

Application for Consent to conduct
Marine Scientific Research

Date: 21.11.2017

1. General Information

1.1 Cruise name and/or number: PS113

1.2 Sponsoring Institution(s):	
Name:	Alfred-Wegener-Institute for Polar- and Marine Research
Address:	Am Handelshafen 12 27570 Bremerhaven Germany
Name of Director:	Prof. Dr. Antje Boetius

1.3 Scientist in charge of the Project:	
Name:	Dr. Volker Strass
Country:	Germany
Affiliation:	Alfred-Wegener-Institut
Address:	Bussestr. 24, 27570 Bremerhaven, Germany
Telephone:	+49-471-4831-1822
Fax:	+49-471-4831-1797
Email:	Volker.Strass@awi.de
Website (for CV and photo):	http://www.awi.de

1.4 Entity(ies)/Participant(s) from coastal State involved in the planning of the project:	
Name:	
Affiliation:	
Address:	
Telephone:	
Fax:	
Email:	
Website (for CV and photo):	

2. Description of Project

2.1 Nature and objectives of the project:
Transfer of vessel from Punta Arenas, Chile, to Bremerhaven, Germany, after performing expeditions in the Antarctic. The Transit will be used for en route measurements of meteorological and oceanographic data, and tests and calibrations of onboard sensors. See map attached.

2.2 If designated as part of a larger scale project, then provide the name of the project and the Organisation responsible for coordinating the project:
Not applicable

2.3 Relevant previous or future research projects:
Not applicable

2.4 Previous publications relating to the project:

Not applicable

3. Geographical Areas

3.1 Indicate geographical areas in which the project is to be conducted (with reference in Latitude and longitude in decimal degrees, including coordinates of cruise/track/way points/sampling stations). Please provide coordinates in a separate excel spreadsheet.

The track through the Engl.Channel will follow the regular traffic ways and traffic separation schemes. All measurements will be done while underway. Therefore, a separate excel-list is not attached, as waypoints may vary due to the traffic situation. Vessels speed will be between 5 to 10,5knots. See also attached maps.

3.2 Attach chart(s) at an appropriate scale (1 page, high-resolution) showing the geographical Areas of the intended work and, as far as practicable, the location and depth of sampling Stations, the tracks of survey lines, and the locations of installations and equipment.

See Attachment I, Maps Only en route measurements.

4. Methods and means to be used

4.1 Particulars of vessel:

Name:	POLARSTERN
Type/Class:	RV / Icebreaker
Nationality (Flag State):	GERMAN
Identification Number (IMO/Lloyds No.):	8013132
Owner:	Federal Ministry of Education and Research, German Government
Operator:	Alfred-Wegener-Institut. Helmholtz-Zentrum für Polar- und Meeresforschung
Overall length (meters):	117.91
Maximum draught:	11.21
Displacement/Gross Tonnage:	17,300 t
Propulsion:	2 Propeller, 4 Engines, MDO
Cruising & maximum speed:	12,0kn and 15.5 kn
Call sign:	DBLK
INMARSAT number and method and capability of communication (including emergency frequencies):	Inmarsat Telephone: 00871 32184 2611 or 2711 Fax: 00871 32184 2612 or 2712
Name of Master:	Wunderlich
Number of Crew:	43
Number of Scientists on board:	30

4.2 Particulars of Aircraft:

Name:	Not applicable
Make/Model:	
Nationality (flag State):	
Website for diagram & Specifications:	
Owner:	
Operator:	
Overall Length (meters):	
Propulsion:	
Cruising & Maximum speed:	
Registration No.:	

Call Sign:	
Method and capability of communication (including emergency frequencies):	
Name of Pilot:	
Number of crew:	
Number of scientists on board:	
Details of sensor packages:	
Other relevant information:	

4.3 Particulars of Autonomous Underwater Vehicle (AUV):	
Name:	Not applicable
Manufacturer and make/model:	
Nationality (Flag State):	
Website for diagram & Specifications:	
Owner:	
Operator:	
Overall length (meters):	
Displacement/Gross tonnage:	
Cruising & Maximum speed:	
Range/Endurance:	
Method and capability of communication (including emergency frequencies):	
Details of sensor packages:	
Other relevant information:	

4.4 other craft in the project, including its use:
Not applicable

4.5 Particulars of methods, full description of scientific instruments to be used (for fishing gear specify type and dimension) and location			
Types of samples and Measurements:	Methods to be used:	Instruments to be used:	To be carried out within 12nm (yes or no):

The following EN Route measurements will be carried out within 12nm.

