

Application for Consent to conduct
Marine Scientific Research

Date: August 1, 2017

1. General Information

1.1 Cruise name and/or number: MERIAN MSM68/2

1.2 Sponsoring Institution(s): <i>(The Sponsoring Institution is the name of the Institution(s) which initiates, finances and is responsible for the proposed scientific research)</i>
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Name:	MPI-Meteorology
Address:	Bundesstrasse 53, 20146 Hamburg, Germany
Name of Director:	Bjorn Stevens

1.3 Scientist in charge of the Project:

Name:	Dr. Stephanie Fiedler
Country:	Germany
Affiliation:	MPI-Meteorology
Address:	Bundesstrasse 53, D-20146 Hamburg, Germany
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Fax:	-
Email:	stephanie.fiedler@mpimet.mpg.de
Website (for CV and photo):	https://www.mpimet.mpg.de/en/staff/stephanie-fiedler/

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

2. Description of Project

2.1 Nature and objectives of the project:

The RV MARIA S MERIAN transit cruise MSM-68/2 from Germany to Cape Verde will be used (1) to sample in detail atmospheric properties of aerosol and clouds (in addition to those already permitted under WMO agreements) and (2) to test a novel measurement system for seawater alkalinity. These measurements will be carried out along the cruise track from Emden/Germany via North Sea and the English Channel to Mindelo/Cape Verde. The cruise track (attached figure) will strictly follow the Traffic Separation Scheme in this region and therefore be constrained to the main shipping route for outbound traffic.

Atmospheric remote sensing will be used for measuring:

- cloud fraction and base height for collecting data for a first ship-based cloud type statistic along the ship track, using vertically oriented cameras and a ceilometer
- OceanRAIN ODM470 optical disdrometer for precipitation rate and droplet size spectrum
- a hand-held sun photometer MICROTOPS for aerosol and water vapour (only during sunshine)
- and a MAX-DOAS for gases.

The following sea measurements will be carried out:

- temperature, salinity and total alkalinity of continuously pumped near-surface water from a submersible pump, using a thermosalinograph and a novel automated spectrophotometric filtration system.
- an echo sounding system (swath sonar multibeam) maps the sea-floor topography
- cetaceans will be observed and recorded with photos and GPS location.
- at the Cape Verde Ocean Observatory site (17.6°N 24.3°W) one full-depth CTD-rosette hydrocast with profiling measurements (temperature, salinity, pressure) and seawater sampling (O₂, nutrients, and CO₂ content) will be carried out to measure the vertical profile of these ocean characteristics, and a hydrophone will be deployed to listen to cetaceans.

The proposed measurements are scientifically important since the network of marine ground-based observations is sparse. Our measurements contribute to filling gaps in our scientific observational system and we hope for including the waters of the United Kingdom.

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:

NASA's https://aeronet.gsfc.nasa.gov/new_web/maritime_aerosol_network.html

The research is carried out with the following project:

Horizon2020 project AtlantOS of the European Commission (www.atlantos-h2020.eu)

It is also taking place in the context of the pan-European research infrastructure ICOS – Integrated Carbon Observation System (www.icos-ri.eu)

