EXPEDITION PROGRAMME
PS151
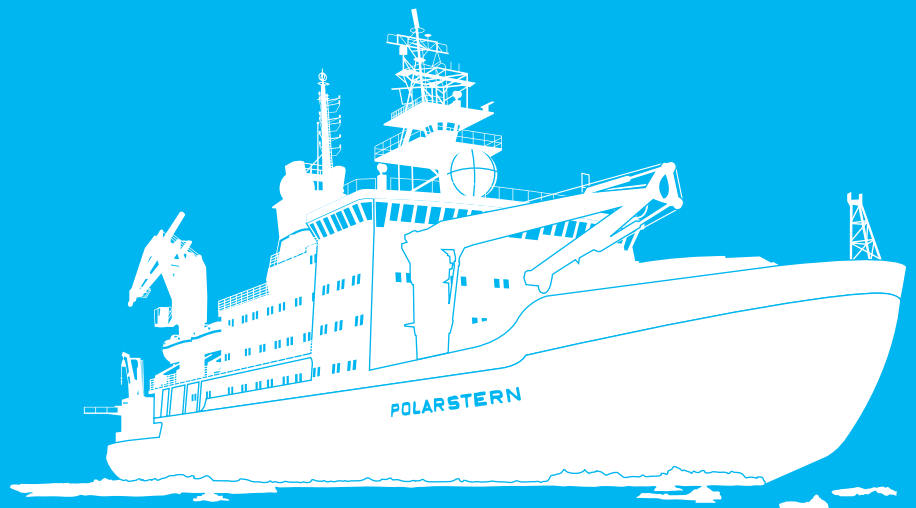
Polarstern

PS151
Bremerhaven – Walvis Bay
13 November 2025 – 12 Dezember 2025

Coordinator: Ingo Schewe

Chief Scientists PS151: Karen Helen Wiltshire
Angelika Dummermuth

HELMHOLTZ

Bremerhaven, September 2025

The Expedition Programme *Polarstern* is issued by
the Alfred Wegener Institute, Helmholtz Centre for Polar and
Marine Research (AWI) in Bremerhaven, Germany.

The Programme provides information about the planned goals and
scientific work programmes of expeditions of the German
research vessel *Polarstern*.
The papers contained in the Expedition Programme *Polarstern* do
not necessarily reflect the opinion of the AWI.

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PS151

13 November 2025 – 12 Dezember 2025

Bremerhaven – Walvis Bay

Chief Scientists
Karen Helen Wiltshire
Angelika Dummermuth

Coordinator
Ingo Schewe

Contents

1. ÜBERBLICK UND EXPEDITIONSVERLAUF

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Die Transitfahrt von Bremerhaven über Las Palmas nach Walvis Bay (Namibia) startet am 13.11.2025 und ist in zwei Abschnitte geteilt: Bremerhaven – Las Palmas und Las Palmas – Walvis Bay (Abb. 1.1). Beide Abschnitte stehen ganz im Zeichnen der studentischen Ausbildung. Über NIPPON-POGO Stipendien wird eine internationale Gruppe von 25 Stipendiaten aus 20 Ländern während einer „schwimmenden Trainingsschule" in Wissen und Techniken der Ozeanographie und Klima geschult. Dabei sollen sie Methoden der Probennahme, der Aufarbeitung der Proben und den Umgang mit erhobenen Daten erlernen.

Als weitere Aufgabe während der Transitfahrt werden chemische und physikalische Messungen zum Energie- und Massen-Austausch zwischen Ozean und Atmosphäre durchgeführt. Zudem werden die Studierenden eine Einführung in die Physik des Klimasystems, internationale Klimaverhandlungen, Ocean Governance und die Ziele der UN Ocean Decade bekommen. Erstmals werden fünf Stipendiaten in die Lehre eingebunden, um sie als zukünftige Lehrende zu qualifizieren.

Das Trainingsprogramm an Bord wird vom Alfred-Wegener-Institut mit Unterstützung des Partnership for the Observation of the Global Ocean (POGO), der Nippon Foundation (NF), SeaNetwork, der University of Galway und dem Lehrstuhl für Klimawissenschaften des Trinity College Dublin (TCD) organisiert. *Polarstern* und das Training an Bord sind als Aktivitäten der UN-Ozeandekade aufgeführt.

Am 12.12.2025 wird *Polarstern* in Walvis Bay einlaufen und damit die Expedition PS151 beenden.

SUMMARY AND ITINERARY

The transit expedition from Bremerhaven via Las Palmas to Walvis Bay (Namibia) starts on the 13.11.2025 and is divided into two sections: Bremerhaven – Las Palmas and Las Palmas – Walvis Bay (Fig. 1.1). Both legs are dedicated to the training of NIPPON-POGO scolars. An international group of 25 scholars from 20 nations will be trained in oceanographic techniques and ocean and climate knowledge during a "floating training school". They will learn methods of data collection, processing and handling. For the first time five of the scolars are trained as junior teacher.

Fundamental tasks during the transit are the chemical and physical measurements of the energy as well as calculations on the mass exchange between ocean and atmosphere. The students will get an introduction to the physics of the climate system, climate negotations, ocean governance and the goals of the UN Ocean Decade.