EnRoute or Underway measurements:

WaMoS II - wave radar

The WaMoS II wave radar of firm OceanWaves / Rutter is operating on X-band and is providing sea state parameters: significant wave height, peak wave direction, peak wave period, peak wave length, and sea surface current. The system is able to detect and analyze different wave systems of swell and wind sea at once.

Measurements are used to support synoptic observations of meteorologist, especially at night. To increase safety on board, the data are also visualized on the bridge to detect freak waves.

Synoptic observations are sent periodically to WMO (World Meteorological Organization) data center. Raw data and resulting parameters of wave radar are recorded and archived on hard disc. They are not available online but on demand.

Product description can be found at <http://www.rutter.ca/wamos-ii-wave-and-current-monitoring>.

Cloud camera

The cloud camera makes pictures in optical spectrum with resolution of 1280 x 720 pixels. The field of vision covers one-third the ocean and two-thirds the sky. The pictures are made periodically with frequency of one picture per ten minutes. Every hour one picture is sent by email to the German Weather Forecast – Training Center (DWD – Trainingszentrum) to give an impression about the weather situation in comparison to the numerical meteorologic values. The pictures are used for that training purpose only. See also <http://www.eumetrain.org/polarstern.html>.

DOAS

The DOAS (Differential Optical Absorption Spectroscopy) system is measuring several atmospheric tracer gases like NO₂, NO₃, SO₂, O₃, HONO, HCHO, ... by detecting/analyzing scattered light.

The data are recorded and archived on local hard disc. They are not available and distributed online but offline on demand. See also at homepage of University of Heidelberg

http://www.hce.uni-heidelberg.de/analytics_en/lab_doas_pla.html.

Distrometer

The optical distrometer ODM 470 is measuring and analyzing precipitation. Measuring particle sizes and in correlation with meteorological data solid, fluid, and mixed phase precipitation can be distinguished to be aimed at an automatic classification.

The system is still under development. The data are recorded and archived on local hard disc. They are not available or distributed online but offline on demand.

Cosmic Ray

Myon detector and neutron detector are passive sensors to count cosmic rays that are energetic particles, which are modulated by the Sun and are occasionally sent out by the Sun. The measurements are also set in correlation to atmospheric parameters, i.e. the pressure. Data are collected for education and for basic research. The neutron monitor project is realized in cooperation with North-West University Potchefstroom (see <http://www.nwu.ac.za/neutron-monitor>, contact nmsupport@nwu.ac.za). Data are sent per email once per day to DESY (Deutsches Elektronen Synchrotron) Zeuthen and University of Kiel. Data of neutron monitor are published in database:

<http://www.nmdb.eu/nest/> (station: POL1).

pCO₂ analyzer

The pCO₂ system measures the partial pressure of carbon dioxide (CO₂) of water and air using a LI-COR infrared analyzer. For calibration purposes, four reference gases are used which contain air with a known concentration of CO₂. The data are registered for fundamental research of the world-wide carbon cycle in the oceans and in the

atmosphere. Onboard Polarstern there are two different systems installed: System one from company General Oceanics (GO) and system two from the company SubCtech. Following parameters of the SubCtech analyzer are recorded in the ships data management system (<https://dship.awi.de/dship-extraction/>): CO₂ (air) [ppm], CO₂ corrected (water) [ppm], CO₂ density [mmol/m²], H₂O (air) [ppt], H₂O density [mmol/m²], xCO₂ dry [μmol].

The parameter of the GO system archived in DShip is CO₂ corrected (water) [ppm] only. The data are processed in the home laboratory. They are part of and delivered to the world-wide data collection effort SOCAT (Surface Ocean CO₂ Atlas), which collects all oceanic CO₂ data and produces a freely available CO₂ data product.

Thermosalinograph (Polarstern)

The sensors Seabird SBE21 and SBE38 (<http://www.seabird.com/sbe21-seacat-thermosalinograph>) are measuring conductivity [mS/cm] and temperature [°C]. Additional parameters salinity [PSU] and sound velocity [m/s] are internally calculated and are also recorded in ships data management system (<https://dship.awi.de/dship-extraction/>). Data are collected for basic research.

After postprocessing and validation the data are archived in PANGAEA database: <http://www.pangaea.de>. (use keywords: polarstern thermosalinograph)

Water sound velocity – SVP/T (Polarstern)

The sensor of type SVP 70 from firm Teledyne RESON is measuring sound velocity of sea water taken from the ship's keel. Data are collected for realtime refraction correction of multibeam echo sounder data and for basic research. The data are recorded continuously in ships data management system (<https://dship.awi.de/dship-extraction/>).

FerryBox

The system FerryBox of firm 4H-Jena (<http://www.4h-jena.de/en/maritime-technologies/flow-systems/ferrybox/>) is a flow-through system analyzing characteristics of sea water: CDOM (Carbon Dissolved Organic Material) [ppb], conductivity [mS/cm], fluorescence chlorophyll a (raw) [μg/l], fluorescence chlorophyll a (TR) [μg/l], oxygen corrected [μmol/l], pH [], phycocynin [cells/ml], turbidity [NTU], and water temperature [°C]. Data are collected for basic research and are archived in ship data management system: <https://dms.awi.de/dship-extraction/>.

ADCP

The Acoustic Doppler Current Profiler (ADCP) of type Ocean Surveyor from firm Teledyne RDI (<http://www.teledynemarine.com/ocean-surveyor-adcp>) is operating on 150 kHz. Transmitting power is 0.4 kW at source level of 217 db re 1μPa @ 1m. By default 40 bins with size of 8m each are detected. The measurements are performed for base research. Detected velocities are recorded in files without verification. First bin is also archived in ships data management system: <https://dms.awi.de/dship-extraction/>.

Hydroacoustic Water Depth

Single beam echo sounder measurements are performed to amend precise knowledge of sea floor depths. The depths are measured by Simrad EK60 echo sounder, which has no beam steering, an opening angle of 11° and is operating on 18 kHz. The transmission power amounts to 2 kW at noise level of 226.6 db re 1µPa @ 1m. The systems does not apply sound velocity profile but static c-mean value of 1500 m/s. Measured depths are recorded in ships data management system:
<https://dms.awi.de/dship-extraction/>.

Endotherm observation

For statistical purpose the nautical officers are recording sights of endotherm like whales and seals into digital log. In case of environmental protection obligations the nautical officers are assisted by scientific observers at this task. If requested the observation is supported by infrared camera. An additional camera is available for the helicopter to support above mentioned tasks.

Magnetics

To measure deviations of the earth's magnetic field two fluxgate magnetometers from Firm Magson GmbH are installed in the crow's nest. The data are registered for basic research. The data will not be available in public repository but will be archived password protected in the PANGAEA database: <https://www.pangaea.de/>

Gravimetry

To measure deviations of the earth's gravity field a sea gravimeter of type KSS 32-M from Firm Bodensee Gravimeter Geosystem (BGGs) GmbH is installed. The data are registered for basic research. The data will not be available in public repository but will be archived password protected in the PANGAEA database: <https://www.pangaea.de/>

Meteorological measurements

Miscl. meteorological measurements, incl. balloon sampling

Air- and water measurement/sampling

Above instruments and others

The following expedition specific measurements will be carried out within 12nm.

Expedition specific measurements:

OCEANET Radiation & microwave remote sensing

A multichannel microwave radiometer will be applied to continuously retrieve the integrated water vapor and the cloud liquid water path over the ocean. Time series of these values will resolve small-scale atmospheric structures as well as the effects of the mean state of the atmosphere and its variability on the co-located measurements of the

downwelling shortwave and longwave radiation. These data will be compared to and combined with METEOSAT SEVIRI products for a characterization of atmospheric state and radiative fluxes. Atmospheric aerosol optical thickness will be measured by means of hand held sun photometer and a multi-spectral solar radiometer, which also enables the determination of spectrally resolved aerosol and cloud radiative effects. Most instruments are integrated in the container-based atmosphere observatory. All OCEANET raw data from this cruise are stored at the oceanet-archive server of TROPOS. Access can be requested via email to ronny@tropos.de. Additionally, higher-level data are uploaded at the Pangaea database under the keyword OCEANET-ATMOSPHERE.

OCEANET Lidar measurements of aerosol and cloud profiles

The system PollyXT, a semi-autonomous multi-wavelength polarization Raman lidar, will be operated inside a container together with the radiation and microwave sensing equipment. The lidar is able to measure independently profiles of particle backscatter at three wavelengths and extinction at two wavelengths, which allows identifying particle type, size, and concentration. Additionally particle depolarisation is measured in order to discriminate between spherical and non-spherical particles, e.g. biomass-burning smoke vs. mineral dust or water clouds vs. ice clouds. The lidar is equipped with a measurement channel for atmospheric water vapour, too. The data are used to characterize long-range transport of aerosol and identify pollution. The determined height-resolved aerosol extinction completes the radiation measurements. In this way, the radiative influence of single lofted aerosol or cloud layers can be calculated with radiation-transport models. All OCEANET raw data from this cruise are stored at the oceanet-archive server of TROPOS. Access can be requested via email to ronny@tropos.de. Additionally, higher-level data are uploaded at the Pangaea database under the keyword OCEANET-ATMOSPHERE.

MICROTOPS Measurements of atmospheric integrated properties and clouds imaging

Reference data for satellite remote sensing and global modeling are sparse over ocean regions. Thus, the NASA's AERONET group distributes calibrated handheld (MICROTOPS) sun-photometers to sample aerosol properties and water vapor content. MICROTOPS measurements require unobstructed views of the sun's solar disk. Thus, regular (every 15 min) sampling in a handheld operation will be conducted during daytime, when the direct view of the sun is not obstructed (e.g. mainly by clouds but also by other obstructions such as masts or ship exhaust). Hereby 8-second long individual samples will be repeated 5 to 10 times (conditions permitting) to better filter poor data from cloud-contamination and mis-orientation. In addition, to capture the variability of clouds which are the strongest modulator to the atmospheric energy budget, two simple upward looking cameras will be employed, automatically taking (jpeg) images every 10 seconds. One of the cameras records visible images while the other camera records thermal images. The MICROTOPS measurements will be transmitted each evening to the publicly accessible MAN database (http://aeronet.gsfc.nasa.gov/new_web/maritime_aerosol_network.html). Cloud images will be placed on a data-server at the MPI for Meteorology, Hamburg, Germany, after the cruise and will be made accessible upon request.

TOPAWI

Test of new towfish Type TRIAXUS / MacArtney incl. miscl. sensors.

<https://www.macartney.com/what-we-offer/systems-and-products/rotrv/triaxus/>

TESTING AND CALIBRATION OF HYDROACOUSTIC DEVICES:

Hydrosweep DSIII, Parasound P70, Multi-frequency EK80”

4.6 Indicate nature and quantity of substances to be released into the marine environment:

None

4.7 Indicate whether drilling will be carried out. If yes, please specify:

None

4.8 Indicate whether explosives will be used. If yes, please specify type and trade name, Chemical content, depth of trade class and stowage, size, depth of detonation, frequency of Detonation, and position in latitude and longitude:

None

5. Installations and Equipment

Details of installations and equipment (including dates of laying, servicing, method and Anticipated timeframe for recover, as far as possible exact locations and depth, and Measurements):

Not applicable

6. Dates

6.1 Expected dates of first entry into and final departure from the research area by the research vessel and/or other platforms:

Expected transit through the English channel: 09.06.2018 to 10.06.2018

6.2 Indicate if multiple entries are expected:

Not applicable

7. Port Calls

7.1 Dates and Names of intended ports of call:

Departure: Punta Arenas 07. May 2018
Portcall: Las Palmas 03. June 2018
Arrival : Bremerhaven 11. June 2018

7.2 Any special logistical requirements at ports of call:

Not applicable

7.3 Name/Address/Telephone of shipping agent (if available):

Not applicable

8. Participation of the representative of the coastal State

8.1 Modalities of the participation of the representative of the coastal State in the research Project:

Per invitation by the chief scientist:

Dr. Harry Leach, University of Liverpool, 4 Brownlow Street, Liverpool, L69 3GP, UK.
Tel. +44(0) 151 794 4097, leach@liverpool.ac.uk, <http://www.liv.ac.uk/~leach/>

8.2 Proposed dates and ports for embarkation/disembarkation:

embarkation: Punta Arenas 07. May 2018, disembarkation: Bremerhaven 11. June 2018

9. Access to Data, Samples and Research Results

9.1 Expected dates of submission to coastal State of preliminary report, which should include The expected dates of submission of the data and research results:

6 months after the end of the cruise

9.2 Anticipated dates of submission to the coastal State of the final report:

12 months after the end of the cruise

9.3 Proposed means for access by coastal State to data (including format) and samples:

Via Internet, through the Pangaea database accessible at <http://www.pangaea.de/>

9.4 Proposed means to provide coastal State with assessment of data, samples and Research results:

Results are published in the Reports of Polar Research by AWI and in other reports, papers and in international scientific journals.

Via Internet: <http://www.pangaea.de/>

<https://www.pangaea.de/expeditions/cr.php/Polarstern>

9.5 Proposed means to provide assistance in assessment or interpretation of data, samples And research results:

Data including documentation and contact details of the responsible scientists are available through the Pangaea database accessible at <http://www.pangaea.de>

9.6 Proposed means of making results internationally available:

Results are published in the Reports of Polar Research by AWI and in other reports, papers and in international scientific journals.

10. Other permits Submitted

10.1 Indicate other types of coastal state permits anticipated for this research (received or Pending):

Similar notification to all coastal states en route

11. List of Supporting Documentation

11.1 List of attachments, such as additional forms required by the coastal State, etc.:

- Attachment I/II: Maps

On behalf of the chief scientist:

Signature:



21.11.2017

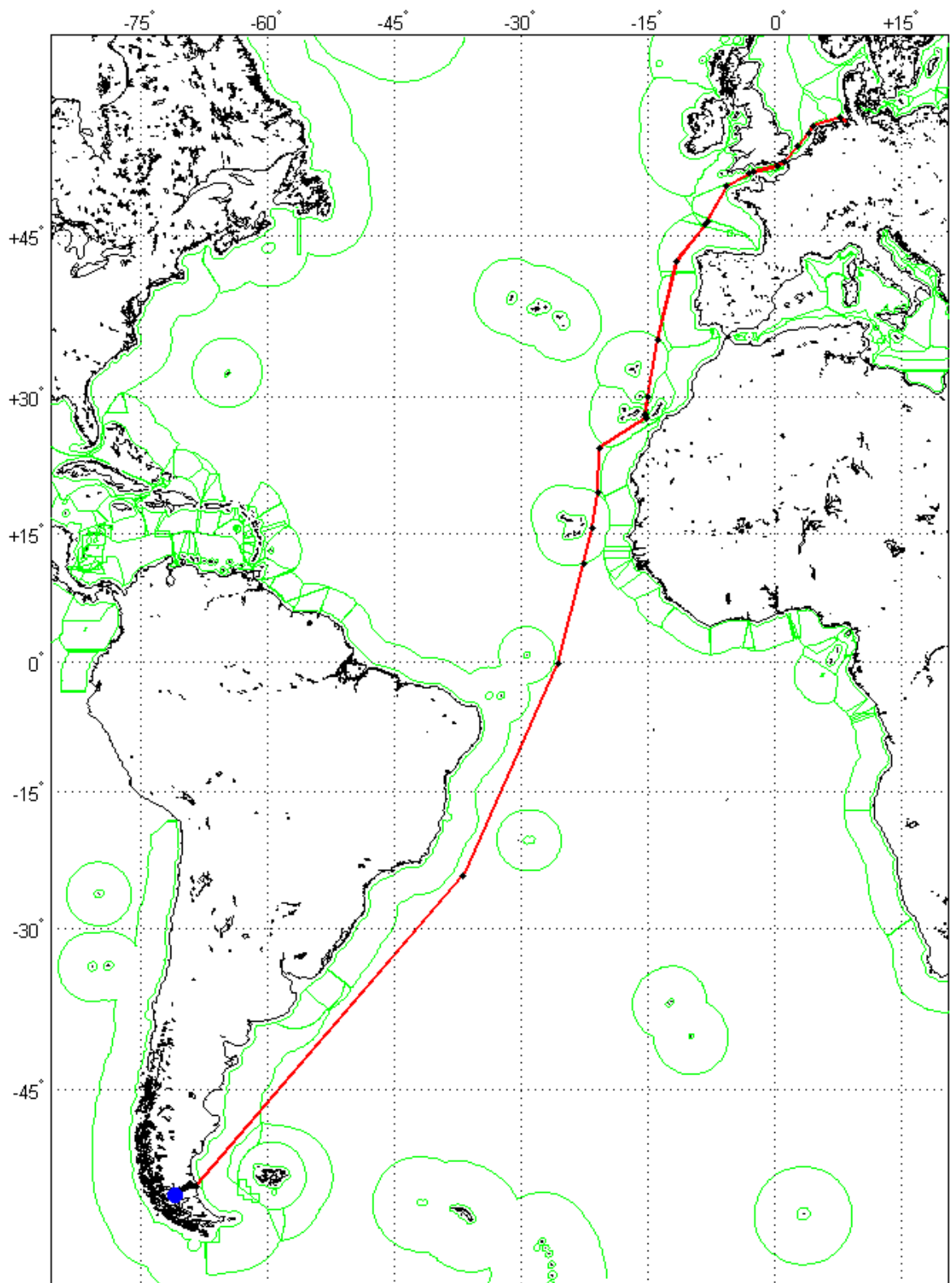
Alfred-Wegener-Institut
Helmholtz-Zentrum für
Polar- und Meeresforschung
Logistik und Forschungsplattformen
Am Alten Hafen 26
27568 Bremerhaven

Contact information of the focal point:

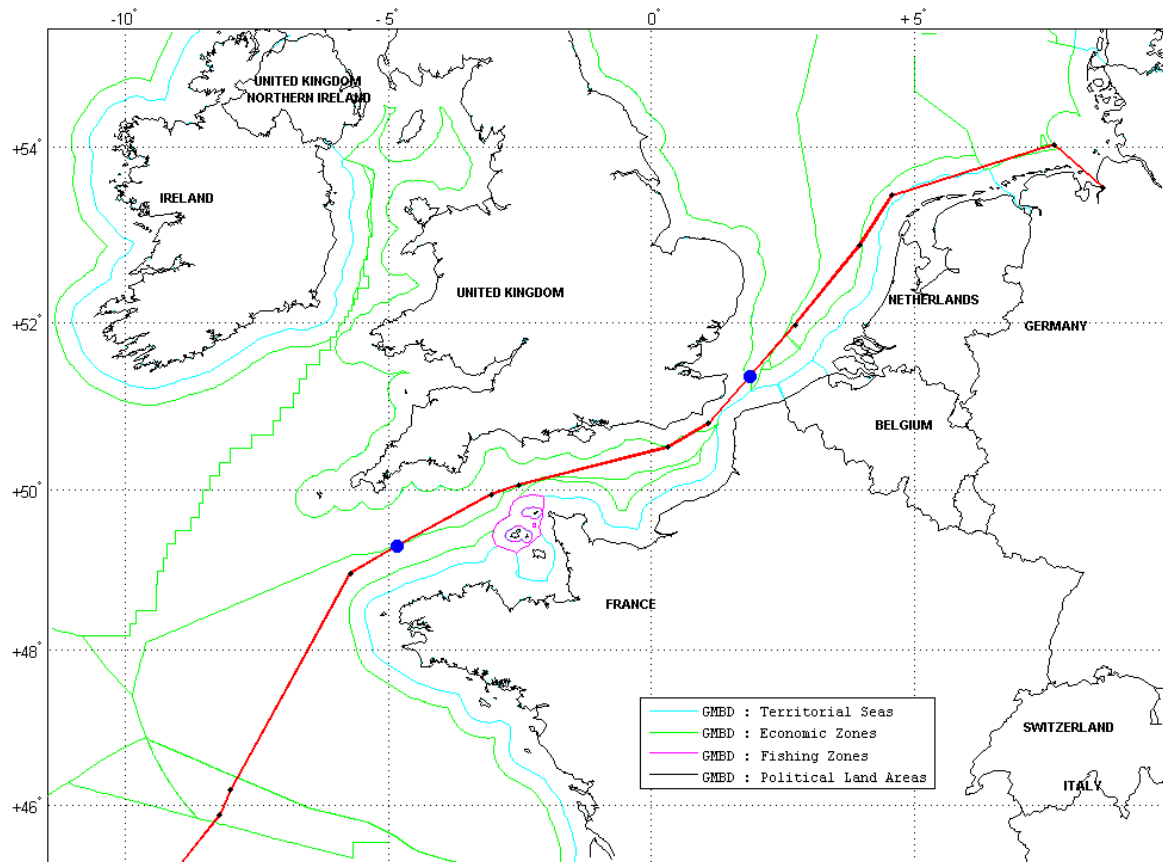
Name: Marius Hirsekorn
Country: Germany
Affiliation: Alfred Wegner Institute

Telephone: +49-(0)471-4831-2241
Email: Schiffskoord@awi.de
Address: Am Alten Hafen 26

Attachment I. (map of total cruise)



Attachment II. (map of cruise section through the English Channel)



No specific research area in the Engl. Channel. Measurements to be done “en route” and underway following the regular traffic ways and separation schemes. → therefore no separate Excel – sheet with research area coordinates.