2.3 Relevant previous or future research projects:

2.4 Previous publications relating to the project:

- Aßmann, S., C. Frank, and A. Körtzinger (2011). **Spectrophotometric high-precision seawater pH determination for use in underway measuring systems**. *Ocean Sci.* 7, 597-607, doi:10.5194/os-7-2011.
- Aßmann, S. (2012). **Entwicklung und Qualifizierung autonomer Messsysteme für den pH-Wert und die Gesamtalkalinität von Meerwasser**. PhD thesis, Christian Albrecht University Kiel, 171 pp.
- Fiedler, B., D. Grundle, F. Schütte, J. Karstensen, C.R. Löscher, H. Hauss, H. Wagner, A. Loginova, R. Kiko, P. Silva, and A. Körtzinger (2016). **Oxygen utilization and downward carbon flux in an oxygen-depleted eddy in the Eastern Tropical North Atlantic**. *Biogeosciences* 13, 5633-5647, doi:10.5194/bg-13-5633-2016.
- Fischer, G., J. Karstensen, O. Romero, K.-H. Baumann, B. Donner, J. Hefter, G. Mollenhauer, M. Iversen, B. Fiedler, I. Monteiro, and A. Körtzinger (2016). **Bathypelagic particle flux signatures from a suboxic eddy in the oligotrophic tropical North Atlantic: production, sedimentation and preservation**. *Biogeosciences* 13, 3203–3223, doi:10.5194/bg-13-3203-2016.
- Grundle, D.S., C.R. Löscher, G. Krahnemann, M.A. Altabet, H.W. Bange, J. Karstensen, A. Körtzinger, and B. Fiedler (2017). **Low oxygen eddies in the eastern tropical North Atlantic: Implications for N₂O cycling**. *Sci. Rep.* 7, 4806, doi:10.1038/s41598-017-04745-y.
- Hauss, H., S. Christiansen, F. Schütte, R. Kiko, M. Edvam Lima, E. Rodrigues, J. Karstensen, C.R. Löscher, A. Körtzinger, and B. Fiedler (2016). **Dead zone or oasis in the open ocean? Zooplankton distribution and migration in low-oxygen medeater eddies**. *Biogeosciences* 13, 1977-1989.
- Karstensen, J., F. Schütte, A. Pietri, G. Krahnemann, B. Fiedler, B., Grundle, H. Hauss, A. Körtzinger, C.R. Löscher, P. Testor, N. Viera, and Martin Visbeck (2017). **Upwelling and isolation in oxygen-depleted anticyclonic medeater eddies and implications for nitrate cycling**. *Biogeosciences* 14, 2167-2181, doi:10.5194/bg-2016-34.
- Kinne, S., D. O'Donnel, P. Stier, S. Kloster, K. Zhang, H. Schmidt, S. Rast, M. Giorgetta, T. F. Eck, and B. Stevens (2013), MAC-v1: **A new global aerosol climatology for climate**

studies, *J. Adv. Model. Earth Syst.*, 5, 704–740, doi:10.1002/jame.20035.

Klepp, C. (2015). **The Oceanic Shipboard Precipitation Measurement Network for Surface Validation - OceanRAIN**. *Atmos. Res.*, Special issue of the International Precipitation Working Group (IPWG), 163, 74-90, doi: 10.1016/j.atmosres.2014.12.014.

Schütte, F., J. Karstensen, G. Krahnemann, H. Hauss, B. Fiedler, P. Brandt, M. Visbeck, and A. Körtzinger (2016). **Characterization of “dead-zone” eddies in the tropical Northeast Atlantic Ocean**. *Biogeosciences* 13, 5865-5881, doi:10.5194/bg-13-5865-2016.

Smirnov, A., B. N. Holben, I. Slutsker, D. M. Giles, C. R. McClain, T. F. Eck, S. M. Sakerin, A. Macke, P. Croot, G. Zibordi, P. K. Quinn, J. Sciare, S. Kinne, M. Harvey, T. J. Smyth, S. Piketh, T. Zielinski, A. Proshutinsky, J. I. Goes, N. B. Nelson, P. Larouche, V. F. Radionov, P. Goloub, K. Krishna Moorthy, R. Matarrese, E. J. Robertson, and F. Jourdin (2009), **Maritime Aerosol Network as a component of Aerosol Robotic Network**, *J. Geophys. Res.*, 114, D06204, doi:10.1029/2008JD011257.

Wagner, T., Beirle, S., Brauers, T., Deutschmann, T., Frieß, U., Hak, C., Halla, J. D., Heue, K. P., Junkermann, W., Li, X., Platt, U., and Pundt-Gruber, I (2011): **Inversion of tropospheric profiles of aerosol extinction and HCHO and NO2 mixing ratios from MAX-DOAS observations in Milano during the summer of 2003 and comparison with independent data sets**, *Atmos. Meas. Tech.*, 4, 2685-2715, doi:10.5194/amt-4-2685-2011, 2011.

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.

These proposed measurements will be carried out along the cruise track from Emden/Germany via North Sea and English Channel to Mindelo/Cape Verde. The cruise track will strictly follow the Traffic Separation Scheme in this region and therefore be constrained to the main shipping route for outbound traffic.

