

EXPEDITION PROGRAMME  
PS130/1 and PS130/2

# Polarstern

PS130/1 and PS130/2

Punta Arenas - Las Palmas - Bremerhaven

30 April 2022 - 30 May 2022

Coordinator:

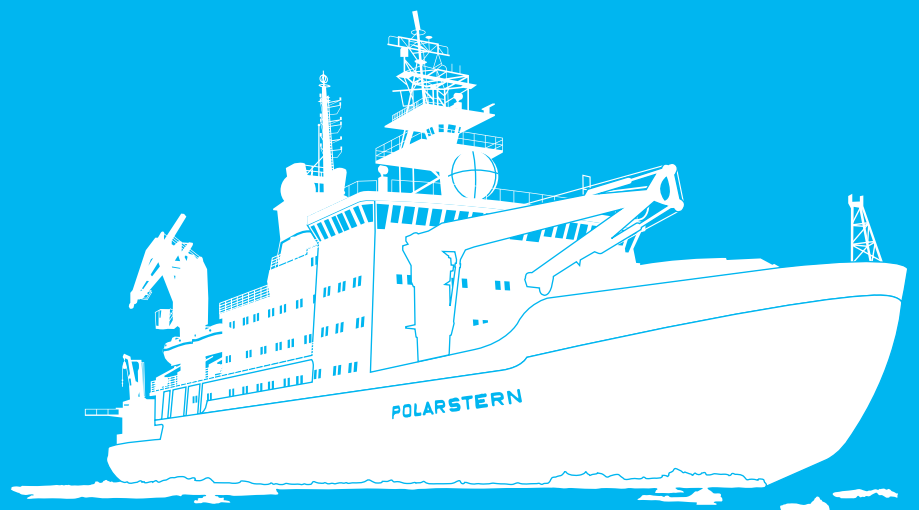
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Chief Scientist PS130/1:

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Claudia Hanfland



HELMHOLTZ

Bremerhaven, April 2022

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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.

Editorial editing and layout  
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**PS130/1  
PS130/2**

**30 April 2022 – 30 May 2022**

**Punta Arenas – Las Palmas – Bremerhaven**

**Chief scientists**

**Simon Dreutter  
(PS130/1 Punta Arenas – Las Palmas)**

**Claudia Hanfland  
(PS130/2 Las Palmas – Bremerhaven)**

**Coordinator  
Ingo Schewe**

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# 1. ÜBERBLICK UND FAHRTVERLAUF

Simon Dreutter<sup>1</sup>, Claudia Hanfland<sup>1</sup>

<sup>1</sup>DE.AWI

Der Fahrtabschnitt PS130 ist der letzte Abschnitt der antarktischen Forschungssaison 2021/22 und dient der Überführung des Schiffes in seinen Heimathafen Bremerhaven. Die Expedition PS130 startet in Punta Arenas am 30.04.2022 und endet am 30.05.2022 in Bremerhaven (Abb. 1). Am 22.05.2022 wird ein Zwischenstopp in Las Palmas stattfinden, der die Fahrt in die Abschnitte PS130/1 und PS130/2 gliedert. Auf der gesamten Reise (Abschnitte 1 und 2) werden folgende *en route* Messungen und Tätigkeiten durchgeführt:

1. Mit den schiffsinternen hydroakustischen Systemen wird auf der gesamten Strecke ein Streifen Meeresbodentopographie bathymetrisch vermessen. Die Gesamtfahrtzeit von vier Wochen umfasst einige Stunden Stationszeit für die Kalibration der Echolotsysteme mittels Wasserschallsonde sowie Durchführung einer CTD-Station in der Biskaya.
2. Über die Seewasserpumpe werden kontinuierlich Wasserproben zur Bestimmung der Mikroplastikkonzentrationen an der Wasseroberfläche genommen.
3. Weiterhin werden auf vorangegangenen Expeditionen gewonnene Planktonproben an das Alfred-Wegener-Institut Helmholtz Zentrum für Polar- und Meeresforschung nach Bremerhaven transportiert.

Während des Zwischenstopps in Las Palmas wird Treibstoff gebunkert. Zudem werden folgende Arbeitsgruppen für den Fahrtabschnitt PS130/2 an Bord gehen:

4. Mitarbeitende der Logistik für Arbeiten am IT-Netz an Bord
5. Mitarbeitende des *Polarstern II* Teams zum besseren Kennenlernen des Schiffes
6. POLMAR-TRAIN: Masterstudent:innen der Universität Bremen, Fachbereich Geowissenschaften sowie Doktorand:innen des AWI und der International Research Training Group ArcTrain zur Ausbildung in geophysikalischen Methoden an den hydroakustischen Messsystemen. Neben den bathymetrischen Vermessungen mit dem Fächerecholot Hydrosweep wird die Gruppe den Sedimentaufbau der oberen Schichten des Meeresbodens mit dem parametrischen Sedimentecholot Parasound vermessen.

## SUMMARY AND ITINERARY

Simon Dreutter<sup>1</sup>, Claudia Hanfland<sup>1</sup>

<sup>1</sup>DE.AWI

The expedition PS130 is the final leg of the Antarctic season 2021/22 and will bring the ship back to its port of registry, Bremerhaven. The leg PS130 will start in Punta Arenas on 30 April 2022 and will end on 30 May 2022, in Bremerhaven (Fig. 1). One stopover will take place in Las Palmas on 22 May, thereby splitting the cruise in two legs, PS130/1 and PS130/2, respectively.

The following underway measurements will be carried out throughout the entire journey (legs 1 and 2):

1. With the ship-mounted hydroacoustic systems, a swath of seabed topography will be bathymetrically surveyed along the ship's track. A few hours of station time will be spent on calibrating the echosounding systems by sound velocity profiler and one CTD cast in the Bay of Biskaye.
2. Continuous water samples from the ship's seawater supply will be continuously analyzed for microplastics concentration in surface waters.
3. Living organisms like plankton caught during the previous Antarctic season will be cared for and transported to the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research in Bremerhaven.

While bunkering fuel in Las Palmas, additional working groups will join the cruise:

4. Staff of AWI Logistics Department for maintenance of the IT network on board
5. Staff of AWI *Polarstern II* team for familiarization with the ship
6. POLMAR-TRAIN: master students from University of Bremen, department of geosciences as well as doctoral candidates from AWI and from the International Research Training Group ArcTrain for a hands-on training in geophysical methods on the ship-mounted hydroacoustic systems. Next to bathymetric surveys of the seafloor with the multibeam echosounder Hydrosweep, the group will also investigate the upper part of the sedimentary layer with the parametric sediment echosounder Parasound.

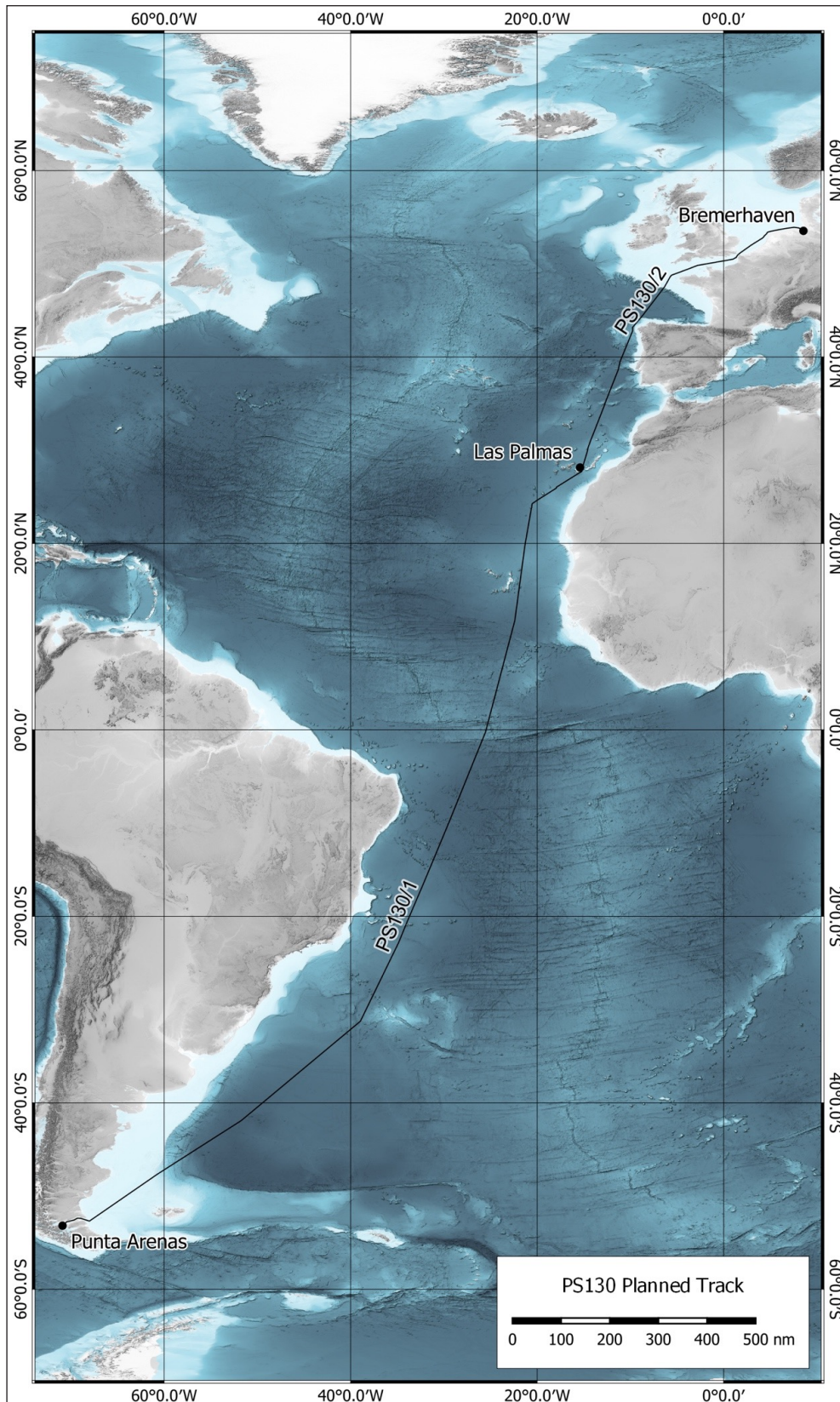


Abb. 1: Geplante Route der Fahrtabschnitte PS130/1 und PS130/2

Fig. 1: Planned route of cruise legs PS130/1 and PS130/2



## **2. BATHYMETRIC UNDERWAY MEASUREMENTS**

Simon Dreutter<sup>1</sup>, Ellen Werner<sup>1</sup>  
not on board: Boris Dorschel<sup>1</sup>

<sup>1</sup>DE.AWI

**Grant-No. AWI\_PS130\_01**

### **Objectives**

Accurate knowledge of the seafloor topography, hence high-resolution bathymetry data, is a basic key information necessary to understand many marine processes. It is of particular importance for the interpretation of scientific data in a spatial context. Bathymetry, hence geomorphology, is furthermore a basic parameter for the understanding of the general geological setting of an area and geological processes such as erosion, sediment transport and deposition. Even information on tectonic processes can be inferred from bathymetry. Supplementing the bathymetric data, high-resolution sub-bottom profiler data of the top 10s of meters below the seabed provide information on the sediments at the seafloor and on the lateral extension of sediment successions.

While world bathymetric maps give the impression of a detailed knowledge of worldwide seafloor topography, most of the world's ocean floor remains unmapped by hydroacoustic systems. In these areas, bathymetry is modelled from satellite altimetry with a corresponding low resolution. Satellite-altimetry derived bathymetry therefore lack the resolution necessary to resolve small- to meso-scale geomorphological features (e.g. sediment waves, glaciogenic features and small seamounts). Ship-borne multibeam data provide bathymetry information in a resolution sufficient to resolve those features. The collection of underway data during PS130 will contribute to the bathymetry data archive at the AWI and therefore contribute to bathymetric world datasets like GEBCO (General Bathymetric Chart of the Ocean).

### **Work at sea**

Bathymetric data will be recorded with the hull-mounted multibeam echosounder Teledyne Reson HYDROSWEEP DS3. The main task of the bathymetry group is to run hydroacoustic systems during transit. The raw bathymetric data will be corrected for sound velocity changes in the water column, and will be further processed and cleaned for erroneous soundings and artefacts.

Sound velocity profiles will be collected with a CTD (Conductivity Temperature Depth), an Underway CTD, or an SVP (Sound Velocity Probe) whenever possible.

### **Preliminary (expected) results**

Expected results will consist of high-resolution seabed maps along the cruise track.

### **Data management**

Geophysical and oceanographic 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. Furthermore, bathymetric data will be provided to the Nippon Foundation – GEBCO Seabed 2030 Project.

In all publications based on this expedition, the **Grant No. AWI\_PS130\_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>.

### 3. MICROPLASTICS

Gabriel Erni-Cassola<sup>1</sup>  
not on board: Patricia Burkhardt-Holm<sup>1</sup>

<sup>1</sup>CH.UNIBASEL

**Grant-No. AWI\_PS130\_02**

#### **Objectives**

Microplastics, i.e. plastic debris <5 mm, have been identified as widespread and persistent pollutants in all types of environmental compartments. On sea surfaces, buoyant plastic debris is transported by marine currents to major oceanic gyres, where it is found to accumulate (Cózar et al. 2014). In aquatic systems, microplastics are colonised by microbes and multicellular organisms, forming a “Plastisphere”, which mediates the plastic’s interaction with the surrounding environment (Oberbeckmann and Labrenz 2020; Wright et al. 2020a). It has for instance been proposed as an important factor for removal of buoyant plastic from sea surfaces through the added density of the colonising organisms. In addition, the colonising biota perform various biological functions, which may increase ingestion rates by other biota, contribute towards polymer degradation, or create a nutrient hotspot in an otherwise oligotrophic environment, e.g. through nitrogen fixation. To date however, very limited data exist on temporal dynamics of plastic colonisation in non-coastal environments, and if the Plastispheres vary by geographic region. With the proposed work we aim to provide microbial colonisation time series data from polyethylene, one of the most commonly found polymer types in surface waters, based on NGS sequencing. In addition, we aim to determine the polymer density over time in response to microbial colonisation, as well as the accreted biofilm thickness. Taken together, the proposed project represents a first systematic, time-course study of the Plastisphere in an off shore setting, while simultaneously addressing the general lack of Plastisphere data in the South Atlantic (Wright et al. 2020b).

#### **Work at sea**

Development of the Plastisphere on low-density polyethylene (LDPE) films will be studied using a flow through system (60L aquarium), under natural light and temperature conditions, receiving seawater from the ship’s Klaus Union Sealex Centrifugal Pump. Separate incubations are planned for the South Atlantic (departing from Falkland Islands to Equatorial Counter Current) and North Atlantic (from Equatorial Counter Current to North Sea). Polymer films, and glass slides as control surfaces, will be exposed to seawater on stainless steel racks. To capture different Plastisphere developmental stages, samples will initially be taken regularly, i.e. on day 0.5, 1, 2, 3 and 8, as well as on day 14 (or earlier, if leaving defined geographic region) to obtain samples of the more stable, later stage Plastispheres (Wright et al. 2019; Erni-Cassola et al. 2020).

At sea, density of biofouled LDPE sections will be estimated by sequentially introducing colonised film pieces into Percoll-NaCl solutions of increasing density. Plastisphere oxygen production and respiration will be measured using sample subsections, under light and dark conditions respectively, with an oxygen meter. For community analysis, biofilms will be removed

from substrates via sonication and stored for DNA extraction. Samples for determining biofilm thickness will be fixed (4 % paraformaldehyde).

### **Preliminary (expected) results**

The overall aim of the incubation experiment is to characterize the temporal dynamics of the microbial Plasticsphere formation under continuous supply of non-coastal, natural surface seawater in the North and South Atlantic. The collected data will contribute to an improved understanding of Plasticsphere community formation and functional potential, as current data stem from opportunistically sampled plastic particles with unknown history. Density measurements will help understanding, whether microbial biofouling has the potential to cause initially buoyant polymers to sink in seawater.

### **Data management**

Molecular data (DNA) will be archived, published and disseminated within one of the repositories of the International Nucleotide Sequence Data Collaboration (INSDC, [www.insdc.org](http://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.

In all publications based on this expedition, the **Grant No. AWI\_PS130\_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>.

### **References**

- Cózar A, Echevarría F, González-Gordillo JI, et al (2014) Plastic debris in the open ocean. *Proc Natl Acad Sci* 111:10239–10244.
- Erni-Cassola G, Wright RJ, Gibson MI, Christie-Oleza JA (2020) Early Colonization of Weathered Polyethylene by Distinct Bacteria in Marine Coastal Seawater. *Microb Ecol* 79:517–526.
- Oberbeckmann S, Labrenz M (2020) Marine Microbial Assemblages on Microplastics: Diversity, Adaptation, and Role in Degradation. *Ann Rev Mar Sci* 12:2.1-2.24.
- Wright RJ, Erni-Cassola G, Zadjelovic V, et al. (2020a) Marine Plastic Debris: A New Surface for Microbial Colonization. *Environ Sci Technol* 54:11657–11672.
- Wright RJ, Gibson MI, Christie-Oleza JA (2019) Understanding microbial community dynamics to improve optimal microbiome selection. *Microbiome* 7:85.
- Wright RJ, Langille MGI, Walker TR (2020b) Food or just a free ride? A meta-analysis reveals the global diversity of the Plasticsphere. *ISME J* 1–18.

## **4. POLARSTERN O2A DATA LOGISTICS SUPPORT**

Maximilian Betz<sup>1</sup>, Sebastian Immoor<sup>1</sup>,

<sup>1</sup>DE.AWI

**Grant-No. AWI\_PS130\_00**

### **Objectives**

The Data Logistics Support (DLS) team from the Computing Department works on O2A (Observation to Archive) products and is responsible for the components on *Polarstern*. In November 2021 the new Mass Data Management (MDM) system onboard *Polarstern* was put into operation. We plan to collect feedback during operation and aim to connect more scientific data sources.

### **Work at sea**

The deployment and test of a new user interface to provide a convenient way to send and receive data via Kepler Space is planned. This system enables to transceive up to 10 Gigabytes per day, especially also in polar regions.

*Polarstern's* Mapviewer system will be prepared to display deployed buoys live on the map. The coupling between DShip-System and Sensor-Metadate-Information System is in operation since MOSAiC. A new module to plan a mission (expedition) in Sensor is being developed. The DShip coupling concept must be reviewed and updated.

## 5. ECHOSOUNDING TRAINING POLMAR-TRAIN

Claudia Hanfland<sup>1</sup>, Simon Dreutter<sup>1</sup>,  
Frank Niessen<sup>1</sup>, Gerhard Kuhn<sup>1</sup>, Michal Siccha<sup>2</sup>

<sup>1</sup>DE.AWI  
<sup>2</sup>DE.MARUM

**Grant-No. AWI\_PS130\_04**

### Objectives

The project POLMAR-TRAIN is a training course jointly run by the AWI-based Helmholtz Graduate School for Polar and Marine Research (POLMAR), the University of Bremen, Department of Geosciences and the International Research Training Group ArcTrain.

It offers Master students and doctoral candidates from geosciences and related disciplines a hands-on training in operating the hull-mounted echosounding systems of *Polarstern* (multibeam echosounder Teledyne Reson HYDROSWEEP DS3 and sediment echosounder Parasound P70). Both systems will be operated continuously between Las Palmas and Bremerhaven. The course is part of the programme “Master of Sciences Marine Geosciences” at the University of Bremen. This ship-based training complements the PhD education at POLMAR and of ArcTrain. Lecturers are affiliated with both postgraduate programmes. Students will be trained in data acquisition, evaluation, interpretation and visualisation with *en route* collected examples as well as published case studies. This training format has been carried out every other year since 2014.

In addition to the main training programme on the echosounding systems, the participants will be introduced on obtaining and handling hydrography data. This will be done by using data from one CTD cast and the underway data from the ship’s thermosalinograph.

### Work at sea

After embarkation, students will start with a half-day introduction to get familiar with the principles of hydro-acoustic data acquisition, to learn how to use the required software and to know how to operate the echosounding systems. Participants will be trained in all parts of the systems and go on watches in 2-hours shifts at day and 4-hours shifts at night. They will learn about sediment properties, reflector horizons, bottom topography and the principles of sediment acoustics. One key objective is the study of the spatial and temporal morphological variability of the huge seafloor sand dunes in the English Channel.

Practical training on the systems will be complemented through plenary lectures and software training in smaller groups to discuss published case studies. Being able to combine and interpret sediment core and multibeam-bathymetric data with Parasound profiles is a further learning outcome.

Participants will also be introduced to survey planning, data handling, editing, and visualisation with different kind of profiling and GIS mapping software. Being able to produce a map from originally raw data will be one of the outcomes participants can “take home”.

Station time will be limited to one CTD cast in the gap between the EEZ of Portugal (Mainland and Madeira) and Morocco. Water depth at this location is larger than 4,000 m and a CTD profile will typically show four water masses: Eastern North Atlantic Central Water, Mediterranean Outflow Water, Eastern Atlantic Subarctic Intermediate Water and Atlantic Deep Water. If time permits, the sound velocity profiler will be deployed for calibration purposes.

Besides the watch duties and learning sessions, students will give a 15 minute presentation on their individual research project (Ms or PhD) and the relevance of the course content for their project. Given the composition of participants (both Master and PhD students), participants will greatly benefit from each other. By experience we know that peer-teaching is an added value in every course. Working and living together on a ship will foster this exchange. Master students can further clarify their motivation for their next career step, e.g. whether following a PhD is an option for them.

### **Preliminary (expected) results**

Expected results will consist of high-resolution seabed and sedimentary 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. By default, the CC-BY license will be applied. Furthermore, bathymetric data will be provided to the Nippon Foundation – GEBCO Seabed 2030 Project.

In all publications based on this expedition, the Grant No. AWI\_ PS130\_04 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 INSTITUTIONEN / PARTICIPATING INSTITUTIONS**

**A.2 FAHRTTEILNEHMER:INNEN / CRUISE PARTICIPANTS**

**A.3 SCHIFFSBESATZUNG / SHIP'S CREW**



## A.1 TEILNEHMENDE INSTITUTIONEN / PARTICIPATING INSTITUTIONS

| Affiliation | Address  |
|-------------|--|
| CA.MCGILL   | McGill University<br>805 Sherbrooke Street West<br>H3A0B9 Montréal<br>Canada   |
| CA.UALBERTA | University of Alberta<br>1-26 Earth Sciences Building<br>T6G 2E3 Edmonton<br>Canada  |
| CA.UQAM     | Université du Québec à Montréal<br>201, Avenue du Président-Kennedy<br>Local PK-6150<br>H2X 3Y7 Montréal<br>Canada             |
| CH.UNIBASEL | Universität Basel<br>Petersplatz 1, P. O. Box<br>4001 Basel<br>Switzerland   |
| DE.AWI      | Alfred-Wegener-Institut<br>Helmholtz-Zentrum für Polar- und Meeresforschung<br>Postfach 120161<br>27515 Bremerhaven<br>Germany |
| DE.DWD      | Deutscher Wetterdienst<br>Seewetteramt<br>Bernhard-Nocht-Str. 76<br>20359 Hamburg<br>Germany                                   |
| DE.KLARTEXT | KlarText Beratung und Training<br>Herzog-Otto-Straße 43<br>67105 Schifferstadt<br>Germany                                      |
| DE.LAEISZ   | Reederei F. Laeisz GmbH<br>Bartelstraße 1<br>27570 Bremerhaven<br>Germany  |

| <b>Affiliation</b> | <b>Address</b>  |
|--------------------|---|
| DE.MARUM           | MARUM - Zentrum für Marine Umweltwissenschaften der<br>Universität Bremen<br>Leobener Str. 6<br>28359 Bremen<br>Germany |
| DE.UNIBREMEN       | Universität Bremen<br>Klagenfurter Straße 2-4<br>28359 Bremen<br>Germany  |

## A.2 FAHRTTEILNEHMER:INNEN / CRUISE PARTICIPANTS

| <b>PS130/1: Punta Arenas – Bremerhaven</b> |                                |                                  |                              |                                     |
|--|--------------------------------|----------------------------------|------------------------------|-------------------------------------|
| <b>Name/<br/>Last name</b>                 | <b>Vorname/<br/>First name</b> | <b>Institut/<br/>Institution</b> | <b>Beruf/<br/>Profession</b> | <b>Fachrichtung/<br/>Discipline</b> |
| Dreutter                                   | Simon                          | DE.AWI                           | Technician                   | Bathymetry                          |
| Elsaesser                                  | Antje                          | DE.DWD                           | Scientist                    | Meteorology                         |
| Erni Cassola e Barata                      | Gabriel                        | CH.UNIBASEL                      | Scientist                    | Biology                             |
| Otte                                       | Frank                          | DE.DWD                           | Scientist                    | Meteorology                         |
| Tebben (*)                                 | Jan                            | DE.AWI                           | Scientist                    | Ecological Chemistry                |
| Wenzel                                     | Anna Julia                     | DE.DWD                           | Scientist                    | Meteorology                         |
| Werner                                     | Ellen                          | DE.AWI                           | Student                      | Bathymetry                          |

(\*) in Las Palmas / Spanien von Bord

| <b>PS130/2: Las Palmas – Bremerhaven</b> |                                |                                  |                              |                                     |
|--|--------------------------------|----------------------------------|------------------------------|-------------------------------------|
| <b>Name/<br/>Last name</b>               | <b>Vorname/<br/>First name</b> | <b>Institut/<br/>Institution</b> | <b>Beruf/<br/>Profession</b> | <b>Fachrichtung/<br/>Discipline</b> |
| Betz                                     | Maximilian                     | DE.AWI                           | Engineer                     | Computing and Data Centre           |
| Bimochan                                 | Niraula                        | DE.AWI                           | PhD Student                  | Physics                             |
| Brand                                    | Caroline                       | DE.UNI-Bremen                    | Student                      | Geosciences                         |
| Bukar                                    | Shettima                       | DE.UNI-Bremen                    | PhD Student                  | Geophysics                          |
| Chnelewski                               | Frank-Peter                    | DE.AWI                           | Observer                     | Logistics and Research Platforms    |
| Doshi                                    | Smit Chetan                    | DE.AWI                           | PhD Student                  | Climate Dynamics                    |
| Dreutter                                 | Simon                          | DE.AWI                           | Technician                   | Bathymetry                          |
| Eggensberger                             | Lea Anna                       | DE.UNI-Bremen                    | Student                      | Geosciences                         |
| Elsaesser                                | Antje                          | DE.DWD                           | Scientist                    | Meteorology                         |
| Erni Cassola e Barata                    | Gabriel                        | CH.UNIBASEL                      | Scientist                    | Biology                             |
| Gille-Petzoldt                           | Johanna Veronika               | DE.AWI                           | PhD Student                  | Geophysics                          |

**Expedition Programme PS130/1 and PS130/2**

| <b>PS130/2: Las Palmas – Bremerhaven</b> |                 |               |             |                                     |
|--|-----------------|---------------|-------------|-------------------------------------|
| Hanfland                                 | Claudia         | DE.AWI        | Scientist   | Scientific Education                |
| Harrie-Salzmann                          | Kerstin         | DE.AWI        | Observer    | Logistics and Research Platforms    |
| Immoor                                   | Sebastian       | DE.AWI        | Technician  | Logistics and Research Platforms    |
| Kamb                                     | Guenter         | DE.KLARTEXT   | Other       | Scientific Education                |
| Kordes                                   | Thomas          | DE.AWI        | Engineer    | Logistics and Research Platforms    |
| Kühl                                     | Johannes        | DE.AWI        | Engineer    | Logistics and Research Platforms    |
| Kuhn                                     | Gerhard         | DE.AWI        | Scientist   | Geosciences                         |
| Leusch                                   | Maja            | DE.UNI-Bremen | Student     | Geosciences                         |
| Marquis                                  | Oreste          | CA.MCGILL     | Student     | Glaciology                          |
| Möller                                   | Wilma Apollonia | DE.UNI-Bremen | Student     | Other Geosciences                   |
| Najjarifarizhendi                        | Banafsheh       | DE.AWI        | PhD Student | Geophysics                          |
| Niessen                                  | Frank           | DE.AWI        | Scientist   | Geosciences                         |
| Otte                                     | Frank           | DE.DWD        | Scientist   | Meteorology                         |
| Queiroz Alves                            | Eduardo         | DE.AWI        | Scientist   | Marine Geochemistry                 |
| Rahf                                     | Johanna         | DE.UNI-Bremen | Student     | Geosciences                         |
| Rogenhagen                               | Johannes        | DE.LAEISZ     | Inspector   | Reederei Laeisz                     |
| Savard                                   | Antoine         | CA.MCGILL     | PhD Student | Glaciology                          |
| Schmidt                                  | Jan-Niklas      | DE.UNI-Bremen | Student     | Geophysics                          |
| Siccha Rojas                             | Michael Georg   | DE.MARUM      | Scientist   | Marine Geology and Palaeontology    |
| Sinnen                                   | Vivian Marissa  | DE.AWI        | PhD Student | Marine Geology and Palaeontology    |
| Stavrakoudis                             | Sophia          | DE.UNI-Bremen | Student     | Marine Geology and Palaeontology    |
| Weiss-Gibbons                            | Tahya           | CA.UALBERTA   | Student     | Physical Oceanography of Polar Seas |
| Wenzel                                   | Anna Julia      | DE.DWD        | Scientist   | Meteorology                         |
| Werner                                   | Ellen           | DE.AWI        | Student     | Bathymetry                          |
| Zarrinderakht                            | Maryam          | CA.UBC        | PhD Student | Geophysics                          |
| Zumaque                                  | Jena            | CA.UQAM       | PhD Student | Geosciences                         |

### A.3 SCHIFFSBESATZUNG / SHIP'S CREW

| <b>PS130/1: Punta Arenas – Bremerhaven</b> |                 |
|--|-----------------|
| <b>Name</b>                                | <b>Position</b> |
| Wunderlich, Thomas Wolf                    | Master          |
| Kentges, Felix                             | Chiefmate       |
| Langhinrichs, Jacob                        | Chiefmate Cargo |
| Grafe, Jens                                | Chief           |
| Lange, Felix                               | 2nd Mate        |
| Müller, Andreas                            | ELO             |
| Goessmann-Lange, Petra                     | Shops Doc       |
| Brose, Thomas Christian Gerhard            | 2nd. Eng        |
| Fielder, Alexander                         | 2nd. Eng        |
| Haack, Michael Detlev                      | 2nd. Eng        |
| Redmer, Jens Dirk                          | ELO             |
| Hüttebräucker, Olaf                        | ELO             |
| Nasis, Ilias                               | ELO             |
| Jäger, Vladimir                            | ELO             |
| Sedlak, Andreas Enrico                     | Bosun           |
| Neisner, Winfried                          | Carpen.         |
| Heinstein, Patricia                        | MP Rat.         |
| Denzer, Florian                            | MP Rat.         |
| Hoche, Jan                                 | MP Rat.         |
| Meier, Jan                                 | MP Rat.         |
| Mohr, Tassilo Peter                        | MP Rat.         |
| Wende, Uwe                                 | AB              |
| Baecker, Andreas                           | AB              |
| Burzan, Gerd-Ekkehard                      | AB              |
| Preußner, Jörg                             | Storek.         |
| Schwarz, Uwe                               | MP Rat.         |
| Hänert, Ove                                | MP Rat.         |
| Rhau, Lars-Peter                           | MP Rat.         |

| <b>PS130/1: Punta Arenas – Bremerhaven</b> |                 |
|--|-----------------|
| <b>Name</b>                                | <b>Position</b> |
| Klinger, Dana                              | MP Rat.         |
| Claasen, Thies                             | MP Rat.         |
| Marquardt, Geron                           | Cook            |
| Silinski, Frank                            | Cooksm.         |
| Martens, Michael                           | Cooksm.         |
| Pieper, Daniel                             | Chief Stew.     |
| Silinski, Carmen Viola                     | 2nd Stew.       |
| Krause, Tomasz                             | 2nd Stew.       |
| Dibenau, Torsten                           | 2nd Stew.       |
| Arendt, René                               | 2nd Stew.       |
| Chen, Dansheng                             | 2nd Stew.       |
| Sun, Yongsheng                             | Laundym.        |

| <b>PS130/2: Las Palmas – Bremerhaven</b> |                 |
|--|-----------------|
| <b>Name</b>                              | <b>Position</b> |
| Wunderlich, Thomas Wolf                  | Master          |
| Kentges, Felix                           | Chiefmate       |
| Langhinrichs, Jacob                      | Chiefmate Cargo |
| Grafe, Jens                              | Chief           |
| Lange, Felix                             | 2nd Mate        |
| Müller, Andreas                          | ELO             |
| Goessmann-Lange, Petra                   | Shops Doc       |
| Brose, Thomas Christian Gerhard          | 2nd. Eng        |
| Fielder, Alexander                       | 2nd. Eng        |
| Haack, Michael Detlev                    | 2nd. Eng        |
| Redmer, Jens Dirk                        | ELO             |
| Frank, Gerhard                           | ELO             |
| Hüttebräucker, Olaf                      | ELO             |
| Nasis, Ilias                             | ELO             |
| Jäger, Vladimir                          | ELO             |
| Sedlak, Andreas Enrico                   | Bosun           |
| Neisner, Winfried                        | Carpen.         |

| <b>PS130/2: Las Palmas – Bremerhaven</b> |                 |
|--|-----------------|
| <b>Name</b>                              | <b>Position</b> |
| Heinstein, Patricia                      | MP Rat.         |
| Denzer, Florian                          | MP Rat.         |
| Hoche, Jan                               | MP Rat.         |
| Meier, Jan                               | MP Rat.         |
| Mohr, Tassilo Peter                      | MP Rat.         |
| Wende, Uwe                               | AB              |
| Baecker, Andreas                         | AB              |
| Burzan, Gerd-Ekkehard                    | AB              |
| Preußner, Jörg                           | Storek.         |
| Schwarz, Uwe                             | MP Rat.         |
| Hänert, Ove                              | MP Rat.         |
| Rhau, Lars-Peter                         | MP Rat.         |
| Klinger, Dana                            | MP Rat.         |
| Claasen, Thies                           | MP Rat.         |
| Marquardt, Geron                         | Cook            |
| Silinski, Frank                          | Cooksm.         |
| Martens, Michael                         | Cooksm.         |
| Pieper, Daniel                           | Chief Stew.     |
| Golla, Gerald                            | 2nd Stew.       |
| Silinski, Carmen Viola                   | 2nd Stew.       |
| Krause, Tomasz                           | 2nd Stew.       |
| Dibenau, Torsten                         | 2nd Stew.       |
| Arendt, René                             | 2nd Stew.       |
| Chen, Dansheng                           | 2nd Stew.       |
| Sun, Yongsheng                           | Laundym.        |

