO296/2_26-9	36° 30,992' S	073° 08,015' W	92	Multinet
25.01.23 05:47	SO296/2_26-10	36° 31,458' S	073° 08,317' W	93	Multinet
25.01.23 06:56	SO296/2_26-11	36° 30,983' S	073° 08,076' W	93	Van Veen grab
25.01.23 07:10	SO296/2_26-12	36° 30,992' S	073° 08,036' W	94	Van Veen grab
25.01.23 07:23	SO296/2_26-13	36° 31,000' S	073° 08,011' W	93	Van Veen grab
25.01.23 07:40	SO296/2_26-14	36° 30,999' S	073° 08,011' W	93	Dredge
25.01.23 08:21	SO296/2_26-15	36° 31,018' S	073° 08,024' W	92	Multicorer
25.01.23 09:28	SO296/2_27-1	36° 28,397' S	073° 16,322' W	114	Van Veen grab
25.01.23 09:45	SO296/2_27-2	36° 28,401' S	073° 16,301' W	115	Van Veen grab

25.01.23 10:01	SO296/2_27-3	36° 28,405' S	073° 16,295' W	114	Van Veen grab
25.01.23 10:19	SO296/2_27-4	36° 28,401' S	073° 16,305' W	114	Dredge
25.01.23 11:40	SO296/2_28-1	36° 25,959' S	073° 23,044' W	118	CTD-Rosette
25.01.23 13:43	SO296/2_28-2	36° 26,003' S	073° 22,996' W	120	CTD-Rosette
25.01.23 14:21	SO296/2_28-3	36° 26,002' S	073° 22,997' W	121	CTD-Rosette
25.01.23 15:54	SO296/2_28-4	36° 26,002' S	073° 22,998' W	123	CTD-Rosette
25.01.23 17:32	SO296/2_28-5	36° 26,003' S	073° 23,003' W	119	Phytoplankton net
25.01.23 17:50	SO296/2_28-6	36° 26,003' S	073° 23,002' W	121	Multinet
25.01.23 21:03	SO296/2_29-1	36° 25,002' S	073° 25,997' W	124	Drifter
25.01.23 23:38	SO296/2_30-1	36° 25,811' S	073° 22,870' W	118	Microstructure probe
26.01.23 00:52	SO296/2_30-2	36° 25,960' S	073° 22,986' W	121	Pump-CTD
26.01.23 04:06	SO296/2_30-3	36° 25,998' S	073° 23,002' W	121	Microstructure probe
26.01.23 05:02	SO296/2_30-4	36° 25,997' S	073° 22,980' W	120	AFIS
26.01.23 05:42	SO296/2_30-5	36° 26,000' S	073° 23,002' W	120	Van Veen grab
26.01.23 06:06	SO296/2_30-6	36° 25,998' S	073° 23,006' W	123	Van Veen grab
26.01.23 06:23	SO296/2_30-7	36° 25,998' S	073° 23,008' W	121	Van Veen grab
26.01.23 06:40	SO296/2_30-8	36° 26,001' S	073° 23,006' W	121	Dredge
26.01.23 07:20	SO296/2_30-9	36° 26,009' S	073° 23,012' W	122	Multicorer
26.01.23 08:32	SO296/2_29-2	36° 25,010' S	073° 25,973' W	124	Drifter
26.01.23 10:27	SO296/2_31-1	36° 22,150' S	073° 42,848' W	767	CTD-Rosette
26.01.23 11:35	SO296/2_31-2	36° 22,153' S	073° 42,844' W	766	Van Veen grab
26.01.23 12:31	SO296/2_31-3	36° 22,152' S	073° 42,850' W	764	Van Veen grab
26.01.23 13:23	SO296/2_31-4	36° 22,153' S	073° 42,850' W	763	Van Veen grab
26.01.23 14:20	SO296/2_31-5	36° 22,148' S	073° 42,848' W	765	Dredge
26.01.23 16:23	SO296/2_32-1	36° 21,997' S	073° 50,002' W	1822	AFIS
26.01.23 19:09	SO296/2_32-2	36° 22,003' S	073° 49,997' W	1817	Multicorer
26.01.23 21:14	SO296/2_33-1	36° 21,588' S	073° 36,064' W	668	CTD-Rosette
26.01.23 21:47	SO296/2_33-2	36° 21,601' S	073° 36,007' W	662	Phytoplankton net
26.01.23 22:11	SO296/2_33-3	36° 21,598' S	073° 36,006' W	662	Van Veen grab
26.01.23 23:22	SO296/2_33-4	36° 21,598' S	073° 36,004' W	663	Van Veen grab
27.01.23 00:13	SO296/2_33-5	36° 21,602' S	073° 36,001' W	657	Van Veen grab
27.01.23 01:04	SO296/2_33-6	36° 21,600' S	073° 36,003' W	661	Dredge
27.01.23 02:39	SO296/2_34-1	36° 22,587' S	073° 33,100' W	310	Microstructure probe
27.01.23 04:00	SO296/2_34-2	36° 22,607' S	073° 33,042' W	296	Pump-CTD
27.01.23 07:31	SO296/2_34-3	36° 22,611' S	073° 33,033' W	297	Microstructure probe
27.01.23 08:53	SO296/2_34-4	36° 22,615' S	073° 33,045' W	300	AFIS
27.01.23 10:02	SO296/2_34-5	36° 22,608' S	073° 33,046' W	301	CTD-Rosette
27.01.23 11:10	SO296/2_34-6	36° 22,613' S	073° 33,050' W	297	CTD-Rosette
27.01.23 12:51	SO296/2_34-7	36° 22,614' S	073° 33,042' W	298	Phytoplankton net
27.01.23 13:03	SO296/2_34-8	36° 22,610' S	073° 33,046' W	295	CTD-Rosette
27.01.23 15:10	SO296/2_34-9	36° 22,615' S	073° 33,017' W	296	Multinet
27.01.23 16:14	SO296/2_34-10	36° 23,812' S	073° 33,830' W	404	Multinet
27.01.23 17:34	SO296/2_34-11	36° 22,606' S	073° 33,024' W	295	Van Veen grab
27.01.23 18:00	SO296/2_34-12	36° 22,597' S	073° 33,037' W	298	Van Veen grab
27.01.23 18:24	SO296/2_34-13	36° 22,601' S	073° 33,037' W	299	Van Veen grab

27.01.23 18:48	SO296/2_34-14	36° 22,598' S	073° 33,037' W	298	Dredge
27.01.23 19:49	SO296/2_34-15	36° 22,627' S	073° 33,069' W	303	Dredge
28.01.23 00:20	SO296/2_36-1	36° 32,674' S	073° 03,053' W	58	CTD-Rosette
28.01.23 00:35	SO296/2_36-2	36° 32,684' S	073° 03,030' W	58	CTD-Rosette
28.01.23 02:32	SO296/2_36-3	36° 32,707' S	073° 02,992' W	57	Pump-CTD
28.01.23 04:39	SO296/2_36-4	36° 32,701' S	073° 02,997' W	61	Multicorer
28.01.23 04:53	SO296/2_36-5	36° 32,685' S	073° 03,010' W	59	Microstructure probe
03.02.23 05:30		51° 16,724' S	074° 07,570' W	341	EM122
03.02.23 17:30	SO296/2_37-1	51° 48,466' S	072° 49,523' W	186	Mooring
03.02.23 18:25	SO296/2_38-1	51° 47,953' S	072° 50,428' W	184	CTD-Rosette
03.02.23 23:53	SO296/2_39-1	52° 03,129' S	072° 58,891' W	275	CTD-Rosette
04.02.23 00:59	SO296/2_39-2	52° 03,161' S	072° 58,910' W	272	CTD-Rosette
04.02.23 01:58	SO296/2_40-1	51° 59,516' S	072° 55,972' W	179	CTD-Rosette
04.02.23 02:09	SO296/2_40-2	51° 59,503' S	072° 55,985' W	173	Surface water pump
04.02.23 02:42	SO296/2_40-3	51° 59,496' S	072° 55,979' W	166	Multicorer
04.02.23 03:16	SO296/2_40-4	51° 59,498' S	072° 55,984' W	172	Gravity corer
04.02.23 04:11	SO296/2_41-1	51° 57,410' S	072° 54,645' W	149	CTD-Rosette
04.02.23 05:28	SO296/2_42-1	51° 55,463' S	072° 50,955' W	88	CTD-Rosette
04.02.23 06:52	SO296/2_43-1	51° 51,806' S	072° 46,567' W	127	CTD-Rosette
04.02.23 07:35	SO296/2_43-2	51° 51,793' S	072° 46,658' W	129	Multicorer
04.02.23 07:59	SO296/2_43-3	51° 51,795' S	072° 46,657' W	117	Gravity corer
04.02.23 09:28	SO296/2_44-1	51° 50,302' S	072° 47,500' W	171	CTD-Rosette
04.02.23 11:01	SO296/2_45-1	51° 47,959' S	072° 50,430' W	184	Microstructure probe
04.02.23 12:57	SO296/2_45-2	51° 47,937' S	072° 50,397' W	179	CTD-Rosette
04.02.23 13:35	SO296/2_45-3	51° 47,948' S	072° 50,429' W	177	Microstructure probe
04.02.23 14:47	SO296/2_45-4	51° 47,935' S	072° 50,406' W	177	Pump-CTD
04.02.23 18:46	SO296/2_45-5	51° 47,944' S	072° 50,411' W	179	Surface water pump
04.02.23 19:32	SO296/2_45-6	51° 47,946' S	072° 50,419' W	177	Microstructure probe
04.02.23 20:27	SO296/2_45-7	51° 47,943' S	072° 50,438' W	178	CTD-Rosette
04.02.23 21:00	SO296/2_45-8	51° 47,949' S	072° 50,421' W	179	CTD-Rosette
04.02.23 21:38	SO296/2_45-9	51° 47,951' S	072° 50,412' W	177	AFIS
04.02.23 22:35	SO296/2_45-10	51° 47,952' S	072° 50,427' W	177	CTD-Rosette
04.02.23 23:24	SO296/2_45-11	51° 47,951' S	072° 50,417' W	179	CTD-Rosette
05.02.23 00:53	SO296/2_45-12	51° 47,951' S	072° 50,423' W	179	CTD-Rosette
05.02.23 02:11	SO296/2_45-13	51° 47,946' S	072° 50,424' W	178	CTD-Rosette
05.02.23 02:38	SO296/2_45-14	51° 47,952' S	072° 50,422' W	178	CTD-Rosette
05.02.23 03:14	SO296/2_45-15	51° 47,952' S	072° 50,424' W	178	CTD-Rosette
05.02.23 04:36	SO296/2_45-16	51° 47,952' S	072° 50,423' W	178	Microstructure probe
05.02.23 11:28	SO296/2_46-1	51° 49,964' S	072° 50,769' W	142	Multicorer
05.02.23 12:01	SO296/2_46-2	51° 49,968' S	072° 50,766' W	142	Gravity corer
05.02.23 20:51	SO296/2_47-1	51° 48,953' S	072° 32,901' W	24	CTD-Rosette
05.02.23 21:33	SO296/2_47-2	51° 48,954' S	072° 32,893' W	24	Surface water pump
05.02.23 21:47	SO296/2_47-3	51° 48,956' S	072° 32,900' W	24	CTD-Rosette
05.02.23 22:39	SO296/2_48-1	51° 50,588' S	072° 36,209' W	29	CTD-Rosette
05.02.23 22:58	SO296/2_48-2	51° 50,600' S	072° 36,226' W	30	Multicorer

05.02.23 23:28	SO296/2_48-3	51° 50,595' S	072° 36,226' W	30	Gravity corer
06.02.23 00:22	SO296/2_49-1	51° 52,296' S	072° 37,780' W	35	CTD-Rosette
06.02.23 01:17	SO296/2_50-1	51° 52,033' S	072° 42,824' W	33	CTD-Rosette
06.02.23 01:44	SO296/2_50-2	51° 52,040' S	072° 42,898' W	31	Multicorer
06.02.23 02:57	SO296/2_51-1	51° 56,299' S	072° 45,167' W	67	CTD-Rosette
06.02.23 05:08	SO296/2_52-1	51° 51,377' S	072° 45,672' W	128	Microstructure probe
06.02.23 08:21	SO296/2_53-1	51° 47,936' S	072° 48,190' W	192	Microstructure probe
06.02.23 11:48	SO296/2_54-1	51° 46,606' S	072° 54,992' W	182	CTD-Rosette
06.02.23 13:18	SO296/2_55-1	51° 47,957' S	072° 50,364' W	185	CTD-Rosette
06.02.23 15:04	SO296/2_55-2	51° 47,958' S	072° 50,418' W	184	CTD-Rosette
06.02.23 15:34	SO296/2_55-3	51° 47,958' S	072° 50,429' W	184	AFIS
06.02.23 16:48	SO296/2_56-1	51° 48,198' S	072° 50,052' W	180	Mooring (recovery)
06.02.23 18:21	SO296/2_57-1	51° 47,951' S	072° 50,425' W	178	Multicorer
06.02.23 19:15	SO296/2_57-2	51° 47,958' S	072° 50,430' W	178	Frahmlot
06.02.23 19:36	SO296/2_57-3	51° 47,957' S	072° 50,428' W	178	Frahmlot
06.02.23 19:56	SO296/2_57-4	51° 47,952' S	072° 50,422' W	178	Frahmlot
06.02.23 20:15	SO296/2_57-5	51° 47,956' S	072° 50,427' W	178	Frahmlot
06.02.23 20:46	SO296/2_57-6	51° 47,956' S	072° 50,425' W	177	Gravity corer
06.02.23 22:26	SO296/2_58-1	51° 52,901' S	072° 45,248' W	83	CTD-Rosette
06.02.23 23:47	SO296/2_59-1	51° 51,327' S	072° 48,312' W	114	Microstructure probe
07.02.23 00:55	SO296/2_59-2	51° 51,319' S	072° 48,164' W	118	CTD-Rosette
07.02.23 01:21	SO296/2_59-3	51° 51,332' S	072° 48,251' W	115	Microstructure probe
07.02.23 03:30	SO296/2_60-1	51° 57,782' S	072° 43,741' W	46	CTD-Rosette
07.02.23 05:33	SO296/2_61-1	51° 59,610' S	072° 55,970' W	161	CTD-Rosette
07.02.23 06:14	SO296/2_61-2	51° 59,492' S	072° 55,977' W	159	Microstructure probe
07.02.23 07:33	SO296/2_61-3	51° 59,500' S	072° 55,977' W	161	Pump-CTD
07.02.23 11:08	SO296/2_61-4	51° 59,497' S	072° 55,981' W	160	Microstructure probe
07.02.23 12:40	SO296/2_61-5	51° 59,476' S	072° 55,972' W	160	CTD-Rosette
07.02.23 13:22	SO296/2_61-6	51° 59,495' S	072° 55,967' W	160	AFIS
07.02.23 14:21	SO296/2_61-7	51° 59,496' S	072° 55,961' W	162	CTD-Rosette