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 attachments

4. Methods and means to be used

4.1 Particulars of vessel:	
Name:	MARIA S. MERIAN
Type/Class:	Research Vessel
Nationality (Flag State):	German
Identification Number (IMO/Lloyds No.):	IMO-Nr. 9274197
Owner:	Federal State of Mecklenburg-Vorpommern, Germany
Operator:	University of Hamburg, Institute for Geology Bundesstraße 55, 20146 Hamburg
Overall length (meters):	94.76 m.
Maximum draught:	6.5 m.
Displacement/Gross Tonnage:	Deadweight 4493t / Gross Tonnage 5573 GT
Propulsion:	Diesel Electric
Cruising & maximum speed:	Cruising speed: 12.5 kn Maximum speed: 15 kn
Call sign:	DBBT
INMARSAT number and method and capability of communication (including emergency frequencies):	SAT: 00870-764354964 SAT: 00870-764354967
Name of Master:	Ralf Schmidt
Number of Crew:	Max. 23

Number of Scientists on board:	Max. 23
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4.2 Particulars of Aircraft:	
Name:	
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:	
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:

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):
Pumped surface water	Submersible pump	Spectrophotometric titration system for seawater alkalinity	Yes
Remote sensing of the atmosphere	OceanRAIN ODM470 optical disdrometer, ceilometer, sun photometer MICROTOPS, two cloud camera systems, MAX-	Precipitation rate and droplet size spectrum, cloud base height, aerosol, atmospheric gases, atmospheric water vapour, cloud fraction	Yes

	DOAS		
Remote sensing of the sea	Swath sonar multibeam	Ocean floor topography	Yes

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:

No drilling to be carried out.

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:

No use of explosives

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):

No deployment of any instrumentation in the sea.

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:

Departure from Emden: Nov. 4, 2017

Transit through North Sea and English Channel: Nov 4/5, 2017

6.2 Indicate if multiple entries are expected:

Single entry

7. Port Calls

7.1 Dates and Names of intended ports of call:

Port of departure: 03/04.11.2017 Emden/Germany

Port of arrival: 14.11.2017 Mindelo/Cape Verde

No further ports along the transit. No call to UK port.

7.2 Any special logistical requirements at ports of call:

None

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

No call to UK port

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:

No

8.2 Proposed dates and ports for embarkation/disembarkation:

Embarkation: Emden/Germany Nov. 03/04, 2017

Disembarkation: Mindelo/Cape Verde: Nov. 14, 2017

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:
Cruise Report three months after finishing the research cruise.

9.2 Anticipated dates of submission to the coastal State of the final report:
Cruise Report three months after finishing the research cruise.

9.3 Proposed means for access by coastal State to data (including format) and samples:
Underway surface water data will be stored in GEOMAR data system and will be made available via the GEOMAR Data Management Portal (<https://portal.geomar.de/de>) no later than 12 months after finishing the cruise.

9.4 Proposed means to provide coastal State with assessment of data, samples and Research results:
Peer-reviewed scientific publication within the following three years.

9.5 Proposed means to provide assistance in assessment or interpretation of data, samples And research results:
Direct contact to principal investigator: stephanie.fiedler@mpimet.mpg.de

9.6 Proposed means of making results internationally available:
aerosol and water vapor data will be available within a few days on http://aeronet.gsfc.nasa.gov/new_web/maritime_aerosol_network.html
peer-reviewed scientific publication: within the following three years.
Oral/poster presentations at international conferences.

