HEINCKE-Berichte

Fluxes and fate of microplastics in northern European waters: Large Scale Transport – South to North

Cruise No. He578

June 5 – July 8, 2021
Bremerhaven – Bremerhaven

JPI-O FACTS

JPI OCEANS

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Table of Contents

Inhalt

1 Cruise Summary

1.1 Summary in English

During the cruise we successfully sampled in total 23 stations from the coast of Bergen to the arctic island Bjornoya. DSHIP station 2 was sampled twice (DSHIP 24) due to bad weather conditions during the first attempt. With respect to the initial cruise application, five further stations (one of the Faroe Shetland Channel box and two of the Svinoy box and Gimsoy box respectively) were also not performed due to weather or time limitations. On transects between stations, "on the way" air and water sampling was successfully performed by using high and low volume air samplers (TUB) and the newly developed automated COMPASS water filtration system (AAU). Air samplers were installed on the compass bridge and only operated while the ship was moving. The Intake of water for COMPASS was realized by applying a submersible pump in the Moon Pool of the Heincke. The COMPASS system consists of three so called UFO units with three filtration units each (2 x 300 µm & 1 x 15 µm), providing three integrative samples of up to 1000 L. During He578, the maximum filtration time was set to 3 h per UFO unit. As a consequence on longer transects (e.g. DSHIP 7; transect from Faroe Shetland Channel box to Bjornoya W box), several subsets of the respective transect were sampled. On all stations of the Faroe Shetland Channel box, the Bjornoya W box and the most westerly or southerly stations of the Gimsoy, Svinoy and Fugloya Bjornoya boxes, the COMPASS system was operated in parallel to surface water sampling (by catamaran or buoy) and the < 15 µm filtrate was further filtered on 0.5 µm metal-sinter membranes for enrichment of submicron plastic particles (or even nanoplastics). All stations were started with a CTD cast to get an overview on the oceanographic conditions and the different water bodies present. Based on these information, sampling depths were defined (e.g. below pycnocline, below Chl a maximum, different waterbodies) for CTD (CNR), in situ pump (MARUM) and Marine Snow catcher (GEOMAR) samples which were taken subsequently. By using the in situ pumps equipped with stainless steel 15 µm meshes, it was possible to filter ~500 L at each station and depth. Surface water samples were then taken by using either a Neuston catamaran or a sampling buoy (depending on the weather conditions). The Neuston catamaran (AWI) was equipped with a 300 µm net for enrichment of larger MP particles and a newly developed on board (air driven, PTFE) pumping and filtration system for particles < 300 µm > 15 µm. An identical pumping and filtration system was used on the Heincke for water samples taken by the sampling buoy (AWI, during heavy weather). With both devices between 350 - 650 L were successfully sampled (and filtered). In total on 5 stations it was possible to take undisturbed sediment cores by using a Multicorer (MARUM). The MUC was equipped with Perspex and stainless steel coring pipes. The stainless steel coring pipes facilitate contamination free samples, enabling slicing of cores and analyses of different sediment horizons for microplastics (AWI) and ^{210}Pb based sediment chronology (MARUM, HEREON). All samples were stored cooled or frozen on board the Heincke and will finally analyzed in the laboratories of the cooperating partners by using FTIR Imaging/FTIR microscopy (AWI, AAU, CNR) or PyGCMS (ICBM). Submicron microplastics (or nanoplastics) will be analyzed by Raman microscopy or nanoFTIR (AWI). Marine Snow Catcher samples (aggregates, water) will be subjected to in deep microbiological and microscopical analyses (GEOMAR).

1.2 Zusammenfassung

Während der Forschungsfahrt He578 konnten wir an insgesamt 23 Stationen von der Küste von Bergen bis zur arktischen Insel Bjornoya erfolgreich Proben nehmen. Die DSHIP-Station 2 wurde aufgrund schlechter Wetterbedingungen (beim ersten Versuch) zweimal beprobt (DSHIP 24). Im Vergleich zum ursprünglichen Fahrtantrag wurden fünf weitere Stationen (eine der Färöer-Shetland-Kanal-Box und zwei der Svinoy-Box bzw. Gimsoy-Box) aufgrund von Wetter- oder Zeitbeschränkungen ebenfalls nicht beprobt. Auf Transekten zwischen den Stationen wurden Luft- und Wasserprobennahmen erfolgreich durchgeführt, indem Luftprobennehmer mit hohem und niedrigem Volumen (TUB) und das neu entwickelte automatisierte COMPASS-Wasserfiltrationssystem (AAU) verwendet wurden. Luftprobennehmer wurden auf der

Kompassbrücke der Heincke installiert und nur während der Fahrt betrieben. Die Wasseraufnahme für das COMPASS System wurde durch den Einsatz einer Tauchpumpe im sogenannten „Moonpool" der Heincke realisiert. Das COMPASS-System besteht aus drei sogenannten UFO-Einheiten mit jeweils drei Filtrationseinheiten (2 x 300 µm & 1 x 15 µm), die drei integrative Proben von bis zu 1000 L liefern. Während der Forschungsfahrt wurde die maximale Filtrationszeit auf 3 h pro UFO-Einheit festgelegt. Infolgedessen wurden bei längeren Transekten (z. B. Transekt von der Faroe Shetland Channel Box bis zur Bjornoya W Box) mehrere Segmente des jeweiligen Transekts beprobt. An allen Stationen der Färöer-Shetland-Kanal-Box, der Bjornoya-W-Box und den westlichsten bzw. südlichsten Stationen der Gimsoy-, Svinoy- und Fugloya-Bjornoya-Boxen wurde das COMPASS-System parallel zur Oberflächenwasserprobenahme (per Katamaran oder Boje) betrieben. Das < 15 µm Filtrat wurde hier zusätzlich auf 0,5 µm Metall-Sintermembranen zur Anreicherung von Submikron-Kunststoffpartikeln filtriert. Alle Stationen wurden mit einem CTD-Cast begonnen, um einen Überblick über die ozeanographischen Bedingungen zu erhalten. Basierend auf diesen Informationen wurden Probenahmetiefen definiert (z. B. oberhalb/unterhalb der Pyknokline, oberhalb/unterhalb des Chla-Maximums) für CTD- (CNR), in situ-Pumpen- (MARUM) und Marine-Snow-Catcher- (GEOMAR) Proben, die anschließend entnommen wurden. Durch die Verwendung der mit 15-µm-Edelstahlsieben ausgestatteten in situ-Pumpen war es möglich, ~500 l an jeder Station und Tiefe zu filtern. Oberflächenwasserproben wurden entweder mit einem Neuston-Katamaran oder einer Probenahmeboje (abhängig von den Wetterbedingungen) entnommen. Der Neuston-Katamaran (AWI) wurde mit einem 300-µm-Netz zur Anreicherung größerer MP-Partikel und einem neu entwickelten onboard-Pumpen- und Filtersystem (luftbetrieben, PTFE) für Partikel < 300 µm > 15 µm ausgestattet. Ein identisches Pumpen- und Filtersystem wurde im Nasslabor der Heincke für Wasserproben verwendet, die mit der Probenahmeboje (AWI) bei schlechten Wetterbedingungen entnommen wurden. Mit beiden Geräten wurden zwischen 350 - 650 L erfolgreich beprobt (und gefiltert). An insgesamt 5 Stationen konnten mit einem Multicorer (MUC; MARUM) ungestörte Sedimentkerne entnommen werden. Der MUC wurde mit Plexiglas- und Edelstahlrohren ausgestattet. Die Verwendung von Edelstahl-Rohren war unumgänglich, um eine Kontamination der Probe mit Plastik (Plexiglas) zu vermeiden. Die Kerne der Edelstahlrohre wurden noch an Bord geschnitten (1 cm Horizonte) und die Proben eingefroren, die Plexiglasrohre mit den Sedimentkernen wurden ungeschnitten eingefroren. Alle anderen Proben wurden an Bord der Heincke gekühlt oder tiefgefroren gelagert und werden abschließend in den Laboren der Kooperationspartner mittels FTIR-Imaging/FTIR-Mikroskopie (AWI, AAU, CNR) oder PyGCMS (ICBM) analysiert. Submikron-Mikroplastik (oder Nanoplastik) wird mittels Raman-Mikroskopie oder nanoFTIR (AWI) analysiert. Marine Snowcatcher-Proben (Aggregate, Wasser) werden tiefenmikrobiologischen und mikroskopischen Analysen (GEOMAR) unterzogen. Die ^{210}Pb-basierte Sedimentchronologie wird am HEREON erfolgen.

2 Participants

2.1 Principal Investigators

Name	Discipline	Institution	Nationality
Gerdts, Gunnar, Dr.	Environmental Sciences	AWI	German

2.2 Scientific Party

Fig. 1 Participants of He578.

Name	Discipline	Institution	Nationality
Gerdts, Gunnar, Dr.	Environmental Sciences	AWI	German
Jebens, Hannah, BSc	Technical assistant	AWI	German
Wu, Fangzhu, MSc	PhD candidate	AWI	Chinese
Zonneveld, Catharina, Prof. Dr.	Micropaleontology	MARUM	Dutch
Versteegh, Gwerardus, Dr.	Micropaleontology	AWI/MARUM	Dutch
Suaria, Giuseppe, Dr.	Environmental Sciences	CNR	Italian
Paluselli, Andrea, Dr.	Marine Chemistry	CNR	Italian
Vianello, Alvise, Dr.	Marine Chemistry	AAU	Danish
Georgi, Christoph, MSc	PhD candidate	TUB	German
Roa, Jo, Dr.	Environmental Sciences	GEOMAR	Spanish
Fink, Christine, MSc	Environmental Sciences	GEOMAR	German

2.2 Participating Institutions

AWI: Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Shelf Seas Systems Ecology, Helgoland, Germany
MARUM: Research Faculty University of Bremen, Bremen, Germany
GEOMAR: Helmholtz-Zentrum für Ozeanforschung Kiel, Biologische Ozeanographie, Kiel, Germany
TUB: Technische Universität Berlin, Institute of Environmental Science & Technology
AAU: Aalborg University, Department of Civil Engineering, Aalborg, Denmark
CNR: National Research Council of Italy, Institute Marine Science, Lerici, Italy

3 Research Program

3.1 Description of the Working Area

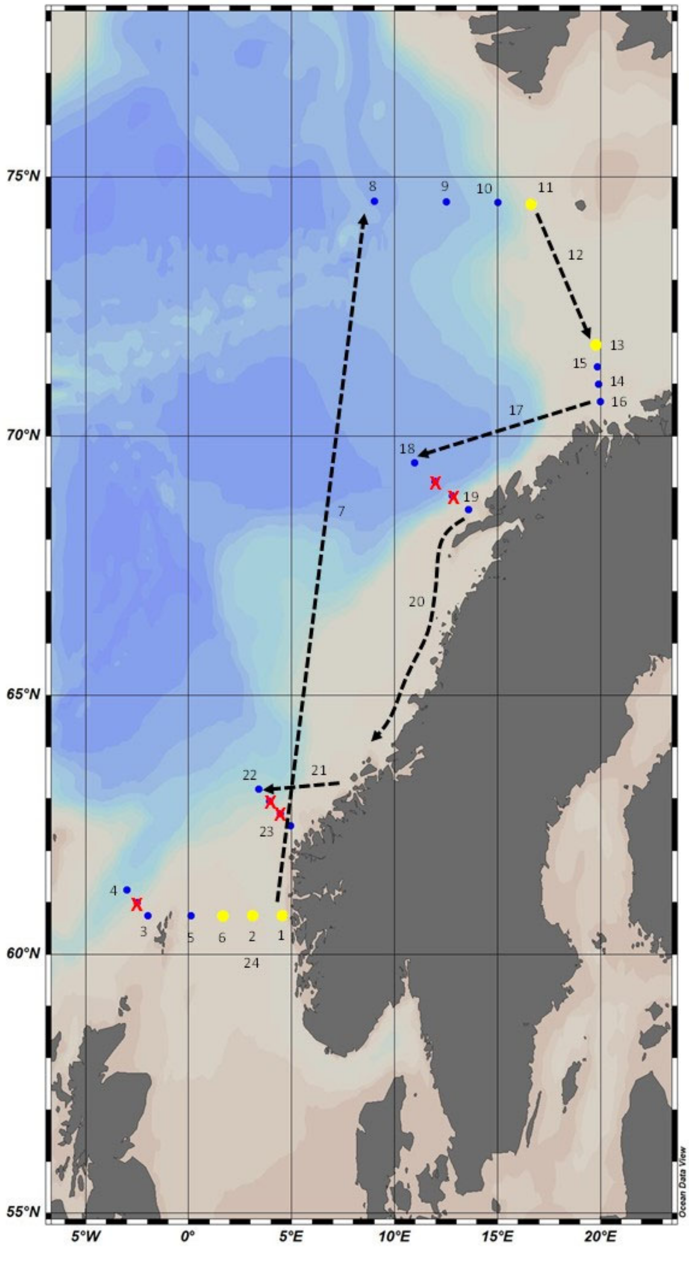

Fig. 2 Station map of He578. Blue circles: CTD (up to 5 depths), *in situ* pumps (up to 3 depths), neuston catamaran (net & on board pump/filtration setup) or sampling buoy with separate on ship pump/filtration setup (surface), marine snow catcher (2 depths). Yellow circles: All devices deployed (blue circles) and Multicorer (sediment). Red crosses: Stations not performed. Dashed lines: Transects between stations used for "on the way sampling" of water and air. Stations 1, 2, 24, 5, 6: Fedje / Shetland box; Stations 3 & 4: Faroe Shetland Channel box; Stations 22 & 23: Svinoy box; Stations 18 & 19: Gimsoy box; Stations 13, 14, 15, 16: Fugjoya Bjornoya box; Stations 8, 9, 10, 11: Bjornoya W box.

The Norwegian Current (or Norway Coastal Current) is one of two dominant arctic inflows of water. It can be traced from near Shetland (north of Scotland) and from the eastern North Sea. It finally passes the opening into the Barents Sea. Compared to its partial source the North Atlantic Current (looping into the East Greenland Current) it is colder and less salty. The other sources are the less saline North and Baltic seas and the Norwegian fjords and rivers. It is considerably warmer and saltier than the Arctic Ocean, which is freshened by precipitation.

Norwegian coastal waters are dominated by two main water masses, the Norwegian Coastal Current and the North Atlantic Drift Water (Atlantic Water). As the Norwegian Coastal Current moves northward, North Atlantic Drift Water is mixed in, raising the salinity (see Salinity below). The current is both wind-driven, “piling up” of water along the Norwegian coast by southwesterly winds (creating elevation and thus pressure differences), and also driven by its salinity distribution which in turn creates density gradients.

3.2 Aims of the Cruise

The cruise was conducted in the framework of the JPI-O project FACTS (Fluxes and fate of microplastics in northern European waters; https://jpi-oceans-facts.eu/), workpackage 1 „Large Scale Transport – South to North”. FACTS creates new knowledge and improve our mechanistic understanding on the sources, transport, occurrence, and fate of small microplastics in the northern marine waters. FACTS combines state-of-the-art analytical, monitoring and modelling approaches in feedback cycles to describe transport and geographical sources of microplastics contamination as well as sinks from the temperate waters of the southern North Sea to the Arctic waters of the Barents Sea. It analyses the distribution of MP in the water column and quantifies Skagerrak as a major sink zone. Investigated transport processes range from drift scenarios to air transport to aggregation and sinking processes. The goal is to address the question of how MP move vertically in the water column with time under comparatively well-defined hydrodynamic conditions. FACTS will be enhanced by tackling the current challenges of nanoplastics and tyre wear particle detection in marine samples. Both particle types are currently not accessible for mass balances of marine plastics contamination.

In detail the following aims have been addressed:

a. Identification, quantification and sizing of microplastic particles (and polymer fibres) at discrete sampling stations (see Fig. 2) in
- Surface water
- Water column
- Sediment
- Ship blanks (indoor & outdoor)

b. Identification, quantification and sizing of submicrometer plastic particles at discrete sampling stations (see Fig. 2) in
- Surface water
- Aggregates

c. Identification, quantification and sizing of microplastic particles on transects between sampling stations (see Fig. 2) in
- surface water
- atmosphere (air)

d. Monitoring of floating macrolitter at the sea surface

3.3 Agenda of the Cruise

The research activities of the cruise He578 concentrated on sampling different areas along the Norwegian coastline (Fig. 2) and different environmental compartments (surface water, water column, sediment, aggregates and atmosphere/air) for later analyses of microplastic particles. In total 23 stations from the coast of Bergen to the arctic island Bjornoya were sampled. DSHIP station 2 was sampled twice (DSHIP 24) due to bad weather conditions during the first attempt. With respect to the initial cruise application, five further stations (one of the Faroe Shetland Channel box and two of the Svinoy box and Gimsoy box respectively) were also not performed due to weather conditions or time limitations. On transects between stations, “on the way” air and water sampling was performed additionally (Fig. 2, dashed lines) by using high and low volume air samplers and a newly developed automated water filtration system (COMPASS - COntinuous Microplastic Automatic Sampling System; AAU).

All stations were started with a CTD (AWI; Fig. 3F) additionally equipped with an ADCP system (CNR)) cast to get an overview on the oceanographic conditions and for taking more frequent (compared to *in situ* pumps) but low volume samples of the water column (CNR). Based on these informations, sampling depths were defined (e.g. below and above pycnocline, below Chl a maximum, different waterbodies) for CTD, *in situ* pump and Marine Snow catcher samples (see below).

The CTD bottles were carefully drained into individual pre-rinsed stain steel cannisters. The samples were then transported to one of the Heincke labs and vacuum filtered on glass-fiber filters by using glass filtration devices to avoid contamination by plastic polymers (CNR).

Surface water samples were taken by using either a Neuston catamaran or a sampling buoy (depending on the weather conditions), subsurface water by using the COMPASS system. The Neuston catamaran (AWI; Fig 3H) was equipped with a 300 µm net for enrichment of larger MP particles and a newly developed pumping and filtration system for particles < 300 µm > 15 µm. Hence -and for the first time- it was possible to sample both size fractions in parallel (and not separately as usual). The pumping system consisted of an air-driven PTFE membrane pump (ALMATEC) connected to a stainless steel filter holder (Pieper filter) equipped with a 15 µm stainless steel mesh (GKD; 293 mm diameter). All connecting tubings were out of PTFE (TUDERTECHNIKA). Air supply was realized by using two commercial diving flasks (which were subsequently re-filled by a compressor on board the Heincke). For intake of water, the tubing system was equipped with a stainless steel 300 µm filter basket (Wolftechnik). An identical (with the exception of the air supply; Heincke) pumping and filtration system was used in case of bad weather conditions onboard Heincke in connection with a sampling buoy (AWI; Fig 3C & Fig. 3D). With both devices between 350 - 650 L were successfully sampled (and filtered).

On all stations of the Faroe Shetland Channel box, the Bjornoya W box and the most westerly or southerly stations of the Gimsoy, Svinoy and Fugloya Bjornoya boxes (Fig. 2), additionally the COMPASS system (AAU; Fig. 3B) was operated in parallel for surface water sampling (by catamaran or buoy). The intake of water for COMPASS was realized by applying a submersible pump in the Moon Pool of the Heincke (water depth ~5 m). The COMPASS system consists of 3 x 3 filtration units (3 x (2 x 300 µm & 1 x 15 µm); GKD), providing three integrative samples of up to 1000 L. Here 80 L of the < 15 µm filtrate was further filtered on 0.5 µm metal-sinter discs (acuraSINTER; Fuhr Filtertechnik; stainless steel; 142 mm diameter) by using a stainless steel filter holder and air pressure filtration system (SARTORIUS) for enrichment of submicron plastic particles (AWI).

On all stations where surface water samples were taken, the water column was sampled as well. *In situ* pump samples were taken in water bodies above and below the pycnocline, for Marine Snow Catcher samples, the Chl a maximum was considered (with samples above and below the maximum, but closer (few meters) compared to the *in situ* pump samples). At each station two *in situ* pumps (McLane; MARUM; Fig. 3A) were attached to the wire at predefined positions. By using the *in situ* pumps equipped with stainless steel 15 µm stainless steel meshes (GKD; diameter 142 mm), it was possible to filter ~500 L at each station and depth. The Marine Snow Catcher (OSIL; MARUM; Fig. 3G) was operated according the manufactures instructions and the broad experience of the “aggregate team” lead by MARUM. After sampling the sampler was placed on deck for some hours to allow a settling of aggregates in the lower collection chamber of the sampler. Then the overlying water was removed and the collection chamber was carefully disassembled and transported to one of the labs of the Heincke, where individual aggregates were hand-sorted and finally stored.

In total on 5 stations it was possible to take undisturbed sediment cores by using a Multicorer (MARUM; Fig. 3E). The MUC was equipped with Perspex and stainless steel coring pipes. The stainless steel coring pipes facilitated contamination free samples, enabling slicing of cores and analyses of different sediment horizons for microplastics (AWI). The steel cores were directly sliced on board after sampling (and the horizons individually stored frozen), the Perspex cores were frozen in total for later slicing and ^{210}Pb based sediment chronology and analyses of further sediment parameters (e.g. grain size, TOC) (MARUM, HEREON).