The shipboard training programme is organised by the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research with the support of the Partnership for the Observation of the Global Ocean (POGO), the Nippon Foundation (NF), SeaNetwork, the University of Galway and Climate Sciences Trinity College Dublin (TCD). *Polarstern* and the shipboard training are listed as activities of the UN Ocean Decade. On 12.12.2025 *Polarstern* will arrive in Walvis Bay, ending expedition PS151.
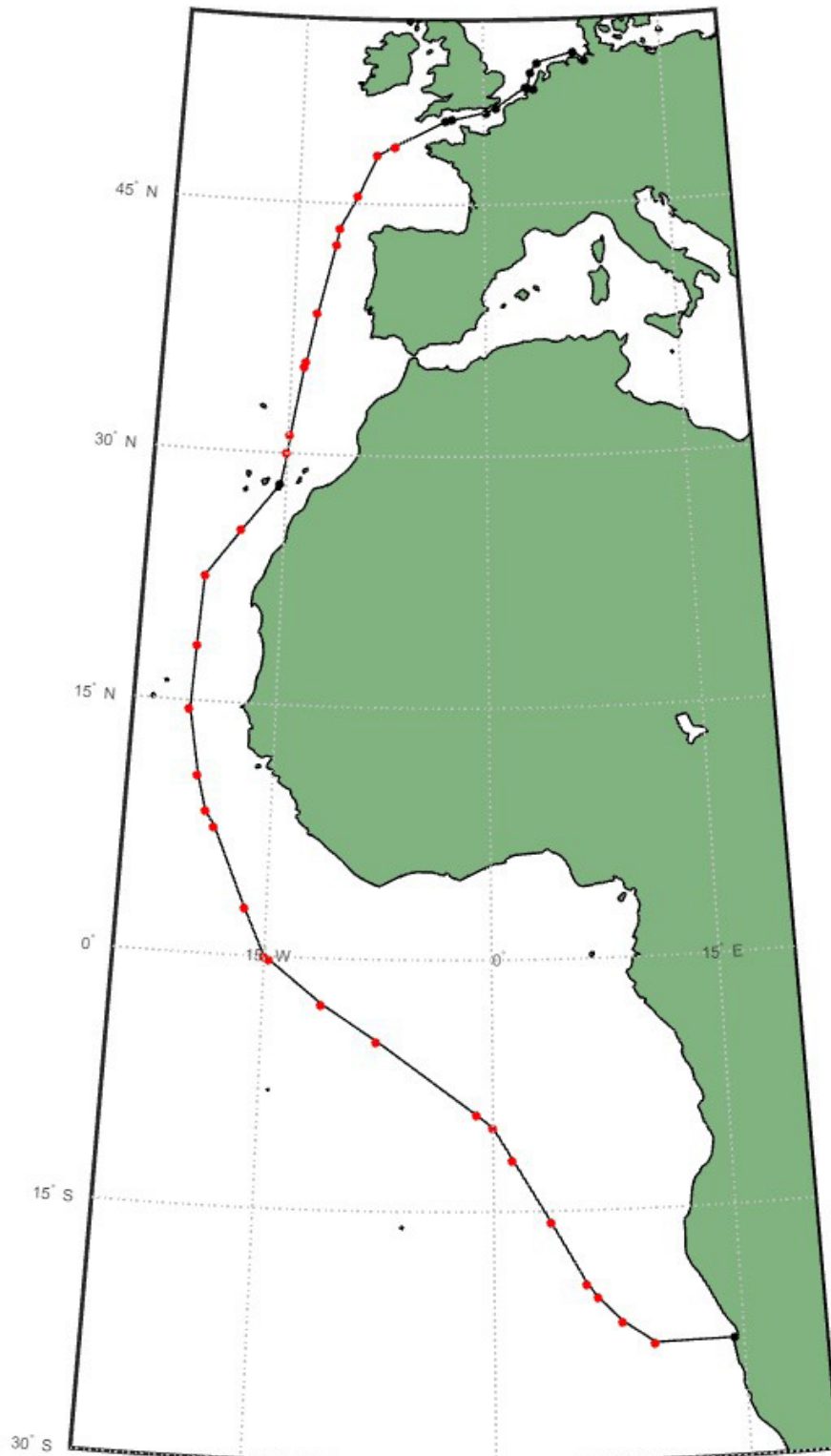
Abb. 1.1: Der generelle Kurs für PS151, rote/schwarze Punkte = Stationen/Wegpunkte
Fig. 1.1: The general course plot PS151, red/black dots = stations/waypoints

2. NORTH SOUTH ATLANTIC TRANSECT OCEAN CAPACITY EXCHANGE (NOSOAT | OCEANCAPX)

Karen Helen Wiltshire[1*], Peter Croot[2], Peter Lemke[3], Anna Bergmann[3] Oisin Boersma[4], Eva-Maria Brodte[3] (not on board), Marthe Claußen[3], Angelika Dummermuth[3], Inga Vanessa Kirstein[3], Sebastian Primpke[3], Subrata Sarker[5], Tido Semmler[6], Norman Sieroka[7,8]

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Outline

In the framework of the UN Ocean Decade "The Science We Need for the Ocean We Want" (https://www.oceandecade.org/) *Polarstern* is providing an educational platform to train an international group of scholars (Postgraduate level) in advanced techniques of oceanographic, meteorological and climate observations and analyses on latitudinal transects. By implementing the important aspects of the UN Ocean Decade, sustainable development goals (SDGs), stakeholder engagement and the agreed climate goals of the Paris agreement (COP21), we want to establish a repeated training programme, which uses the transit expeditions of *Polarstern*, therefore minimizing additional costs and while guaranteeing high quality standards as stated in a broader concept by Brodte et al. 2025 and Krug et al 2025.

In addition, natural climate variability, global warming and international climate negotiations are part of the teaching portfolio. Participants will learn how to take samples, how to process them and how to deal with the resulting data. The following standard sampling procedures will be applied: CTD Rosette with 12 l Niskin bottles, Underway CTD profiler (towed), Plankton-Nets, FerryBox, thermosalinography, xBTs. Causes of natural climate variability and anthropogenic climate change will be discussed together with the international climate negotiations, as well as the ocean governance and its impacts on research activities at sea. The berth has been advertised world-wide and the applications were reviewed by an international team.

Objectives

Aim of the expedition is to chart and characterize different water bodies and their biological, chemical and physical properties along a North-South Atlantic transect, as to be an international training exercise for capacity building in oceanography and climate. An international group of 25 scholars (Postgraduate level) will be trained in basic oceanographic principles including seagoing methods and sampling associated with these. For the first time, in addition to 20 trainee berths, we will also be offering five berths for training of future trainers.

The cruise track will cross coastal, shelf and open Atlantic Ocean waters. Specifically, participants will learn how to sample and analyse the ocean properties, also as "Ground Truthing" information for Remote Sensing information.

Intended study objectives include:

- Differentiation of different water masses using biological parameters temperature, salinity, turbidity etc.

- Localization and sampling of the thermocline and other water inclusions

- Detection of salinity gradients and turbidity

- Detection of micro plastics and plastics along the transect

- Measurements of atmospheric properties

- Studies of climate physics, the warming trends in the ocean and comparison to climate models

- Understanding of Ocean and Climate Modelling

- Introduction to the philosophy of the ocean, the international climate negotiations and outreach of scientists to the public

Work at sea

After embarkation, students will present their previous research projects (Master or PhD) in short talks and will be assigned to a team project during the expedition. All participants need to pick a topic followed through team discussion on a continuous basis taking place during the cruise. Topics comprise oceanography, climate, observation methods and underway sampling, modelling, as well as outreach and philosphy. The modules will be taught in a rotating system during the length of the expedition. Station work will take place along the route, e.g., on the Western European Shelf, the Western European Slope, to the north west off the Ampere Sea Mount, and at least three more stations in the South Atlantic. The map of all 30 planned stations is shown in Figure 2.1, and the 10 deep CTD stations are displayed in Figure 2.2.

CTD Rosette sampling

Deployed instruments comprise CTD rosette casts. Investigations of the hydrographic regime will include 10 CTD casts measuring temperature, salinity and depth coupled with additional sensors to provide information on fluorescence, turbidity, oxygen etc. (Fig. 2.1, exact locations are given in Tab. 2.1). Water samples from depth will be recovered via Niskin bottles in a rosette frame and analysed for quantitative determination of chlorophyll-a concentration.
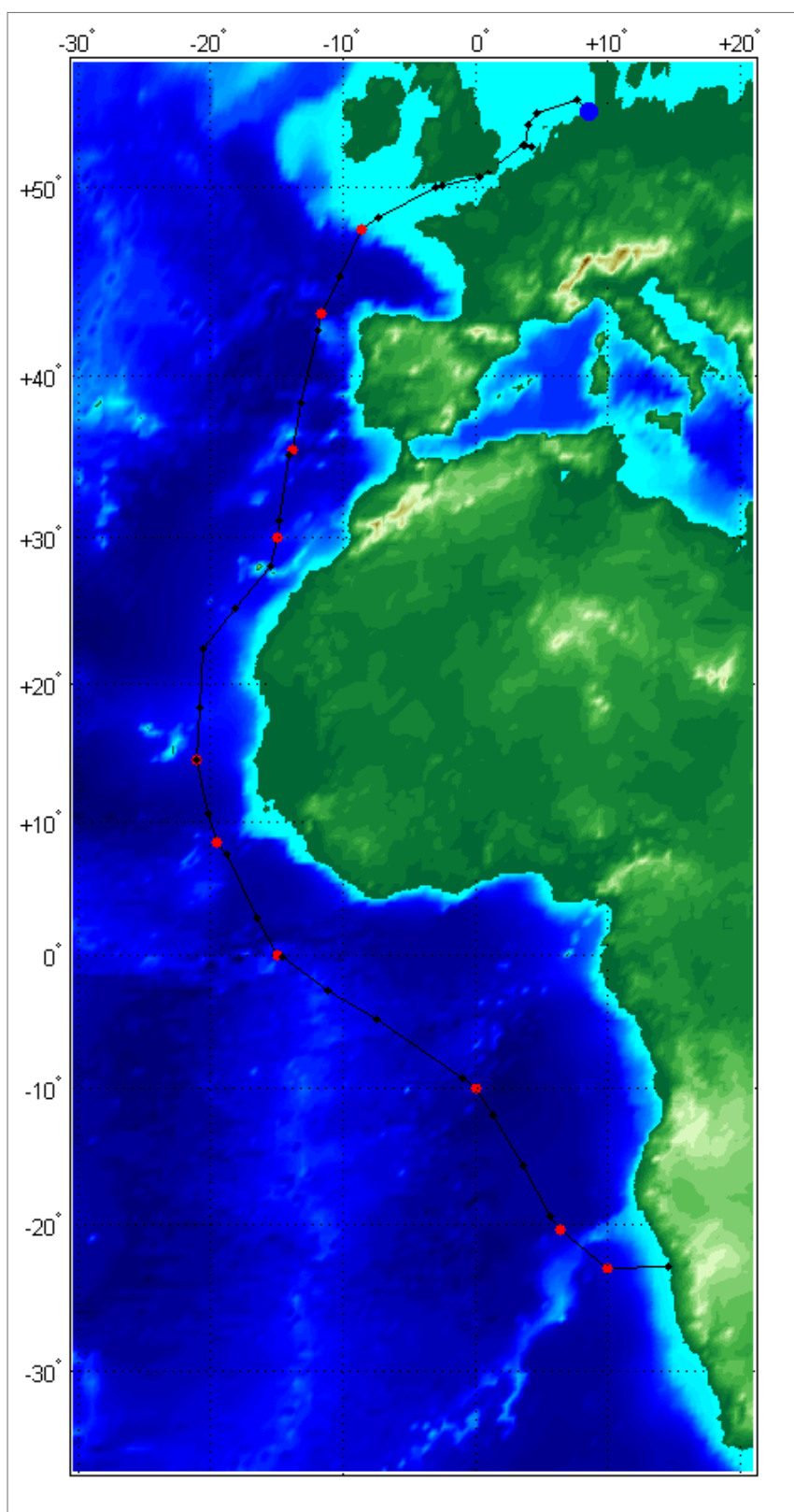
Fig. 2.1: Expedition route with preliminary deep sampling station marks (CTD)

XBT Deployments

Physical environmental data will be enhanced by regular deployment of Expendable Bathythermographs (XBTs) to measure the thermal structure of the upper 1.8 km of the water column. XBT probes are 'fired' when the vessel is underway at a speed of approximately 6 knots. In order to resolve fine scale shelf features such as fronts and mesoscale eddies XBT probes are generally deployed at a distance of ~25 km. For larger scale ocean processes, distances between deployments are in the order of ~150 km. The position and number of XBT stations for the NoSoAT survey is dependent on a number of factors and station positions will be *en route* (Fig. 2.2).
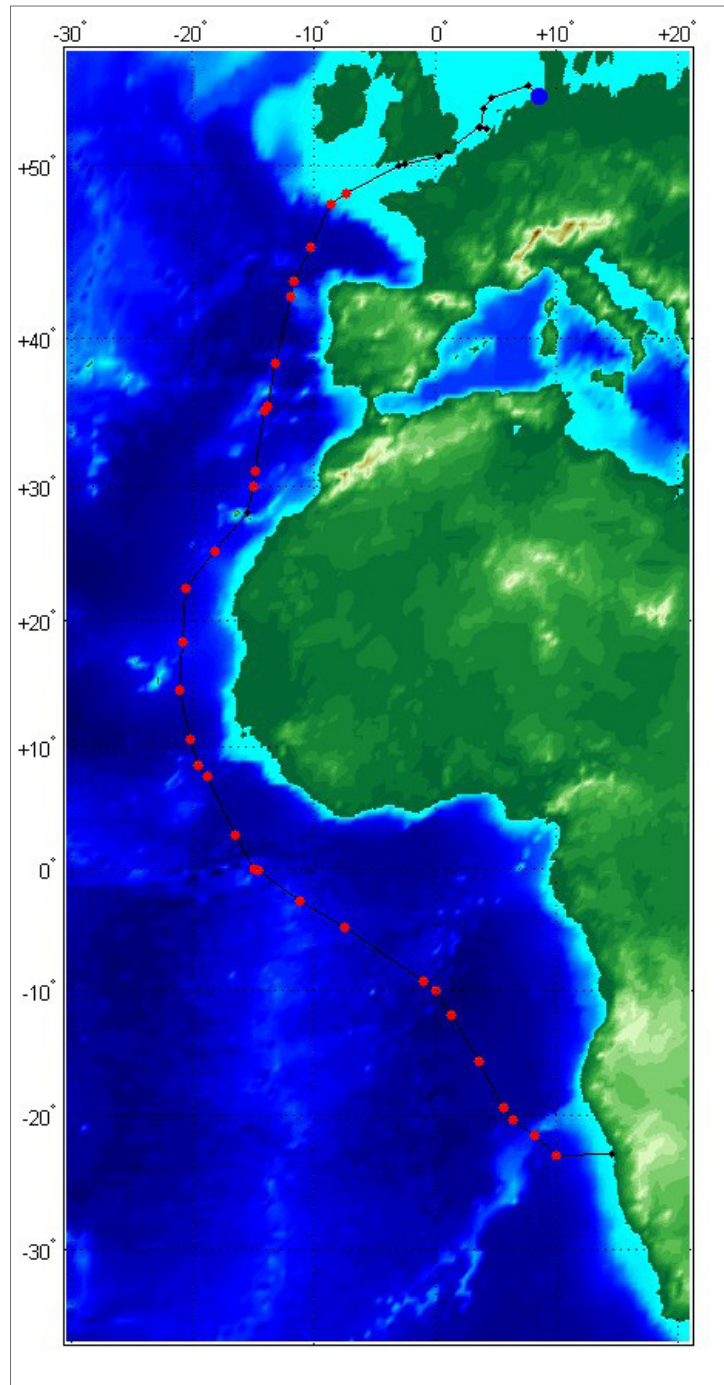

Fig. 2.2: Expedition route with preliminary sampling station marks (CTD, xBT)

Thermosalinograph DAS Measurements & Sampling

In addition, underway sub-surface (ca. 3 m) temperature, salinity and fluorescence data will be collected using the vessels thermosalinograph unit and underway data acquisition system (DAS).

e DNA in the water column

Prokaryotic and eukaryotic microbes and their community changes are much more elusive, compared to larger plankton, mainly due to their size and often uniform morphology, which makes visual identification challenging, if not impossible. Hence, we aim to take samples for subsequent DNA extraction and sequencing. Water samples will be taken with the CTD rosette casts (or alternatively surface water with a bucket) and filter it directly on a 0.2 µm (whole community approach). We assume ten sampling stations with the CTD and plan to sample a) the surface water, b) the Chl max zone, c) water directly below the Chl max zone, d) in 500 m, and e) in 2,500 m. At every depth eDNA filters will be collected. Since the methodologies used for the above-mentioned analysis require very specific instrumentation, this module will consist mainly in sampling for further analysis on land.

Phytoplankton communities distribution along the Atlantic

Different approaches will be performed: characterization of phytoplankton populations through pigment analysis; estimation of phytoplankton cells abundance quantitatively; and obtainment of highly resolved biooptic chlorophyll-a *in-situ* measurements.

Climate relevant dissolved gases in the water column

Utilizing a membrane inlet mass spectrometer (MIMS), discrete samples for dissolved gases will be obtained from the Niskin bottles on the CTD and analyzed onboard ship for N_2, O_2, CO_2, Ar and DMS. Students will be introduced to the concepts of gas solubility, physical mixing, and the use of O_2/Ar ratios for primary productivity estimates. During the course of the expedition, students will be shown how to sample and analyse for dissolved gases onboard ship using a MIMS.

Plastics and Micro plastics in the water column

To address the abundance, distribution, and composition of microplastics, sub-surface water samples will be taken by using on-board pumps and underway pipe system of the *Polarstern*. Two sampling procedures will be carried out during the PS151. Firstly, at the sampling stations, 1 m³ of seawater will be collected in a storage tank and filtered through a cascade of 300 µm followed by 10 µm stainless steel filter cartigdes in a closed filter system to prevent contamination and aim for small microplastics (< 20 µm). Secondly, on a daily basis, seawater collected by an automated underway sampler using collecting the samples on 10 µm stainless steel filter cartigdes in specialized filtration unit. It allows the filtration of a high volume of water over a longer transect. The filtration units will be sealed on board. All filter meshes from both sampling will be stored at -20°C for later polymer analysis in the laboratory. Since bigger plastic items are fragmented over time, we expect to find increasing amounts of microplastics with decreasing particle size. Collected microplastic samples will undergo sample preparation and afterwards characterized using µFT-IR in the home laboratory at Biological Institute Heligoland.

Deployment of Argofloats (BSH)

Argo is an international programme that uses profiling floats to observe temperature, salinity, currents, and, recently, bio-optical properties in the Earth's oceans; it has been operational

since the early 2000s. The real-time data provided is used in climate and oceanographic research. A special research interest is to quantify the ocean heat content (OHC).

The Argo fleet consists of almost 4,000 drifting "Argo floats" (as profiling floats used by the Argo programme are often called) deployed worldwide. Each float weighs 20–30 kg. In most cases probes drift at a depth of 1,000 metres (the so-called parking depth) and, every 10 days, by changing their buoyancy, dive to a depth of 2,000 metres and then move to the seasurface, measuring conductivity and temperature profiles as well as pressure. By this process salinity and density can be calculated. Seawater density is important in determining large-scale motions in the ocean. Average current velocities at 1,000 metres are directly measured by the distance and direction a float drifts while parked at that depth, which is determined by GPS or Argos system positions at the surface. The data are transmitted to shore via satellite, and are freely available to everyone, without restrictions.