10. Other permits Submitted

10.1 Indicate other types of coastal state permits anticipated for this research (received or Pending):
Netherlands (to be requested)
Cape Verde (to be requested)

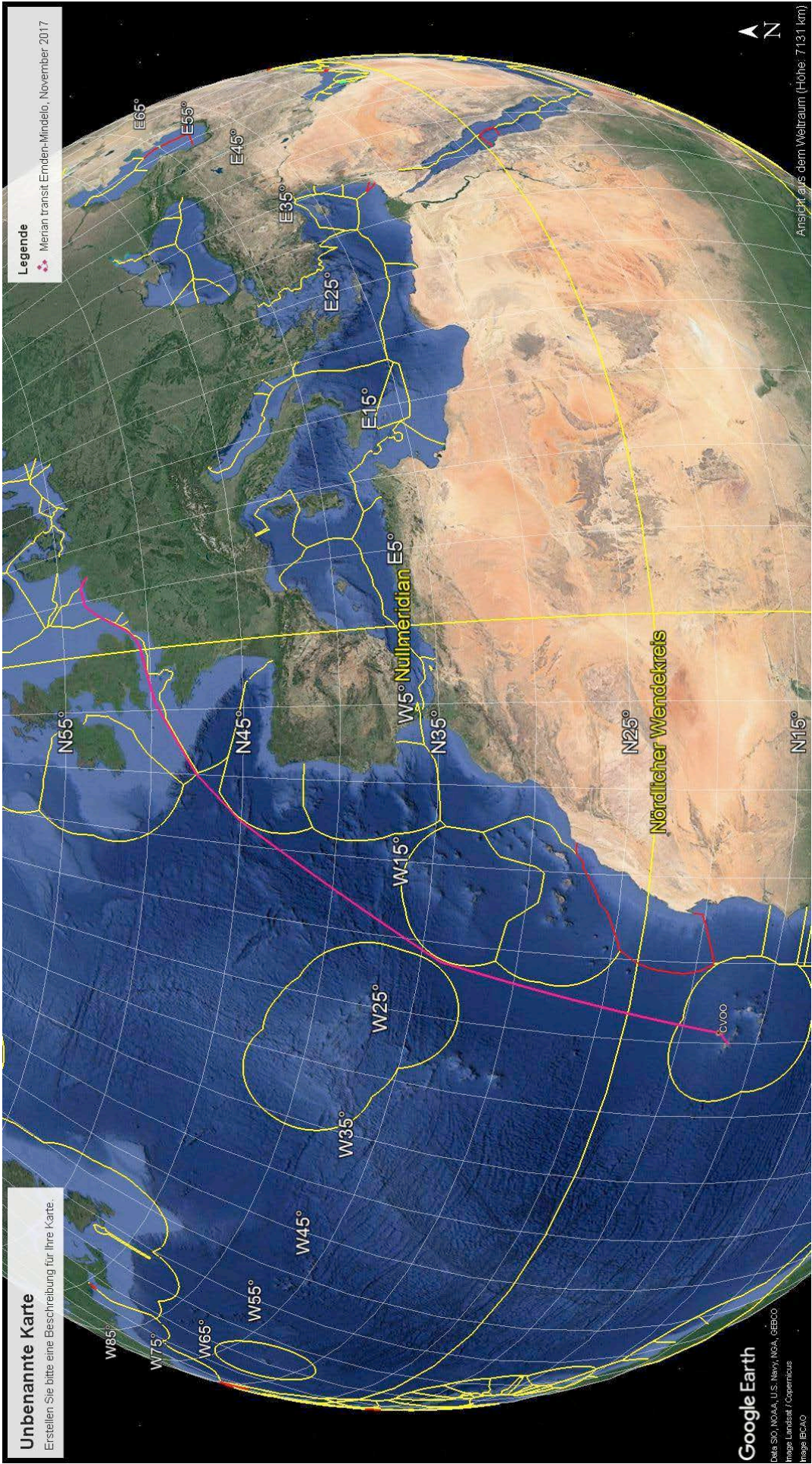
11. List of Supporting Documentation

11.1 List of attachments, such as additional forms required by the coastal State, etc.:
Overview map and detail map of cruise track

Signature:



Contact information of the focal point:	
Name:	Leitstelle Deutsche Forschungsschiffe
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Fax:	+49 (40) 42838-4644
Email:	leitstelle@ifm.uni-hamburg.de