High and low volume air samplers for collecting atmospheric microplastics (TUB; Fig. 3I & Fig. 3J) were installed on the compass bridge of the Heincke and only operated on transects between stations (Fig. 2, dashed lines) while the ship was moving.
During these transects, the COMPASS system (AAU; Fig. 3B) was applied as well for permanent "on the way" sampling of subsurface water. The maximum filtration time was set to 3 h per COMPASS unit (see above). As a consequence, on longer transects (e.g. DSHIP 7; transect from Faroe Shetland Channel box to Bjornoya W box; Fig. 2, dashed lines), several subsets of the respective transect were sampled.
For minimizing the risk of contamination during sampling, we avoided wearing of plastic derived clothing (e.g. fleece jackets) and minimized air-exposure during collection and storage of samples. Furthermore, all material and devices used for sampling were extensively cleaned with tap water before and after sampling followed by flushing with 0.5 µm filtered tap water (by using the already mentioned metal-sinter discs). For an overview of "unavoidable" contamination of the samples with synthetic polymers by air, glass jars filled with MilliQ were placed inside the wet lab of the Heincke and outside on the deck during working time on stations.
All samples were stored cooled or frozen on board the Heincke and will be finally analyzed (identity, quantity and size of MP particles) in the laboratories of the cooperating partners by using FTIR Imaging/FTIR microscopy (AWI, AAU, CNR). Submicron microplastics (or nanoplastics) will be analyzed by Raman microscopy or nanoFTIR (AWI). Marine Snow catcher samples (aggregates, water) will be subjected to in deep microbiological and microscopical analyses (GEOMAR) and exemplarily MP analysis by Raman microscopy.

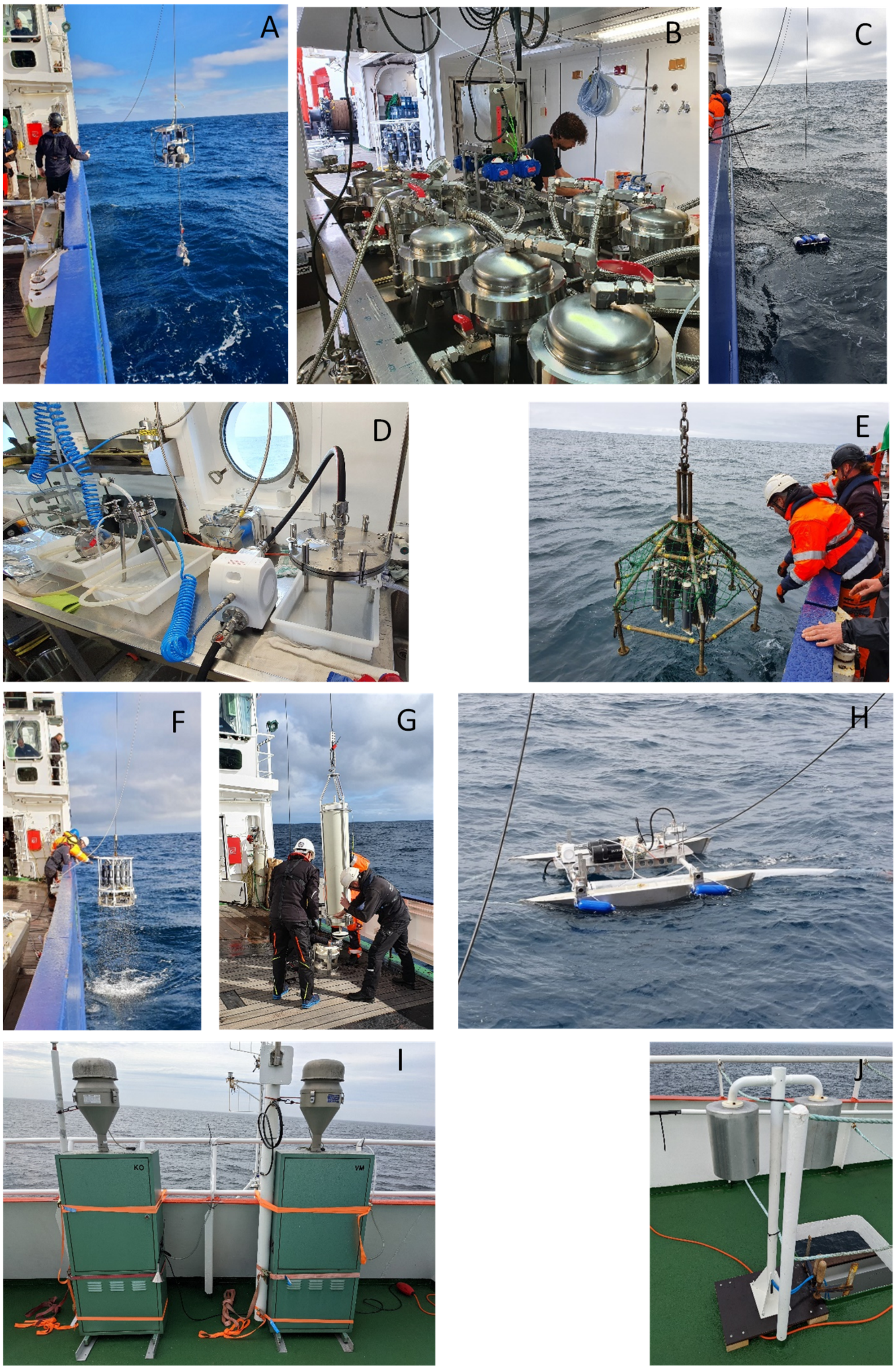

Fig. 3 Sampling devices used on He578. A: in situ pumps; B: COMPASS filtration system; C: Sampling buoy with separate on ship pump/filtration set up (D); E: Multicorer; F: CTD; G: Marine Snow Catcher; H: Neuston catamaran with net and on board pump/filtration setup; I & J: High (I) and low volume (J) air samplers

4 Narrative of the Cruise

After one week of quarantine in a hotel in Bremerhaven (and later on the Heincke) and several COVID-19 tests, we left the port of Bremerhaven on 05.06. heading for the first sampling box west of Bergen (Fedje / Shetland; Fig. 2). On 07.06. the first station was sampled as outlined in 3.3. Although we already had extensive experience of using the catamaran (even from Heincke), we again faced problems due to not optimal mounting of leaches (connection ship-catamaran). As a consequence the catamaran hit the hull of the ship several times (releasing lots of paint flakes).

Nevertheless after several attempts with different leach geometries, we were finally able to start regular sampling and the catamaran was towed in distance of 10 to 15 meters beside the ship. On the next day (08.06.) we proceeded with sampling (station 2) but were informed that the weather forecast for the coming days announces heavy weather in this region. Hence, we decided to proceed with the stations west of Shetlands (3 & 4) and then continue with the stations east of Shetlands (5 & 6). Unfortunately, due to a severe accident in his family, a colleague then had to leave the Heincke on 13.06. in the port of Bergen. Since the weather forecast for the whole Norwegian coast was getting worse and worse, we then decided to go directly to one of the most northerly stations (8; Bjornoya W box). During this transect (7; 4 days), for the first time, the COMPASS system was frequently used to sample subsurface water (as well as for the further transects 12, 17, 20 and 21). Although this transect was initially not planned, these extra samples will provide us a for more comprehensive overview on the MP concentrations in this wider area. During transects also air samples were taken. In the following days we proceeded with our program and successfully sampled stations 8. 9. 10 and 11. Since a restocking of foodstuffs was necessary and planned for the 25.06. in the port of Tromsö, we proceeded southward with transect 12, followed by sampling on stations 13, 14, 15 and 16 before we entered the port of Tromsö at 25.06. as planned. Since the weather forecast again announced heavy weather for the northern Norwegian coast, we discussed how to proceed with the remaining sampling boxes "Gimsoy" and "Svinoy" and decided to sample at last the most westerly and easterly stations. After leaving Tromsö we again used the COMPASS system and collected air samples on transect 17 on the way to box "Gimsoy", where we sampled at stations 18 and 19 (as decided). On the way to box "Svinoy" (station 20; COMPASS applied), unfortunately a major disaster happened with the freshwater supply (reverse osmosis) of the Heincke, hence an extra stop in Trondheim was necessary to fill tanks with freshwater for the remaining time of the cruise. On 01.07. we reached the port of Trondheim. On the next day, we proceeded to the "Svinoy" box (transect 21) and sampled on 02.07 and 03.07. at stations 22 and 23. Finally, on 04.07., we resampled sediments at station 2 (now 24) of the "Fedje / Shetland" box since on 08.06. our first attempt failed. On the way back to Bremerhaven everybody was busy with clearing up and packing but also with custom issues which were finally "solved" before entering the port.

It can be stated that cruise He578 in the framework of JPI-O FACTS, WP 1 "Large Scale Transport – South to North" was a full success and will for the first time provide a comprehensive picture on the transport and fate of microplastics in northern waters.

5 Preliminary Results

Due to the extremely elaborate analysis pipeline for identification, quantification and sizing of microplastic particles (from extraction to spectrometry) which can only be applied and performed in a dedicated lab-environment (clean lab), the cruise was solely dedicated to sampling approaches (as described in 3.3). Hence no preliminary results can be provided.

6 Ship's Meteorological Station

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7. Station List He578

Station list of He578. Displayed are initial station numbers (cruise application) and final DSHIP station numbers. Red/Yellow: Stations not performed due to insufficient weather conditions.

Date	Station	DSHIP	Name	Latitude	Longitude	Samples						
				decimal degrees (WGS84)		Water					Sediment	Air
						CTD	*in situ* pumps	Marine snow catcher	Catamaran (C)/Buoy (B)	on the way	MUC	on the way
07.06.2021	1	1	Fedje / Shetland box	60.750	4.010	x	x	x	C		x	
08.06.2021	2	2	Fedje / Shetland box	60.750	3.417	x	x	x	C			
12.06.2021	3	6	Fedje / Shetland box	60.750	1.617	x	x	x	B		x	
11.06.2021	4	5	Fedje / Shetland box	60.750	0.117	x	x	x	C			
09.06.2021	5	3	Faroe Shetland channel box	60.750	-2.000	x	x	x	C			
-	6	-	Faroe Shetland channel box	61.000	-2.500	x	x	x				
10.06.2021	7	4	Faroe Shetland channel box	61.250	-3.000	x	x	x	B			
03.07.2021	8	23	Svinoy box	62.485	4.945	x	x	x	C			
-	9	-	Svinoy box	62.720	4.433	x	x	x				
-	10	-	Svinoy box	62.957	3.917	x	x	x				
02.07.2021	11	22	Svinoy box	63.192	3.395	x	x	x	C			
29.06.2021	12	19	Gimsoy box	68.580	13.583	x	x	x	C			
-	13	-	Gimsoy box	68.850	12.800	x	x	x				
-	14	-	Gimsoy box	69.139	12.023	x	x	x				
27.06.2021	15	18	Gimsoy box	69.483	10.950	x	x	x	C			
24.06.2021	16	16	Fugloya Bjornoya box	70.667	19.967	x	x	x	C			
22.06.2021	17	14	Fugloya Bjornoya box	71.000	19.900	x	x	x	C			
23.06.2021	18	15	Fugloya Bjornoya box	71.333	19.676	x	x	x	C			
21.06.2021	19	13	Fugloya Bjornoya box	71.750	19.733	x	x	x	C		x	
20.06.2021	20	11	Bjornoya W box	74.500	16.667	x	x	x	C		x	
19.06.2021	21	10	Bjornoya W box	74.510	15.000	x	x	x	B			
18.06.2021	22	9	Bjornoya W box	74.520	12.500	x	x	x	C			
17.06.2021	23	8	Bjornoya W box	74.530	9.000	x	x	x	C/B			
13.06. . 17.06.2021	-	7	Faroe Shetland channel box to Bjornoya W box							x		x
20.06. - 21.06.2021	-	12	Bjornoya W box Fugloya Bjornoya box							x		x
25.06.-26.06.2021	-	17	Fugloya Bjornoya box to Gimsoy box							x		x
29.06.-30.06.2021	-	20	Gimsoy box to Trondheim							x		x
01.07.-02.07.2021	-	21	Trondheim to Svinoy box							x		x
04.07.2021	2	24									x	

13.06.2021	-	-	Bergen
25.06.2021	-	-	Tromsoe
01.07.2021	-	-	Trondheim

8. Data and Sample Storage and Availability

Data Type	Database	Available date	Open Access date	Contact Person
MP data Surface, water column, sediment	PANGAEA	~Sept 2023	~Sept 2023	gunnar.gerdts@awi.de
MP data Subsurface-Transects	PANGAEA	~Sept 2023	~Sept 2023	avia@build.aau.dk
MP data (fibers) Macrolitter data	PANGAEA	~Sept 2023	~Sept 2023	giuseppe.suaria@sp.ismar.cnr.it

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