Tab. 2.1: Coordinates and depth of the suggested stations along the transit

Station	Latitude	Longitude	Depth [m]
1	48° 28.3' N	7° 18.55' W	156
2	47° 55.8' N	8° 39.6' W	2009
3	45° 27' N	10° 12.6' W	3378
4	43° 30'N	11°37.66' W	5001
5	42° 33.27' N	11° 51.15' W	926
6	38° 25.78' N	13° 6.87' W	4644
7	35° 30' N	13°51.32' W	4813
8	35° 11.84' N	13° 59.87' W	4229
9	31° 4.3' N	14° 51.41' W	3961
10	30° 0' N	15° 0' W	3260
11	25° 19.27' N	18° 5.04' W	3049
12	22°30'N	20°35' W	4186
13	18° 17.81' N	20°49.38' W	3099
14	14° 33.08' N	20° 59.14' W	4252
15	10° 36.04' N	20° 7.9' W	4796
16	8° 28.78' N	19° 28.04' W	4498
17	7° 35.26' N	18°47.62' W	4615
18	2°48'N	16°27'W	4802
19	0° 0' N	15° 0' W	3620
20	0° 12.87' S	14° 37.73' W	3901
21	2° 44.25' S	11° 5.72' W	3335
22	4° 53.46' S	7° 26.07' W	4042
23	9° 15.63' S	0° 59.95' W	4998
24	10° 0' S	0° 0' E	5237
25	11°59 35'S	1° 16.35' E	5451
26	15° 39.88' S	3° 32.65' E	5098
27	19° 23.67' S	5° 41.38' E	5064
28	20° 15' S	6° 21' E	4456
29	21° 42' S	7° 48' E	3004
30	23°0'S	9°42'E	4594

Data Analyses

Simple T/S (CTD) and scatter plots (XBT) will be worked up along the transect to give students a good understanding of different water mass characteristics and data handling. Section plots will be worked up using open software such as Ocean Data Viewer (ODV) http://odv.awi.de which will be integrated with related data sets (phytoplankton, MODIS SST remote sensing data) to determine different water masses and biogeographic and provinces. Comparison with previous trans-meridional data sets will also be undertaken e.g., http://www.pangaea. de/search?ie=UTF-8&env=All&count=10&q=XBT+Polarstern (Wiltshire, K. H. , Brodte, E. M. , Wilson, A. and Lemke, P. (2017), Wiltshire, K. H. and Brodte, E. M. (2020), Wiltshire, K. H. and Dummermuth, A. (2023)).

Climate Basics, Analyses and Modelling

The climate physics teaching will focus on the energy balance of the Earth, especially on heat transport, surface exchange, and the variations of the heat storage in the ocean. The analysis will look in the long-term trend of the warming in the ocean through comparison with CTD data from previous cruises. A special emphasis is on the comparison of the observed (CTD) temperature fields with climate models.

Communication, Ocean Literacy Outreach & Ocean Philosophy

Similar to successful outreach acitivities during previous transit expeditions in collaboration with POGO we will use the *Polarstern* App and the AWI social media accounts for communication and outreach. On-board, students will learn how to communicate scientific knowledge through onboard seminars, presentations and various outreach activities. One target group are school children, interactive video calls with several schools will be organised during the expedition. In addition, scholars will learn, practice and present the "Climate Folk – Dance of the Carbon Cycles – initiated by Prof. Laurence Gill, Chair of Environmental Engineering at Trinity College Dublin. Furthermore, the students on-board will be discussing philosophical aspect of the ocean. The aim would be to explore the existential questions about the origin of life and the significance of the ocean for human societies, including the fascination of the sea – between beauty and threat.

Preliminary (expected) results

The expedition from Bremerhaven to Walvis Bay will cover an enormous geographic range as we transit through temperate, sub-tropical and tropical regions. During the transect, participants will be trained in the principles of oceanographic, meteorological, and atmospheric interactions and their impacts on climate. Work on-board will focus on active learning and hands-on, practical applied research techniques, supported by a suite of background lectures, exercises and presentations. Participants will gain hands-on training in the set-up and operation of scientific instrumentation and equipment, acquisition and processing of samples and analysis and interpretation of the respective data.

These data will allow us to categorise regional oceanic and atmospheric patterns and to identify biogeographic provinces of the Atlantic. The practical work will be supported by on-board lectures, discussions, practical exercises, data workup sessions and peer-led presentations which will enable interpretation of the respective data.

In addition, participants will receive training in understanding climate processes, simple climate modelling and the legal framework of ocean governance and its impacts on research activities at sea.

Students will also receive training in:

- Physics of the climate: processes and models

- Physical, chemical and biological oceanography

- Detection of plastics

- Energy Budgeting

- Molecular Biology

- Discussion and debating

- Bathymetry

- Science communication

The international collaborative nature of the training provides an extraordinary opportunity for school children to interact with the young marine science trainees on board, their local oceanographic institution and researchers as well as the ship.

Data management

Environmental data will be archived, published and disseminated according to international standards by the World Data Center PANGAEA Data Publisher for Earth & Environmental Science (https://www.pangaea.de) within two years after the end of the cruise at the latest. By default, the CC-BY license will be applied.

Molecular data (DNA and RNA data) will be archived, published and disseminated within one of the repositories of the International Nucleotide Sequence Data Collaboration (INSDC, www.insdc.org) comprising of EMBL-EBI/ENA, GenBank and DDBJ).

Any other data will be submitted to an appropriate long-term archive that provides unique and stable identifiers for the datasets and allows open online access to the data.

This expedition was supported by the Helmholtz Research Programme "Changing Earth – Sustaining our Future".

In all publications based on this expedition, the **Grant No. AWI_PS151_01** will be quoted and the following publication will be cited:

Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung (2017) Polar Research and Supply Vessel POLARSTERN Operated by the Alfred-Wegener-Institute. Journal of large-scale research facilities, 3, A119. http://dx.doi.org/10.17815/jlsrf-3-163.

References

Brodte et al (2025) The *Polarstern* Atlantic Transect as a concept for shipboard training on ocean science. ICES Journal of Marine Science.

Krug L A, Beckman F, Rees A P, Dummermuth A, Stymiest C, Brodte E-M, Wiltshire K H, Croot P, and Seeyave S (2025) All aboard! Providing shipboard technical skills while building capacity in ocean observations. Oceanography 38(1):20–25. https://doi.org/10.5670/oceanog.2025.123

Wiltshire K H and Dummermuth A (2023) The Expedition PS132 of the Research Vessel POLARSTERN to the Atlantic Ocean in 2022 / H. Bornemann and S. Amir Sawadkuhi (editors). Berichte zur Polar- und Meeresforschung = Reports on polar and marine research, Bremerhaven, Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung 771, 46 p. https://doi.org/10.57738/BzPM_0771_2023

Wiltshire K H and Brodte E M (2020) The Expedition PS120 of the Research Vessel POLARSTERN to the Atlantic Ocean in 2019. Berichte zur Polar- und Meeresforschung = Reports on polar and marine research, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research 740, 58 p. https://doi.org/10.2312/BzPM_0740_2020

Wiltshire K H, Brodte E M, Wilson A and Lemke P (2017) The Expedition PS102 of the Research Vessel POLARSTERN to the Atlantic Ocean in 2016. Berichte zur Polar- und Meeresforschung = Reports on polar and marine research, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research 713, 99 p. https://doi.org/10.2312/BzPM_0713_2017

3.   BATHYMETRY

Natalie Roslyn Cornish[1], Ludovica Martina Gatti[2]   [1]DE.AWI
Boris Dorschel[1] (not on board)   [2]DE.UNI-Potsdam

Grant-No. AWI_ PS151_02

Objectives

High-resolution bathymetry is a key dataset required to understand many marine processes, and is particularly important when interpretating scientific data in a spatial context. Bathymetry contains valuable information on geomorphological features at various spatial scales, from isolated, individual features like knolls or seamounts, to those across large spatial expanses like sand waves or contourites. The spatial nature of bathymetric data means that it also provides context to the broader environment being studied. Bathymetry can also enhance our knowledge of geological processes such as erosion, sediment transport or even tectonics. In addition to the multibeam swath bathymetry, high-resolution sub-bottom profiler transects reveal insights on subsurface sediment composition and characteristics.

Although global maps give the impression that seafloor topography has been fully mapped, most of the world's ocean floor remains unmapped by hydroacoustic systems. In regions lacking such hydroacoustic measurements, bathymetry is modelled from satellite altimetry which is characterized by relatively low spatial and temporal resolutions, when compared with hydroacoustic data. Bathymetry derived from satellite altimetry thus lacks the resolution necessary to resolve small- to meso-scale geomorphological features (e.g., sediment waves, glacial features and small seamounts). Ship-borne multibeam data provide bathymetric information in a resolution sufficient to resolve those features. The collection of underway data during PS151 will contribute to the bathymetry data archive at AWI, which, in turn, contributes to global bathymetric datasets such as GEBCO (General Bathymetric Chart of the Ocean).

Work at sea

Bathymetric data will be recorded with the *Teledyne Reson HYDROSWEEP DS3*, which is a hull-mounted multibeam echosounder. The bathymetry working group's primary task is to operate hydroacoustic systems during transit. Sound velocity profiles acquired from CTD, underway CTD, SVP or XBT measurements, will calibrate the raw bathymetric data, by correcting for sound velocity changes in the water column. All multibeam data collected will be cleaned for erroneous soundings and artefacts.

Preliminary (expected) results

The expected results are high-resolution seabed maps along the cruise track.

Data management

Environmental data will be archived, published and disseminated according to international standards by the World Data Center PANGAEA Data Publisher for Earth & Environmental Science (https://www.pangaea.de), within two years after the end of the cruise, at the latest.

The data will fall under a CC-BY license, by default. Furthermore, bathymetric data will be provided to the Nippon Foundation – GEBCO Seabed 2030 Project.

The data will be obtained as part of the Project BATHY-LTO.

This expedition is supported by the Helmholtz Research Programme "Changing Earth – Sustaining our Future" Topic 2, Subtopic 3 Sea Level Change.

In all publications based on this expedition, the **Grant No. AWI_PS PS151_02** will be quoted and the following publication will be cited:

Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung (2017) Polar Research and Supply Vessel POLARSTERN Operated by the Alfred-Wegener-Institute. Journal of large-scale research facilities, 3, A119. http://dx.doi.org/10.17815/jlsrf-3-163

4.   PHYSICS OF THE ATMOSPHERE

Amanda Sellmaier[1, 2], Markus Rex[1]

[1]DE.AWI
[2]DE.TUBS

Grant-No. AWI_PS PS151_00

Objectives

Under this project we will carry out the standard radiosonde programme of the weather station on *Polarstern*. The data will contribute to the compilation of meteorological data from the weather station. Additionally, a time series of methane (CH_4) concentration and its stable carbon isotopic signature is recorded in the lower troposphere. Methane is the second most important human-influenced greenhouse gas in terms of climate forcing. For CH_4, both bottom-up and top-down approaches are subject to large uncertainties, leading to a significant mismatch in modelling. The time series will contribute to quantify CH_4 sources and sinks in the Atlantic Ocean needed for the improvement of model parameterizations.

Work at sea

The standard radiosonde programme includes daily soundings of the standard meteorological parameter temperature, pressure, wind and humidity up to approximately 30 km altitude with weather balloons. The continuous ship-borne measurements of CH_4 concentration and $δ^{13}C$-CH_4 will be carried out by Cavity Ring-Down Spectroscopy (CRDS) using a Picarro G2132-i isotope analyser (Picarro, Inc., Santa Clara, USA). CRDS is a highly sensitive gas analysis technique that measures the near-infrared absorption spectra of small gas-phase molecules within a high-reflectivity cavity using a laser diode. Air will be sucked from the starboard side of the Peildeck at about 21 m above sea-ice/water surface using a Teflon tube. A constant flow will be generated with a 3KQ Diaphragma pump (Boxer, Ottobeuren, Germany).

Preliminary (expected) results

All data will be made public under the established procedures for weather observations and will contribute to the section on meteorological conditions of the cruise report, which will be prepared by the meteorologist on board. Variations in CH_4 concentration and $δ^{13}C$-CH_4 ratios over time will help to understand and validate source and sink capacities. The data evaluation focuses on using backwards airmass trajectories to monitor air masses and to distinguish locally induced signals from signals transported from remote areas.

Data management

Atmospheric data collected during the expedition will be archived and published in the PANGAEA data repository (https://www.pangaea.de) at the AWI in accordance to the AWI research data guideline and directive (https://hdl.handle.net/10013/epic.be2ebee5-fb98-4144-9e74-aa1d38378c5e).

Any other data will be submitted to an appropriate long-term archive that provides unique and stable identifiers for the datasets and allows open online access to the data.

This expedition was supported by the Helmholtz Research Programme "Changing Earth – Sustaining our Future" Topic 1, Subtopic 2.

In all publications based on this expedition, the **Grant No. AWI_PS PS151_00** will be quoted and the following publication will be cited:

Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung (2017) Polar Research and Supply Vessel POLARSTERN Operated by the Alfred-Wegener-Institute. Journal of large-scale research facilities, 3, A119. http://dx.doi.org/10.17815/jlsrf-3-163

APPENDIX

A.1   TEILNEHMENDE INSTITUTE / PARTICIPATING INSTITUTE

A.2   FAHRTTEILNEHMER:INNEN / CRUISE PARTICIPANT

A.3   SCHIFFSBESATZUNG / SHIP'S CREW

A.4.   STATIONSLISTE / STATION LIST

A.1 TEILNEHMENDE INSTITUTE / PARTICIPATING INSTITUTES

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CL.ECOTECNOS	SGS-Ecotecnos Limache 3405 7410000 Viña del Mar Chile
CL.UPV	Universidad del País Vasco Hernando de Magallanes 1047 7570582 Santiago Chile

Affiliation	Address
On board	
CV.UTA	Universidade Técnica do Atlântico CP.163 – Campus de Ribeira de Julião, São Vicente 2110 Mindelo Cape Verde
DE.AWI	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung Postfach 120161 27515 Bremerhaven Germany
DE.BGV	BG Verkehr Seeärztlicher Dienst Brandstwiete 1 20457 Hamburg Germany
DE.DWD	Deutscher Wetterdienst Seewetteramt Bernhard Nocht Str. 76 20359 Hamburg Germany
DE.HEREON	Helmholtz-Zentrum hereon GmbH Max-Planck-Str. 1 21502 Geesthacht Germany
DE.LAEISZ	Reederei Laeisz Bartelstraße 1 27568 Bremerhaven Germany
DE.MACGREGOR	Macgregor GmbH & Co Kg Haderslebener Straße 7 25421 Pinneberg Germany
DE.MWB	MWB Elektrotechnik Service GmbH Rudloffstrasse 49 27568 Bremerhaven Germany
DE.SYSTEMA	Systema Gesellschaft für angewandte Datentechnik mbH Baberowweg 7 14482 Potsdam Germany
DE.UNI-Bremen	Universität Bremen Bibliothekstraße 1 28359 Bremen Germany

Affiliation	Address
On board	
DE.UNI-Göttingen	Georg-August-Universität Göttingen Bioklimatologie Wilhelmsplatz 1 37073 Göttingen
DE.UNI-Potsdam	Universität Potsdam Am Neuen Palais 10 14469 Potsdam
DE.TUBS	Technical University Braunschweig Universitätspl. 2 38106 Braunschweig Germany
DZ.ENSSMAC	Ecole Nationale Supérieure des Sciences de la Mer et de l'Aménagement du Littoral Campus Universitaire de Dely Ibrahim Bois des Cars 16000 Algiers Algeria
EG.PSU	Port Said University 451123 Port Said Egypt
ES.AZTI	AZTI Foundation Biotechnology and Molecular Ecology Txatxarramendi Island 48395 Sukarrieta Spain
GH.FCWC.FISH	Fisheries Commission Fisheries Scientific Survey Division P.O. Box BT 62 233 Tema Ghana
IA.ATU	Atlantic Technological University Department of Natural Resources & the Environment ATU Galway City, Old Dublin Road H91 T8NW Galway Ireland
IE.MET	Met Éireann Research & Applications Division 65/67 Glasnevin Hill D09 Y921 Dublin Ireland

Affiliation	Address
On board	
IE.TCD	Trinity College Dublin Faculty of Science, Technology, Engineering and Mathematics (STEM) Dublin 2 Ireland
IE.UCC	University College Cork College Road T12 K8AF Cork Ireland
IE.UNI-Galway	University of Galway Earth and Ocean Sciences University Road, H91 TK33 Galway Ireland
IT.OGS	Istituto Nazionale di Oceanografia e di Geofisica Sperimentale Sezione di Oceanografia Borgo Grotta Gigante 42/C 34010 Sgonico Italy
MX.UABC	Autonomous University of Baja California Carr. Transpeninsular 3917 22860 Ensenada Mexico
NA.NNF	Namibia Nature Foundation 6 Hidipo Hamutenya str 13001 Swakopmund Namibia
PT.UALG	Universidade de Algarve Campus de Gambelas 8005-139 Faro Portugal
TN.CBBC	Center of Biotechnology of Borj-Cedria Laboratory of Bioactive Substances BP 901 Hamman-lif 2050 Ben Arous Tunesia
UK.STIR	University of Stirling FK9 4LA Stirling United Kingdom

Not on board	
DE.BSH	Bundesamt für Seeschiffahrt und Hydrographie Bernhard-Nocht-Str. 78 20359 Hamburg Germany

A.2 FAHRTTEILNEHMER:INNEN / CRUISE PARTICIPANTS

Name/ Last name	Vorname/ First name	Institut/ Institute	Beruf/ Profession	Fachrichtung/ Discipline
Aguilar Vega	Ximena	University of Stirling	PhD student	Glaciology
Amaral Wasielesky	Ana	Istituto Nazionale di Oceanografia e di Geofisica Sperimentale	PhD student	Oceanography
Arafat	Esraa	Port Said University	PhD student	Oceanography
Bahl	Beate	BG Verkehr Seeärtzlicher Dienst	Other	Logistics
Bellabad	Fahima	Ecole Nationale Superieure des Sciences de la Mer et de l'Amenagement du Littoral	PhD student	Other Geosciences
Bergmann	Anna	Alfred-Wegener-Institut	Scientist	Biology
Boersma	Oisín Jelle	Georg-August-Universität Göttingen	PhD student	Meteorology
Boje	Andreas	MacGregor	Other	Logistics
Castillo Ramírez	Alejandra de Jesús	Autonomous University of Baja California	Scientist	Oceanography
Claußen	Marthe	Alfred-Wegener-Institut	Technician	Biology
Claver	Cristina	AZTI Foundation	Scientist	Biology
Concolis	Brenna Mei	Helmholtz-Zentrum hereon GmbH	PhD student	Other Geosciences
Cornish	Natalie Rosyln	Alfred-Wegener-Institut	Scientist	Geophysics
Crenan	Brieuc	Reederei F. Laeisz GmbH	Inspector	Shipping Company

Name/ Last name	Vorname/ First name	Institut/ Institute	Beruf/ Profession	Fachrichtung/ Discipline
Croot	Peter	University of Galway	Scientist	Oceanography
Dos Santos	Sarah Sofia Dias	Universidade Técnica do Atlântico	Scientist	Biology
Dummermuth	Angelika	Alfred-Wegener-Institut	Scientist	Biology
Ewusi	Emmanuel Ofosu Mireku	Fisheries Commission	Scientist	Biology
Fragueiro	María Monserrat	SGS-Ecotecnos	Scientist	Biology
Galdiga	Tim	Alfred-Wegener-Institut	Technician	Engineering Sciences
Garcia Ortiz	Tomas Andres	Alfred-Wegener-Institut	PhD student	Biology
Gatti	Ludovica Martina	Universität Potsdam	Student (Master)	other geo sciences
Hähnel	Uwe	MWB Elektrotechnik Service GmbH	Engineer	Shipping Company
Hossain	Md. Shabit	Shahjalal University of Science and Technology	Student (Master)	Oceanography
Hug	Guillaume	Maynooth University	Student	Oceanography
Karow	Nils	MacGregor	Other	Logistics
Kirstein	Inga	Alfred-Wegener-Institut	Scientist	Biology
Knobloch	Joscha Paul	Alfred-Wegener-Institut	Engineer	Logistics
Lemke	Peter	Alfred-Wegener-Institut	Scientist	Physics
Molano Cárdenas	Sergio Mauricio	Universidade Federal do Rio Grande do Sul	PhD student	Geology
Moyo	Penelope Nozithelo	Atlantic Technological University	PhD student	Biology
Nghaangulwa	Priskilla Patemoshela Ndapewoshali	Namibia Nature Foundation	Scientist	Biology
OFlynn	Aisling	University College Cork	Student (Master)	Biology
Pérez López	Benjamín Andrés	Universidad del País Vasco	Scientist	Oceanography
Primpke	Sebastian	Alfred-Wegener-Institut	Scientist	Chemistry

Name/ Last name	Vorname/ First name	Institut/ Institute	Beruf/ Profession	Fachrichtung/ Discipline
Ribeiro	Caio Cesar	Universidade de Algarve	Scientist	Oceanography
Rodrigues	Douglas	Fundacao Universidade do Rio Grande	Scientist	Biology
Sarker	Subrata	Shahjalal University of Science and Technology	Teacher	Oceanography
Sayari	Olfa	Center of Biotechnology of Borj-Cedria	PhD student	other geo sciences
Seidenstücker	Andreas	Systema Gesellschaft für angewandte Datentechnik mbH	Other (e.g. freelancer or pupil)	Data
Sellmaier	Amanda	Alfred-Wegener-Institut, Technical University Braunschweig	PhD student	Physics
Semmler	Tido	Met Éireann	Scientist	Meteorology
Sieroka	Norman	Universität Bremen, ETH Zürich	Scientist	Physics
Suter	Patrick	Deutscher Wetterdienst	Scientist	Meteorology
Swaraj	Ankit	University of Galway	PhD student	Oceanography
van der Marck	Floor	Private	Scientist	Marine Science and Climate Change
Wiese	Anne Jasmin	Deutscher Wetterdienst	Scientist	Meteorology
Wiltshire	Karen	Trinity College Dublin	Chief scientist	Oceanography
Zinzindohoue	Coffi Gerard Franck	Private	Scientist	Oceanography

A.3 SCHIFFSBESATZUNG / SHIP'S CREW PS151

No.	Nachname/ Name	Vorname/ First name	Rank / Position
1	Kentges	Felix	Master
2	Langhinrichs	Jacob	Chief Mate
3	Janik	Michael	Chief Mate Cargo
4	Hering	Igor	2nd Mate
5	Rathke	Wulf Jannik	2nd Mate
6	Gößmann-Lange	Petra	Doctor
7	Ziemann	Olaf Hermann August	Chief Engineer
8	Farysch	Tim	2nd Engineer
9	Brose	Thomas Christian Gerhard	2nd Engineer
10	Domann	Franz	2nd Engineer
11	Zivanov	Stefan	Ship Electrotechnical Officer Engine
12	Kliemann	Olaf	Electrotechnical Engineer Winches
13	Hofmann	Jörg Walter	Electrotechnical Engineer Network/Bridge
14	Hüttebräucker	Olaf	Electrotechnical Engineer Labor
15	Pliet	Johannes Oliver	Electrotechnical Engineer System
16	Sedlak	Andreas Enrico	Bosun
17	Neisner	Winfried Wolfgang	Carpenter
18	Klee	Philipp	Multi Purpose Rating Deck
19	Burzan	Gerd-Ekkehard	Multi Purpose Rating Deck
20	Fischer	Sascha	Multi Purpose Rating Deck
21	Klähn	Anton	Multi Purpose Rating Deck
22	Kryszkiewicz	Maciej Waldemar	Multi Purpose Rating Deck
23	Siegel	Kilian	Multi Purpose Rating Deck
24	Bäcker	Andreas	Multi Purpose Rating Deck
25	Röth	Benedikt Konrad	Multi Purpose Rating Deck
26	Preußner	Jörg	Storekeeper

No.	Nachname/ Name	Vorname/ First name	Rank / Position
27	Rolofs	Nils Christian Timo	Multi Purpose Rating Engine
28	Hänert	Ove	Multi Purpose Rating Engine
29	Klinger	Dana	Multi Purpose Rating Engine
30	Schneider	Denise	Multi Purpose Rating Engine
31	Kliem	Julian Peter	Multi Purpose Rating Engine
32	Hofmann	Werner	1st Cook
33	Hammelmann	Louisa	2nd Cook
34	Dietrich	Emilia Felizitas Ilse Lieselotte	2nd Cook
35	Pieper	Daniel	1st Stewardess
36	Brändli	Monika	2nd Stewardess
37	Dibenau	Torsten	2nd Steward
38	Möhle	Steffi	2nd Stewardess
39	Schwantes	Andrea	2nd Stewardess / Nurse
40	Arendt	Rene	2nd Steward / Laundry
41	Cheng	Qi	2nd Steward / Laundry
42	Chen	Dansheng	2nd Steward / Laundry
43	Chen	Dansheng	2nd Steward / Laundry
44	Liedtke	Mattes	Apprentice Multi Purpose Rating