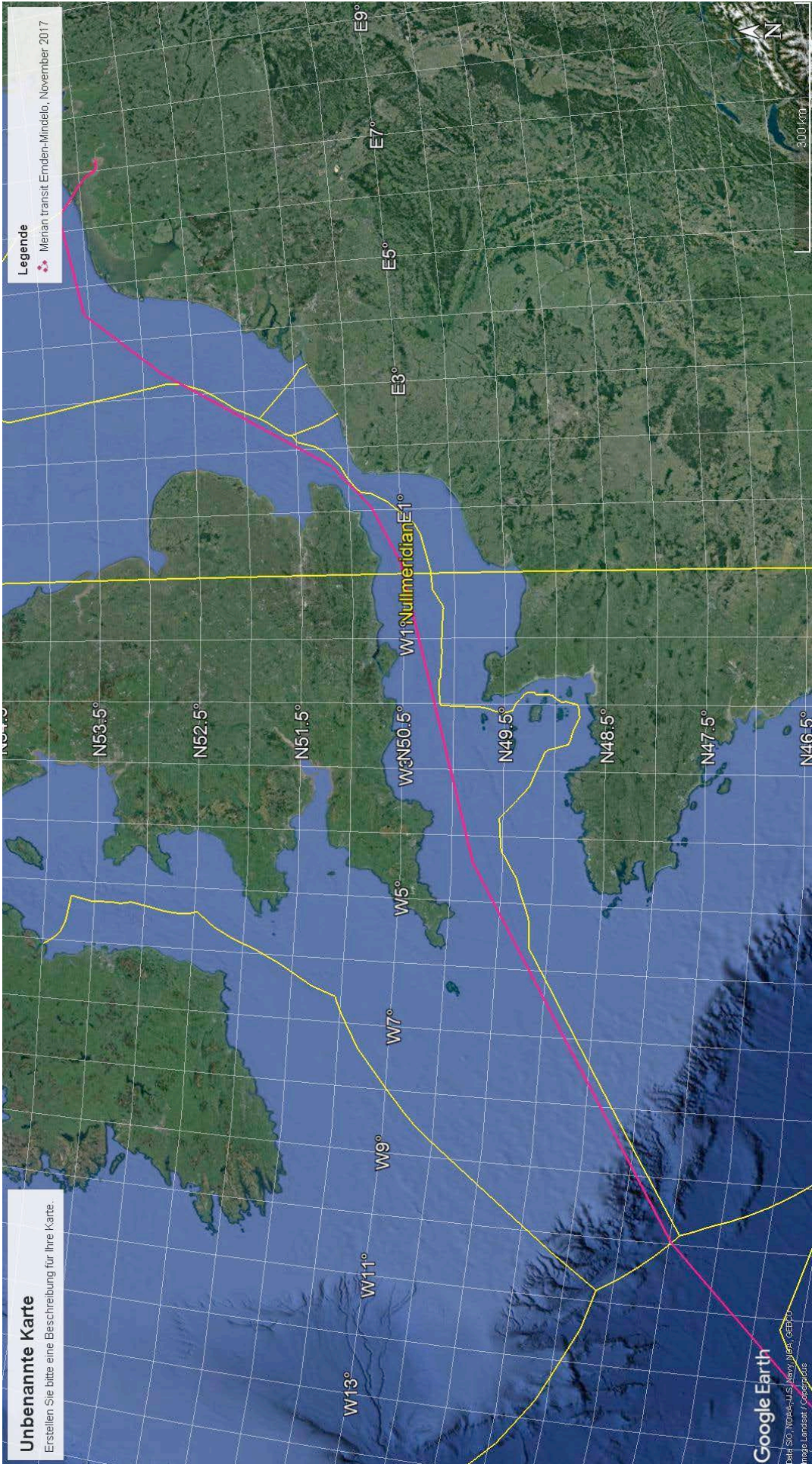


Unbenannte Karte
 Erstellen Sie bitte eine Beschreibung für Ihre Karte.

Legende
 Merian transit Emden-Mindel, November 2017

Google Earth
 Data SIO, NOAA, U.S. Navy, NGA, GEBCO
 Image Landsat / Copernicus
 Image IBCAO

Ansicht aus dem Weltraum (Höhe: 7131 km)



Unbenannte Karte
Erstellen Sie bitte eine Beschreibung für Ihre Karte.

Legende
Meran transit Emden-Mindelo, November 2017

Google Earth
©2017 SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus