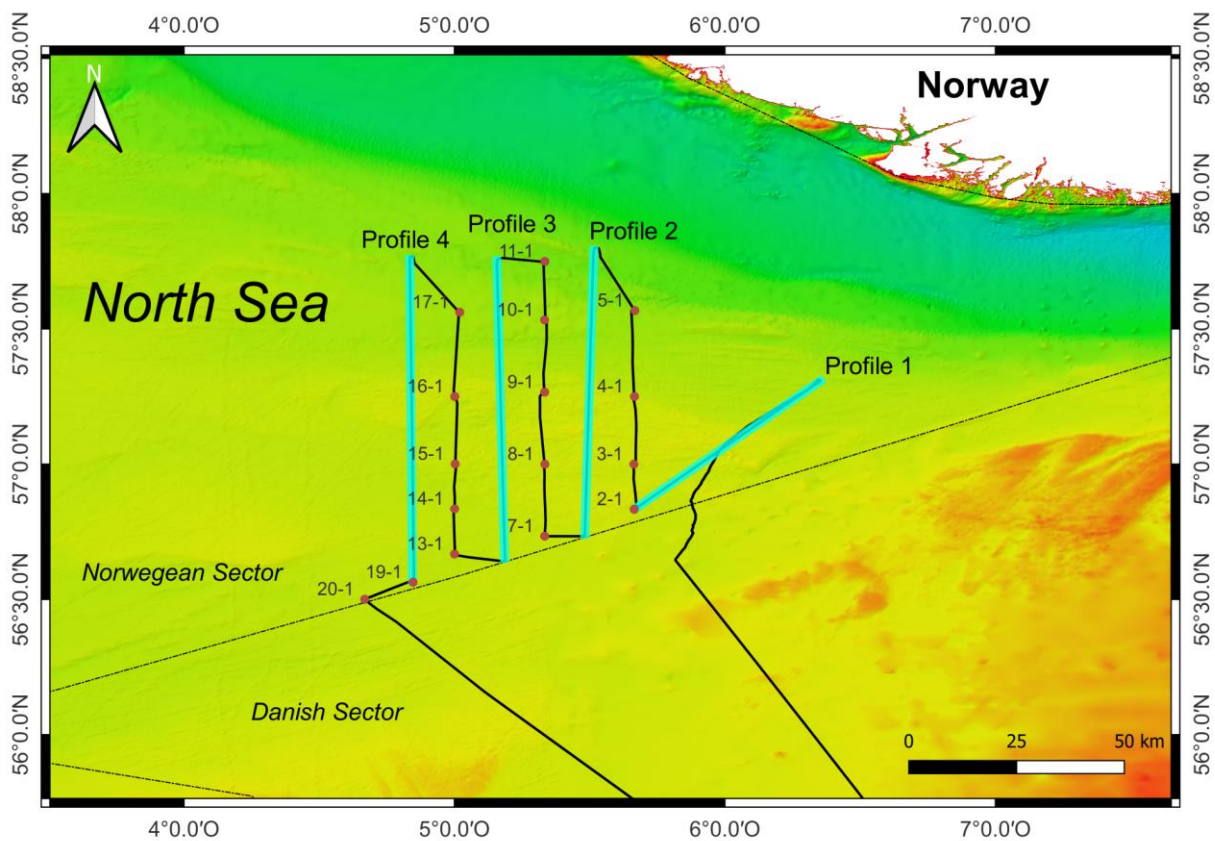


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## Short Cruise Report R/V Heincke 606

**Bremerhaven - Bremerhaven**  
**08.09.2022 – 14.09.2022**  
**Chief Scientist: Niko Lahajnar**  
**Captain: Hero Nannen**



## **Objectives**

The cruise HE 606 serves two purposes: The focus is on training master students from the Universität Hamburg to conduct marine research on a research vessel. This training cruise has been part of the curriculum in Geology at Universität Hamburg as a practical exercise for students at the M.Sc. level (lecture number 63-345) since 2006. The goals of this master course are (1) to learn ship-based operations at sea, (2) to apply and to use techniques to collect surface sediment and suspended matter samples, (3) to obtain water samples for biogeochemical measurements, (4) to obtain profiles of water column structure and water properties by CTD profiling, and (5) to get a first insight to acoustic techniques for the investigation of sediment layering and structure. During each evening of the cruise, students give seminars on topics related to geology and environment in the North Sea or on measurement and sampling techniques. The course also introduces to the software OceanDataView for data evaluation and visualisation.

In addition to the purpose of student training, a second objective was to obtain samples of surface sediment for granulometric measurements and biogeochemical properties. This included the analyses of organic carbon, nitrogen, and for mapping the distribution of stable isotope ratios of nitrogen ( $^{15}\text{N}/^{14}\text{N}$ ) in water-column particulate matter and surface sediments in the Norwegian Exclusive Economic Zone. This work is performed under research project "North Sea – Assessment of Habitats" (NOAH). The present set of samples will be analysed in the near future and provided for potential B.Sc and M.Sc. theses.

## **Ziele**

Die Fahrt HE 606 dient zwei Zwecken: Der Schwerpunkt liegt auf der Ausbildung von Masterstudenten der Universität Hamburg. Diese Trainingsfahrt ist seit 2006 Teil des Curriculums im Studiengang Geologie an der Universität Hamburg (Vorlesungsnummer 63-345). Die Ziele dieses Masterkurses sind (1) das Erlernen von schiffsgestützten Arbeitsabläufen auf See, (2) die Anwendung und Nutzung von Techniken zur Entnahme von Oberflächensediment- und Schwebstoffproben, (3) die Gewinnung von Wasserproben für biogeochemische Messungen, (4) die Gewinnung von Profilen der Wassersäulenstruktur und der Wassereigenschaften mittels CTD-Profilierung und (5) ein erster Einblick in akustische Techniken zur Untersuchung der Sedimentschichtung und -struktur.

Neben dem Zweck der Ausbildung der Studenten bestand ein zweites Ziel darin, Proben von Oberflächensedimenten für granulometrische Messungen und biogeochemische Eigenschaften zu gewinnen. Dies beinhaltete die Analysen von organischem Kohlenstoff, Stickstoff und zur Kartierung der Verteilung von stabilen Isotopenverhältnissen von Stickstoff ( $^{15}\text{N}/^{14}\text{N}$ ) in Partikeln der Wassersäule und Oberflächensedimenten in der norwegischen Ausschließlichen Wirtschaftszone. Diese Arbeit wird im Rahmen des Forschungsprojekts "North Sea - Assessment of Habitats" (NOAH) durchgeführt. Der vorliegende Probensatz wird in naher Zukunft für die Erstellung von B.Sc- und M.Sc.-Arbeiten angeboten.

## Cruise Narrative

Scientific equipment arrived by truck in Bremerhaven at 14:00 LT (UTC+2 hours) on September 7, 2022, shortly before the scientific participants. The instruments, gears and ship laboratories were prepared for the cruise during the afternoon. Also all participants were tested for SARS-CoV-2 – all negative. The scientific party stayed on board during the night. R/V Heincke left Bremerhaven on September 08 at 07:40 local time and set out for the first instrument testing station near Helgoland. All instruments were ready for data and sample acquisition. Most participants suffered from seasickness due to high waves up to 4 m that evening and night and even more during the next day when RV Heincke reached the Norwegian EEZ. It was impossible and highly dangerous to work outside during this sea state so that the Captain and Chief Scientist decided together to wait until the weather conditions would improve. The first scientific station in the Norwegian working area (606\_01) was a hydroacoustic profile that started at 00:00 UTC on Sep. 10. After finishing this profile the regular sampling scheme started as follows: (1) deployment of a Secchi disc for turbidity and visibility estimation in the photic zone; (2) deployment of a hand-held phytoplankton net (25  $\mu\text{m}$  mesh-size); deployment of a CTD-rosette cast for hydrographic profiling and to obtain water samples from various depths for suspended matter sampling; (4) deployment of a modified bottom water sampler in order to gain information on benthic biogeochemistry at the sediment-water interface; (5) a van Veen grab for a preliminary sediment description and to obtain short cores for permeability calculation; and (6) a multicorer deployment for undisturbed sediment sample retrieval. After the dayshift (usually from 08:00 to 18:00 h) seismic surveys with SES2000 echosounder and EM-712 multibeam were conducted from 19:00 until the next morning at around 07:00.

Starting at 56°50'N 05°40'E at the south-eastern branch of our sampling grid, we worked our way to the north and conducted four complete stations on that track line during Sep 10. Weather and sea conditions calmed down so that deck work was possible. All students were highly motivated to start with their practical work on board. During the night a first full seismic grid (SES2000 echosounder and multibeam echosounder) were surveyed in the vicinity of our water and sediment stations. The hydroacoustic data showed a former glacial landscape comprised of buried tunnel and paleo-river valleys, massive till as well as glacial marine deposits. The seismic facies of one unit points to the existence of a Late Weichselian lake in the study area. We continued our daily work, sampled a good number of stations during daylight and conducted seismic profiling during the night. Excellent weather conditions prevailed on Sep. 11. However, in the afternoon, the electronic unit of the CTD got broken, so that no regular CTD sampling was possible thereafter. At least we had some buckets available so that we were able to take some surface water samples for filtration.

On Sep 12, weather conditions increasingly worsened again. All heavy instruments such as the bottom water sampler or multicorer were cancelled in the afternoon. In the evening we faced up to 4 m waves and windspeed of more than 8 bft. On Tuesday morning we conducted two stations in the southwestern part of our station grid and terminated station work at 08:25 LT. R/V Heincke began her one-day transit from the Danish-Norwegian border to our final destination - Bremerhaven. Meanwhile, the cooling box was full of water, filter, and sediment samples. The scientific party cleaned and washed the instruments and then packed the equipment. On Sep 14 at 07:40 RV Heincke reached the lock, at 08:10 Heincke docked at AWI to deliver 25 tons of fresh North Sea water for the fish aquariums. After that, the ship moved to her final destination and at 10:30 LT we were back at the pier

Fischkai 27. We all had our final lunch together and after leaving customs we left the ship at 13:30 LT. All students expressed their gratitude for the great opportunity to be part of such a high quality training on a research vessel.

## Acknowledgements

We would like to thank Captain Hero Nannen, his officers and the crew of R/V Heincke for their outstanding support, the provision of a highly professional working environment and their significant contribution to the success of this cruise. All of us enjoyed the friendly, flexible and family-like atmosphere aboard during all stages of the cruise. We are also indebted to the Norwegian authorities for granting permission to conduct marine research in the Norwegian EEZ. We would like to acknowledge the valuable support of the AWI Schiffskoordination (Ingo Schewe, Sanne Bochert, Marius Hirsekorn, Stefanie Klüver, Bjela König and all other supporters).

## Participants

1. Lahajnar, Niko	Chief Scientist	IfGeol
2. Lüdmann, Thomas	Seismics	IfGeol
3. Metzke, Marc	Technician	IfGeol
4. Gohr, Berit	Student	IfGeol
5. Heinrich, Inken	Student	IfGeol
6. Oldhaver, Manja	Student	IfGeol
7. Ristow, Yannick	Student	IfGeol
8. Schmidt, Maryse	Student	IfG
9. Spille, Keno	Student	IfGeol

IfGeol: Institute of Geology, Universität Hamburg  
IfG: Institute of Geophysics, Universität Hamburg

## Station List

### Abbreviation:

WST: Weather Station  
 TSG: Thermosalinograph  
 Secdisk: Secchi-Disk  
 PLA: Plankton-Net  
 CTD: CTD-Rosette  
 BWS: Bottom Water Sampler  
 GRAB: van Veen Grab  
 MUC: Multicorer  
 Bucket: Pütz  
 MB+SES: Multibeam / SES 2000

Station Number	Latitude	Longitude	Date&Time	Water Depth [m]	Device	Action
HE606_0_UW	53° 31,946' N	008° 34,703' E	08.09.2022 06:00		WST	station start
HE606_0_UW	53° 48,786' N	008° 07,608' E	08.09.2022 08:57	14.2	TSG	station start
HE606_1-1	57° 18,678' N	006° 20,710' E	09.09.2022 23:40	72.3	MB+SES	station start
HE606_1-1	57° 18,401' N	006° 21,136' E	09.09.2022 23:45	70.6	MB+SES	profile start
HE606_1-1	56° 50,010' N	005° 39,991' E	10.09.2022 05:41	49.2	MB+SES	profile end
HE606_1-1	56° 49,997' N	005° 39,971' E	10.09.2022 05:41	48.8	MB+SES	station end
HE606_2-1	56° 49,982' N	005° 39,961' E	10.09.2022 05:57	50.2	Secdisk	in the water
HE606_2-2	56° 49,977' N	005° 39,962' E	10.09.2022 05:59	49.1	PLA	in the water
HE606_2-2	56° 49,997' N	005° 39,976' E	10.09.2022 06:03	50.0	PLA	on deck
HE606_2-3	56° 50,005' N	005° 39,902' E	10.09.2022 06:10	49.1	CTD	max depth/on ground
HE606_2-4	56° 50,032' N	005° 40,018' E	10.09.2022 06:26	48.9	BWS	max depth/on ground
HE606_2-5	56° 50,031' N	005° 40,043' E	10.09.2022 06:41	50.7	GRAB	max depth/on ground
HE606_2-6	56° 50,029' N	005° 40,054' E	10.09.2022 06:50	50.0	MUC	max depth/on ground
HE606_3-1	56° 59,986' N	005° 39,829' E	10.09.2022 08:08	47.2	Secdisk	in the water
HE606_3-2	56° 59,993' N	005° 39,830' E	10.09.2022 08:12	46.1	PLA	in the water
HE606_3-2	57° 00,002' N	005° 39,821' E	10.09.2022 08:14	46.5	PLA	on deck
HE606_3-3	56° 59,989' N	005° 39,866' E	10.09.2022 08:19	45.5	CTD	max depth/on ground
HE606_3-4	57° 00,005' N	005° 39,970' E	10.09.2022 08:30	45.9	BWS	max depth/on ground
HE606_3-5	57° 00,037' N	005° 39,948' E	10.09.2022 08:47	46.4	BWS	max depth/on ground
HE606_3-6	57° 00,059' N	005° 39,964' E	10.09.2022 08:59	45.5	GRAB	max depth/on ground
HE606_3-7	57° 00,053' N	005° 39,947' E	10.09.2022 09:08	47.3	MUC	max depth/on ground
HE606_4-1	57° 15,004' N	005° 39,952' E	10.09.2022 11:00	57.3	Secdisk	in the water
HE606_4-2	57° 15,004' N	005° 39,961' E	10.09.2022 11:03	57.4	PLA	in the water
HE606_4-3	57° 15,006' N	005° 39,960' E	10.09.2022 11:12	58.2	CTD	max depth/on ground
HE606_4-4	57° 15,006' N	005° 39,966' E	10.09.2022 11:24	58.5	BWS	max depth/on ground
HE606_4-5	57° 15,001' N	005° 39,980' E	10.09.2022 11:38	57.0	GRAB	max depth/on ground
HE606_4-6	57° 15,004' N	005° 39,981' E	10.09.2022 11:47	57.4	MUC	max depth/on ground
HE606_5-1	57° 34,063' N	005° 40,059' E	10.09.2022 14:02	92.1	Secdisk	in the water
HE606_5-2	57° 34,064' N	005° 40,050' E	10.09.2022 14:05	91.7	PLA	in the water
HE606_5-3	57° 34,064' N	005° 40,069' E	10.09.2022 14:14	91.8	CTD	max depth/on ground
HE606_5-4	57° 34,058' N	005° 40,061' E	10.09.2022 14:25	91.5	BWS	max depth/on ground
HE606_5-5	57° 34,060' N	005° 40,086' E	10.09.2022 14:43	92.1	GRAB	max depth/on ground
HE606_5-5	57° 34,065' N	005° 40,088' E	10.09.2022 14:48	91.6	GRAB	max depth/on ground
HE606_6-1	57° 47,816' N	005° 31,028' E	10.09.2022 16:25	115.2	MB+SES	station start
HE606_6-1	57° 47,259' N	005° 30,945' E	10.09.2022 16:28	117.1	MB+SES	profile start

Station Number	Latitude	Longitude	Date&Time	Water Depth [m]	Device	Action
HE606_6-1	56° 44,370' N	005° 28,907' E	11.09.2022 04:50	52.4	MB+SES	profile end
HE606_6-1	56° 44,353' N	005° 28,907' E	11.09.2022 04:50	52.4	MB+SES	station end
HE606_7-1	56° 44,022' N	005° 20,024' E	11.09.2022 05:54	54.6	Secdisk	in the water
HE606_7-2	56° 44,005' N	005° 20,047' E	11.09.2022 06:00	54.6	PLA	in the water
HE606_7-3	56° 44,000' N	005° 20,056' E	11.09.2022 06:07	54.5	CTD	max depth/on ground
HE606_7-4	56° 43,988' N	005° 20,055' E	11.09.2022 06:19	54.6	BWS	max depth/on ground
HE606_7-5	56° 43,980' N	005° 20,058' E	11.09.2022 06:35	54.5	GRAB	max depth/on ground
HE606_7-6	56° 43,964' N	005° 20,063' E	11.09.2022 06:46	54.6	MUC	max depth/on ground
HE606_8-1	56° 59,985' N	005° 20,086' E	11.09.2022 08:28	49.8	Secdisk	in the water
HE606_8-2	56° 59,978' N	005° 20,094' E	11.09.2022 08:31	49.7	PLA	in the water
HE606_8-3	56° 59,974' N	005° 20,064' E	11.09.2022 08:39	49.8	CTD	max depth/on ground
HE606_8-4	56° 59,976' N	005° 20,063' E	11.09.2022 08:52	50.0	BWS	max depth/on ground
HE606_8-5	56° 59,975' N	005° 20,076' E	11.09.2022 09:05	50.1	GRAB	max depth/on ground
HE606_9-1	57° 15,968' N	005° 20,028' E	11.09.2022 11:00	54.1	Secdisk	station start
HE606_9-2	57° 15,972' N	005° 20,026' E	11.09.2022 11:05	54.2	PLA	in the water
HE606_9-3	57° 15,986' N	005° 20,017' E	11.09.2022 11:18	54.7	CTD	max depth/on ground
HE606_9-4	57° 15,990' N	005° 20,000' E	11.09.2022 11:28	54.9	BWS	max depth/on ground
HE606_9-5	57° 15,983' N	005° 20,014' E	11.09.2022 11:42	54.7	GRAB	max depth/on ground
HE606_10-1	57° 31,985' N	005° 19,982' E	11.09.2022 13:27	81.3	Secdisk	in the water
HE606_10-2	57° 31,997' N	005° 19,989' E	11.09.2022 13:31	81.4	PLA	in the water
HE606_10-3	57° 32,006' N	005° 20,039' E	11.09.2022 13:39	81.4	CTD	max depth/on ground
HE606_10-4	57° 32,014' N	005° 20,106' E	11.09.2022 13:53	81.8	BWS	max depth/on ground
HE606_10-5	57° 32,046' N	005° 20,105' E	11.09.2022 14:08	81.6	GRAB	max depth/on ground
HE606_10-6	57° 32,072' N	005° 20,156' E	11.09.2022 14:19	80.6	MUC	max depth/on ground
HE606_10-7	57° 32,112' N	005° 20,192' E	11.09.2022 14:30	80.6	CTD	max depth/on ground
HE606_11-1	57° 44,958' N	005° 20,070' E	11.09.2022 16:08	113.8	Secdisk	in the water
HE606_11-2	57° 44,958' N	005° 20,067' E	11.09.2022 16:11	113.6	PLA	in the water
HE606_11-3	57° 44,958' N	005° 20,072' E	11.09.2022 16:13	113.6	BUCKET	in the water
HE606_11-3	57° 44,950' N	005° 20,083' E	11.09.2022 16:17	113.6	BUCKET	on deck
HE606_11-4	57° 44,958' N	005° 20,051' E	11.09.2022 16:23	113.9	BWS	max depth/on ground
HE606_11-5	57° 44,981' N	005° 20,029' E	11.09.2022 16:39	114.0	GRAB	max depth/on ground
HE606_11-6	57° 44,945' N	005° 20,063' E	11.09.2022 16:52	113.5	MUC	max depth/on ground
HE606_12-1	57° 45,062' N	005° 09,468' E	11.09.2022 17:49	103.7	MB+SES	station start
HE606_12-1	57° 45,049' N	005° 09,469' E	11.09.2022 17:49	103.8	MB+SES	profile start
HE606_12-1	56° 38,833' N	005° 11,204' E	12.09.2022 04:46	57.5	MB+SES	profile end
HE606_12-1	56° 38,537' N	005° 10,878' E	12.09.2022 04:50	57.4	MB+SES	station end
HE606_13-1	56° 40,029' N	005° 00,054' E	12.09.2022 05:59	60.4	Secdisk	in the water
HE606_13-2	56° 40,030' N	005° 00,059' E	12.09.2022 06:02	60.4	PLA	in the water
HE606_13-3	56° 40,027' N	005° 00,067' E	12.09.2022 06:07	60.2	BUCKET	max depth/on ground
HE606_13-4	56° 40,033' N	005° 00,075' E	12.09.2022 06:15	60.5	BWS	max depth/on ground
HE606_13-5	56° 40,027' N	005° 00,086' E	12.09.2022 06:30	60.7	GRAB	max depth/on ground
HE606_13-6	56° 40,035' N	005° 00,096' E	12.09.2022 06:40	60.5	MUC	max depth/on ground
HE606_14-1	56° 50,094' N	005° 00,077' E	12.09.2022 07:59	59.3	Secdisk	in the water
HE606_14-2	56° 50,087' N	005° 00,091' E	12.09.2022 08:06	60.2	PLA	in the water
HE606_14-3	56° 50,094' N	005° 00,103' E	12.09.2022 08:12	59.6	BUCKET	max depth/on ground
HE606_14-4	56° 50,087' N	005° 00,124' E	12.09.2022 08:17	60.5	BWS	max depth/on ground

Station Number	Latitude	Longitude	Date&Time	Water Depth [m]	Device	Action
HE606_14-5	56° 50,071' N	005° 00,145' E	12.09.2022 08:32	60.1	GRAB	max depth/on ground
HE606_14-6	56° 50,071' N	005° 00,165' E	12.09.2022 08:41	59.4	MUC	max depth/on ground
HE606_15-1	57° 00,036' N	005° 00,159' E	12.09.2022 10:14	53.9	Secdisk	in the water
HE606_15-2	57° 00,014' N	005° 00,208' E	12.09.2022 10:18	54.3	PLA	in the water
HE606_15-3	57° 00,000' N	005° 00,231' E	12.09.2022 10:20	54.4	BUCKET	in the water
HE606_15-3	56° 59,964' N	005° 00,240' E	12.09.2022 10:23	55.3	BUCKET	on deck
HE606_15-4	56° 59,963' N	005° 00,270' E	12.09.2022 10:27	55.2	GRAB	max depth/on ground
HE606_16-1	57° 14,994' N	005° 00,084' E	12.09.2022 12:10	58.9	Secdisk	in the water
HE606_16-2	57° 14,974' N	005° 00,144' E	12.09.2022 12:14	57.6	PLA	in the water
HE606_16-3	57° 14,926' N	005° 00,174' E	12.09.2022 12:18	59.9	BUCKET	in the water
HE606_16-4	57° 14,905' N	005° 00,210' E	12.09.2022 12:24	60.5	GRAB	max depth/on ground
HE606_17-1	57° 33,639' N	005° 01,167' E	12.09.2022 14:33	81.9	Secdisk	in the water
HE606_17-2	57° 33,614' N	005° 01,169' E	12.09.2022 14:35	81.4	PLA	in the water
HE606_17-3	57° 33,607' N	005° 01,217' E	12.09.2022 14:37	81.4	BUCKET	in the water
HE606_17-4	57° 33,584' N	005° 01,295' E	12.09.2022 14:44	79.6	SVP	max depth/on ground
HE606_17-5	57° 33,549' N	005° 01,311' E	12.09.2022 14:54	81.2	GRAB	max depth/on ground
HE606_18-1	57° 45,914' N	004° 50,167' E	12.09.2022 16:30	96.7	MB+SES	station start
HE606_18-1	57° 45,545' N	004° 50,116' E	12.09.2022 16:32	97.7	MB+SES	profile start
HE606_18-1	56° 34,212' N	004° 51,050' E	13.09.2022 03:50	58.4	MB+SES	profile end
HE606_18-1	56° 34,187' N	004° 51,046' E	13.09.2022 03:50	59.5	MB+SES	station end
HE606_19-1	56° 33,812' N	004° 50,812' E	13.09.2022 04:03	59.2	Secdisk	in the water
HE606_19-2	56° 33,814' N	004° 50,792' E	13.09.2022 04:05	59.0	PLA	in the water
HE606_19-3	56° 33,819' N	004° 50,828' E	13.09.2022 04:09	61.3	BUCKET	in the water
HE606_19-4	56° 33,810' N	004° 50,784' E	13.09.2022 04:15	58.2	GRAB	max depth/on ground
HE606_19-4	56° 33,809' N	004° 50,785' E	13.09.2022 04:20	60.2	GRAB	station end
HE606_20-1	56° 30,013' N	004° 40,018' E	13.09.2022 06:02	60.9	Secdisk	in the water
HE606_20-2	56° 30,025' N	004° 40,039' E	13.09.2022 06:04	62.0	PLA	in the water
HE606_20-3	56° 30,018' N	004° 40,013' E	13.09.2022 06:09	61.3	BUCKET	max depth/on ground
HE606_20-4	56° 30,016' N	004° 39,984' E	13.09.2022 06:12	59.5	GRAB	max depth/on ground