07.02.23 15:16	SO296/2_61-8	51° 59,492' S	072° 55,978' W	160	CTD-Rosette
07.02.23 16:10	SO296/2_61-9	51° 59,495' S	072° 55,970' W	159	CTD-Rosette
07.02.23 18:17	SO296/2_62-1	51° 57,395' S	072° 54,677' W	143	Microstructure probe
08.02.23 00:22	SO296/2_62-2	51° 51,793' S	072° 46,636' W	111	CTD-Rosette
08.02.23 00:53	SO296/2_62-3	51° 51,792' S	072° 46,637' W	110	Microstructure probe
08.02.23 02:01	SO296/2_62-4	51° 51,796' S	072° 46,701' W	111	Pump-CTD
08.02.23 05:04	SO296/2_62-5	51° 51,674' S	072° 47,384' W	130	Microstructure probe
08.02.23 05:50	SO296/2_62-6	51° 51,785' S	072° 46,644' W	110	CTD-Rosette
08.02.23 07:23	SO296/2_62-7	51° 51,786' S	072° 46,650' W	111	CTD-Rosette
12.02.23 03:30		50° 32,340' S	074° 48,467' W	360	ADCP_300
17.02.23 15:00		49° 59,335' S	075° 56,543' W	1449	ADCP_300
12.02.23 12:42	SO296/2_63-1	49° 57,311' S	074° 25,854' W	942	CTD-Rosette
12.02.23 12:49	SO296/2_63-2	49° 57,275' S	074° 25,870' W	957	Surface water pump
12.02.23 14:13	SO296/2_63-3	49° 57,255' S	074° 25,880' W	957	CTD-Rosette
12.02.23 15:59	SO296/2_63-4	49° 57,261' S	074° 25,876' W	957	Phytoplankton net

12.02.23 16:20	SO296/2_63-5	49° 57,259' S	074° 25,883' W	957	CTD-Rosette
12.02.23 17:04	SO296/2_63-6	49° 57,261' S	074° 25,878' W	956	CTD-Rosette
12.02.23 17:56	SO296/2_63-7	49° 57,251' S	074° 25,875' W	957	CTD-Rosette
12.02.23 18:02	SO296/2_63-8	49° 57,255' S	074° 25,882' W	957	CTD-Rosette
12.02.23 18:57	SO296/2_63-9	49° 57,259' S	074° 25,882' W	956	Multicorer
12.02.23 20:13	SO296/2_63-10	49° 57,259' S	074° 25,882' W	957	Gravity corer
12.02.23 23:39	SO296/2_64-1	50° 15,282' S	074° 48,261' W	403	CTD-Rosette
13.02.23 00:43	SO296/2_64-2	50° 15,252' S	074° 48,202' W	402	Multicorer
13.02.23 01:16	SO296/2_64-3	50° 15,250' S	074° 48,196' W	404	Gravity corer
13.02.23 03:05	SO296/2_65-1	50° 19,216' S	074° 50,111' W	425	Gravity corer
13.02.23 04:53	SO296/2_66-1	50° 28,049' S	074° 53,749' W	559	CTD-Rosette
13.02.23 05:01	SO296/2_66-2	50° 28,071' S	074° 53,755' W	558	Surface water pump
13.02.23 05:51	SO296/2_66-3	50° 28,070' S	074° 53,747' W	533	Multicorer
13.02.23 06:35	SO296/2_66-4	50° 28,069' S	074° 53,757' W	558	Gravity corer
13.02.23 17:00	SO296/2_67-1	49° 21,052' S	074° 05,240' W	291	Microstructure probe
13.02.23 17:34	SO296/2_67-2	49° 21,051' S	074° 05,199' W	304	CTD-Rosette
13.02.23 17:42	SO296/2_67-3	49° 21,052' S	074° 05,193' W	303	Phytoplankton net
13.02.23 17:46	SO296/2_67-4	49° 21,053' S	074° 05,193' W	303	Surface water pump
13.02.23 19:39	SO296/2_67-5	49° 21,055' S	074° 05,202' W	303	Multicorer
13.02.23 21:22	SO296/2_68-1	49° 26,519' S	074° 07,614' W	544	Gravity corer
13.02.23 21:49	SO296/2_68-2	49° 26,518' S	074° 07,619' W	546	Microstructure probe
13.02.23 23:03	SO296/2_69-1	49° 29,225' S	074° 07,632' W	542	CTD-Rosette
13.02.23 23:40	SO296/2_69-2	49° 29,244' S	074° 07,665' W	542	CTD-Rosette
14.02.23 00:34	SO296/2_69-3	49° 29,251' S	074° 07,658' W	542	CTD-Rosette
14.02.23 01:10	SO296/2_69-4	49° 29,244' S	074° 07,665' W	542	CTD-Rosette
14.02.23 01:34	SO296/2_69-5	49° 29,250' S	074° 07,657' W	542	CTD-Rosette
14.02.23 01:52	SO296/2_69-6	49° 29,246' S	074° 07,661' W	542	CTD-Rosette
14.02.23 03:34	SO296/2_70-1	49° 36,465' S	074° 17,486' W	537	CTD-Rosette
14.02.23 04:37	SO296/2_70-2	49° 36,438' S	074° 17,444' W	539	Multicorer
14.02.23 05:16	SO296/2_70-3	49° 36,435' S	074° 17,451' W	539	Gravity corer
14.02.23 06:31	SO296/2_70-4	49° 36,439' S	074° 17,447' W	536	Gravity corer
14.02.23 15:03	SO296/2_71-1	50° 33,970' S	075° 03,773' W	527	CTD-Rosette
14.02.23 16:13	SO296/2_71-2	50° 33,959' S	075° 03,785' W	532	Multicorer
14.02.23 16:56	SO296/2_71-3	50° 33,968' S	075° 03,789' W	530	Gravity corer
14.02.23 18:11	SO296/2_71-4	50° 33,966' S	075° 03,780' W	525	Gravity corer
14.02.23 21:41	SO296/2_72-1	50° 41,713' S	075° 10,145' W	390	CTD-Rosette
14.02.23 22:04	SO296/2_72-2	50° 41,793' S	075° 10,137' W	393	Surface water pump
14.02.23 22:49	SO296/2_72-3	50° 41,795' S	075° 10,133' W	388	CTD-Rosette
14.02.23 23:24	SO296/2_72-4	50° 41,793' S	075° 10,138' W	391	CTD-Rosette
15.02.23 00:01	SO296/2_72-5	50° 41,799' S	075° 10,133' W	390	CTD-Rosette
15.02.23 00:28	SO296/2_72-6	50° 41,796' S	075° 10,137' W	393	CTD-Rosette
15.02.23 00:47	SO296/2_72-7	50° 41,790' S	075° 10,130' W	389	CTD-Rosette
15.02.23 01:19	SO296/2_72-8	50° 41,796' S	075° 10,131' W	386	Multicorer
15.02.23 02:02	SO296/2_72-9	50° 41,794' S	075° 10,133' W	395	Gravity corer
16.02.23 11:14	SO296/2_73-1	50° 02,172' S	077° 04,113' W	4023	CTD-Rosette

16.02.23 12:54	SO296/2_73-2	50° 02,194' S	077° 04,128' W	4026	Surface water pump
16.02.23 13:09	SO296/2_73-3	50° 02,195' S	077° 04,132' W	4019	Phytoplankton net
16.02.23 14:47	SO296/2_73-4	50° 02,194' S	077° 04,139' W	4018	Multicorer
16.02.23 18:19	SO296/2_73-5	50° 02,193' S	077° 04,134' W	4020	Gravity corer
16.02.23 21:28	SO296/2_73-6	50° 02,190' S	077° 04,136' W	4015	Gravity corer
17.02.23 02:44	SO296/2_74-1	50° 18,462' S	076° 21,860' W	751	CTD-Rosette
17.02.23 04:22	SO296/2_74-2	50° 18,461' S	076° 21,859' W	751	Multicorer
17.02.23 06:23	SO296/2_75-1	50° 22,333' S	076° 11,082' W	497	Multicorer
17.02.23 06:44	SO296/2_75-2	50° 22,332' S	076° 11,071' W	505	CTD-Rosette
17.02.23 07:11	SO296/2_75-3	50° 22,336' S	076° 11,081' W	501	Surface water pump
17.02.23 07:48	SO296/2_75-4	50° 22,334' S	076° 11,077' W	504	CTD-Rosette
17.02.23 08:12	SO296/2_75-5	50° 22,330' S	076° 11,072' W	502	CTD-Rosette
17.02.23 10:24	SO296/2_76-1	50° 31,931' S	075° 49,000' W	111	CTD-Rosette

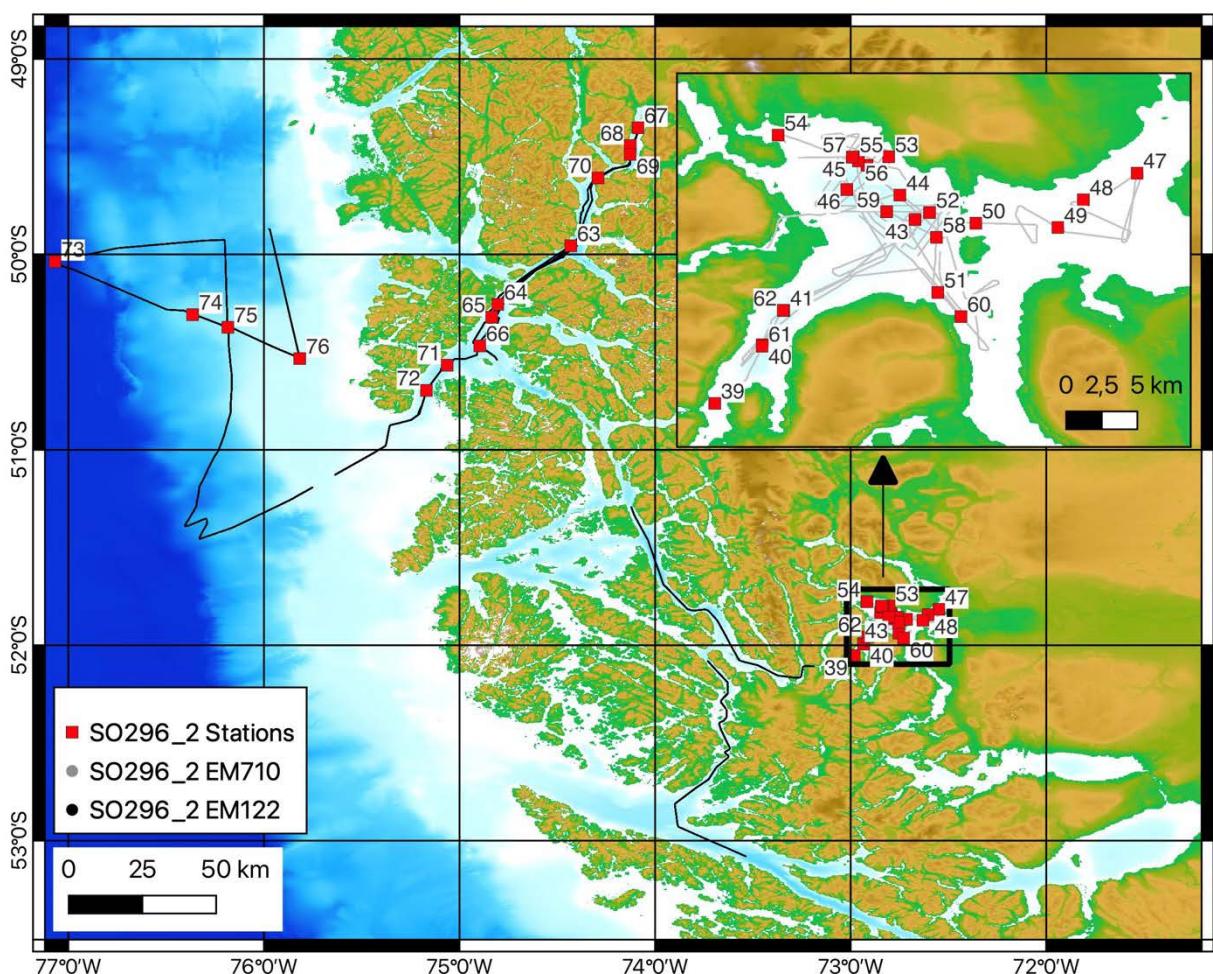


Fig. 5: Parasound and multibeam profiles measured in working area 2

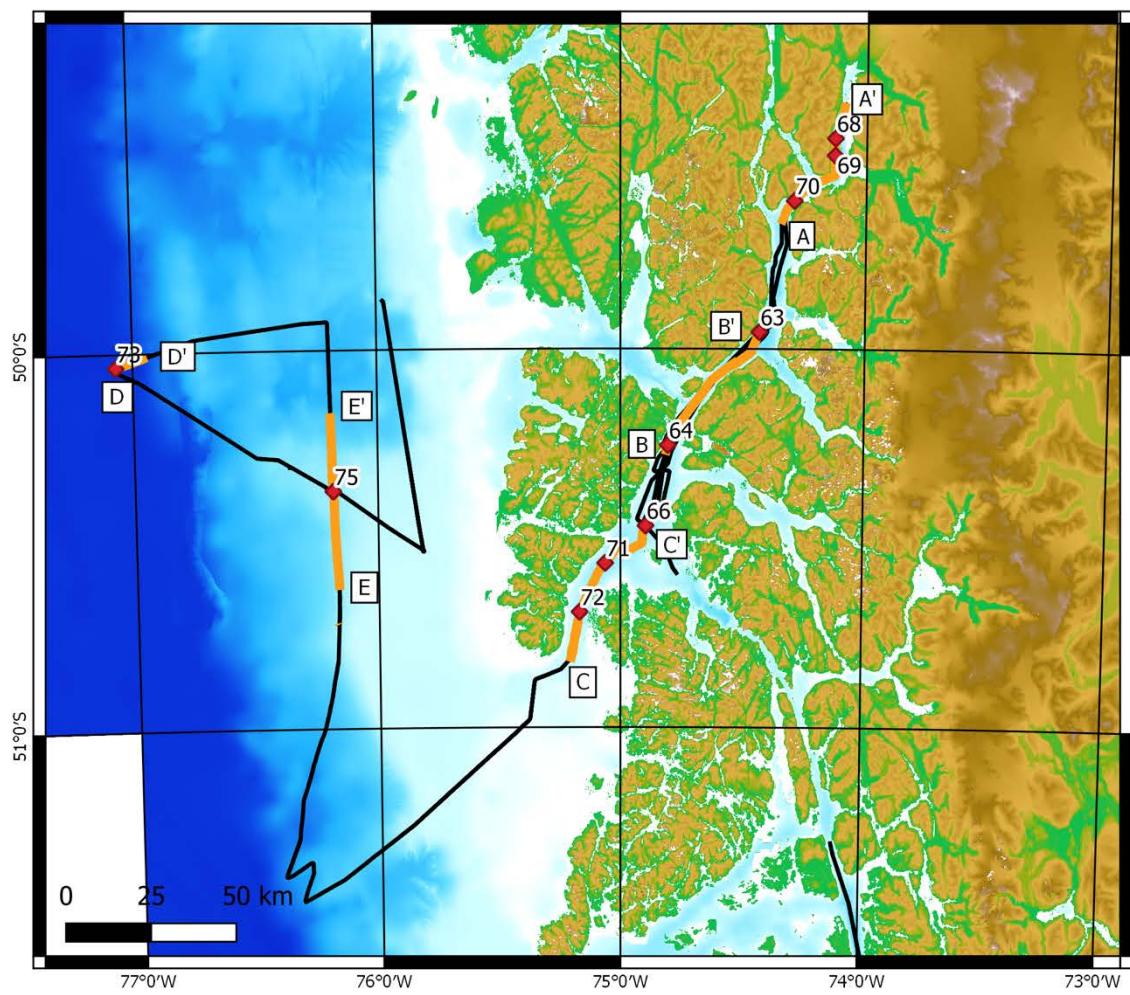


Fig. 6: Parasound and multibeam profiles measured in working area 3.