

NOTIFICATION OF PROPOSED RESEARCH CRUISE

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GENERAL

Part A

01. Name of research ship: **MARIA S. MERIAN** Cruise No. **MSM 76**
02. Dates of cruise from **11.08.2018 Reykjavik** to **11.09.2018 Longyearbyen**
03. Operating Authority **Institut für Geologie / University of Hamburg**
Bundesstr. 55, D-20146 Hamburg, Germany
Tel.: +49-40-42838-3640 - Fax: +49-40-42838-46 44
04. Owner (if different from para 3) **Federal State Mecklenburg-Vorpommern, Germany**
-
05. Particulars of ship:
- | | |
|-----------------|------------------------|
| Name | MARIA S. MERIAN |
| Nationality | German |
| Overall length | 94,8 metres |
| Maximum draught | 6,5 metres |
| Nett tonnage | 1671 NT |
| Propulsion | Diesel Electric |
| Call sign | D B B T |
06. Crew
- | | |
|----------------|-----------------------|
| Name of master | Ralf Schmidt |
| No. of crew | <u>max. 23</u> |
07. Scientific personnel:
- | | |
|---|--|
| Name and address of scientist in charge | Prof. Dr. Torsten Kanzow
AWI (Alfred Wegener Institute)
Bussestr. 24
27570 Bremerhaven, Germany |
| Tel./Fax/Telex No. | Tel.: +49-471-4831-2913
Fax: +49-471-4831-1149 |
| No. of scientists | <u>max.23</u> |
08. Geographical areas in which ship will operate (with reference in latitude and longitude)

The overall area in which the ship will operate is between 61°N and 80°N and between 32°W and 15°E. Within the overall area, there are 2 regions, in which the work will be focussed, namely,

- Region1: Denmark Strait and Iceland-Faroe Ridge (area between 64°N and 67°30'N and between 33°W and 10°W).
- Region 2: Fram Strait (area between 76°00'N to 80°00'N and between 20°00'W and 15°E)

09. Brief description of purpose of cruise

Denmark Strait Overflow Water (DSOW), is continued to be observed as it enters the North Atlantic by means of a long term mooring program. DSOW contributes to the large scale deep ocean circulation and spreads throughout the whole Atlantic. The dense DSOW gravity plume immediately downstream of Denmark Strait is associated with rapid water mass modification due to vigorous mixing and entrainment of ambient water. Using new observations on small spatial and temporal scales we aim at understanding the pathways and processes by which kinetic energy within the plume is transferred from the mesoscale eddy field to internal waves and 3-D turbulence (dissipation). The entrainment of ambient water into the Denmark Strait Overflow has been found to be most effective within the first 200 km downstream of the Strait, where warm Atlantic Water and cold East Greenland shelf water are mixed into the plume. Our goals in the cruise are both to obtain data in the region of intense mixing and continue the monitoring of the Denmark Strait Overflow transports at the sill of Denmark Strait. We will use ship-borne measurements (CTD, ADCP) and short term moorings, as well as service existing moorings and deploy new moorings. In addition we will also work in Fram Strait in order to recover moorings on the North-East Greenland shelf break in order to better understand the dynamics that drive the subsurface transport of warm Atlantic waters onto the shelf. Previous measurements on the shelf have shown that these waters are transported via a boundary current towards the glaciers at the coast of North-East Greenland where they cause strong melting. Additionally we will recover, service and re-deploy an array of moorings covering the West Spitsbergen Current to study, in combination with another mooring line located in the Western Fram Strait, the variability and recirculation of Atlantic waters in Fram Strait.

10. Dates and names of intended ports of call

Reykjavik (Iceland) for 4 days in the period from 05.08.2018 – 14.08.2018 (intended so far 08.08.2018 – 11.08.2018) (already applied for with cruise MSM79)

11. Any special logistic requirements at ports of call

Crew change, container handling, bunkering

DETAIL

Part B

01. Name of research ship ***Maria S. Merian*** Cruise No. **MSM76**
02. Dates of cruise from: **11.08.2018 Reykjavik** to: **11.09.2018 Longyearbyen**

03. Purpose of research and general operational methods

The physical properties of the water masses and their transformation will be studied by means of moored and ship borne equipment. The major goal of the cruise is to quantify the dense water outflow from the Nordic Seas into the North Atlantic and to assess the mixing occurring on its way along the continental slope off Greenland. Another goal of the expedition is to determine long-term changes the flow of Atlantic Water in the West Spitsbergen Current and to understand processes driving Atlantic Waters toward the inner shelf of North-East of Greenland.

04. Attach chart showing (on an appropriate scale) the geographical area of the intended work, positions of intended stations, tracks of survey lines, positions of moored / seabed equipment.

see Appendix 1

05. Types of samples required, e.g. Geological / Water / Plankton / Fish / Radio-activity / Isotope

Water column samples

and methods by which samples will be obtained (including dredging / coring / drilling).

CTD Rosette system

06. Details of moored equipment:
- ***See Tables in Appendix 2 for positions of moorings to be recovered and moorings to be deployed***
 - ***The actual mooring deployment positions may deviate from the target positions given in Appendix 1, depending on the (partly unknown) water depths, circulation pathways and and weather conditions by up to 20 mn.***

07. Explosives: Page 4

no explosives

08. Detail and reference of

(a) Any relevant previous / future cruises

Pelagia 64PE426; MERIAN MSM21/1; Poseidon P471, P486, P503; Polarstern PS100, PS109

(b) Any previous published research data relating to the proposed cruise.
(Attach separate sheet if necessary.)

Jochumsen, K., M. Moritz, N. Nunes, D. Quadfasel, K. M. Larsen, B. Hansen, H. Valdimarsson and S. Jonsson: Revised transport estimates of the Denmark Strait Overflow, Journal of Geophysical Research, 122, doi:10.1002/2017JC012803.

Schaffer, J., T. Kanzow, K. Jochumsen, K. Lackschewitz, S. Tippenhauer, V. M. Zhurbas, and D. Quadfasel (2016): Enhanced turbulence driven by mesoscale motions and flow topography interaction in the Denmark Strait Overflow plume, Journal of Geophysical Research, 121, doi:10.1002/2016JC011653.

Jochumsen, K., S. M. Schnurr, and D. Quadfasel (2016): Bottom temperature and salinity distribution and its variability around Iceland, Deep-Sea Research I, 111, pp. 79–90, doi: <http://dx.doi.org/10.1016/j.dsr.2016.02.009>.

09. Names and addresses of scientists of the coastal state in whose waters the proposed cruise takes place with whom previous contact has been made.

Name: Dr. Héðinn Valdimarsson
Address: Marine Research Institute
 Skulagata 4, 121 Reykjavik, Iceland
Telephone: 00354 552 0240
e-mail: hv@havro.is

10. State:

(a) Whether visits to the ship in port by scientists of the coastal state concerned will be acceptable.

Yes

(b) Whether it will be acceptable to carry on board an observer from the coastal state for any part of the cruise and dates and ports of embarkation / disembarkation.

Yes

(c) When research data from intended cruise is likely to be made available to the coastal state and if so by what means.

- Cruise Report three months after finishing the research cruise

- Scientific publications within the following three years

COASTAL STATE: *Iceland*

SCIENTIFIC EQUIPMENT

11. Complete the following table - SEPARATE COPY FOR EACH COASTAL STATE
(indicate 'YES' or 'NO')

List of all major Marine Scientific Equipment it is proposed to use and indicate waters in which it will be deployed	Fisheries Research within Fishing Limits	Research concerning Continental Shelf out to Coastal State's Margin	Within 3 NM	Between 3 - 12 NM	Between 12 - 50 NM	Between 50- 200 NM
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CTD-Rosette (full water column)	No	Yes	No	Yes	Yes	Yes
Ship ADCP (water column to 700 m)	No	Yes	No	Yes	Yes	Yes
Surface Thermosalinograph (surface)	No	Yes	No	Yes	Yes	Yes
Multibeam Echosounder (full water column)	No	Yes	No	Yes	Yes	Yes
Meteorological measurements	No	Yes	Yes	Yes	Yes	Yes
"ADCP" sea current measurement LADCP	No	Yes	No	Yes	Yes	Yes
"PARASOUND P70" sediment echo sounder	No	No	No	Yes	Yes	Yes
Moorings	No	Yes	No	No	Yes	yes
Watercolumn temperature and sea current profiler	No	Yes	No	Yes	Yes	Yes

Appendix 1

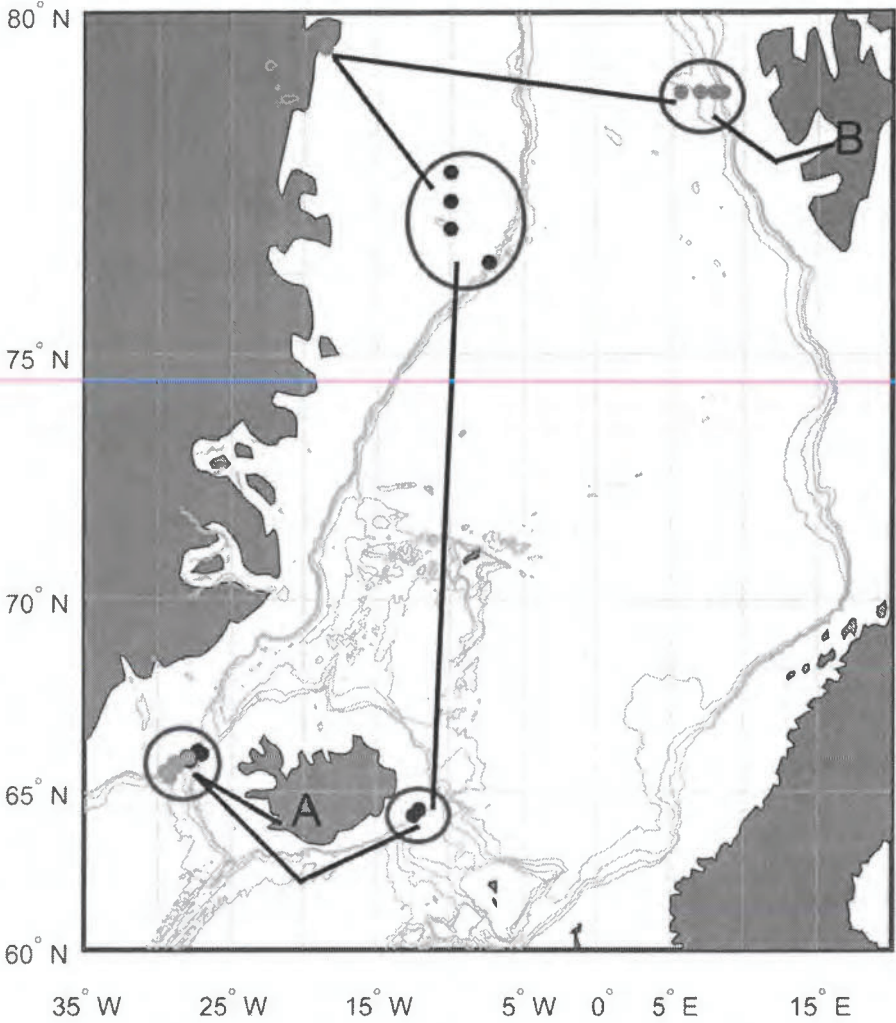


Figure 1. The approximate route of the cruise follows the **black** lines from point A (Reykjavik, Iceland) to point B (Longyearbyen, Norway) . Moorings that are going to be recovered, deployed and recovered and recovered and re-deployed are marked by blue , green and orange colour respectively. Enclosed in red circles are the main working mooring-areas.

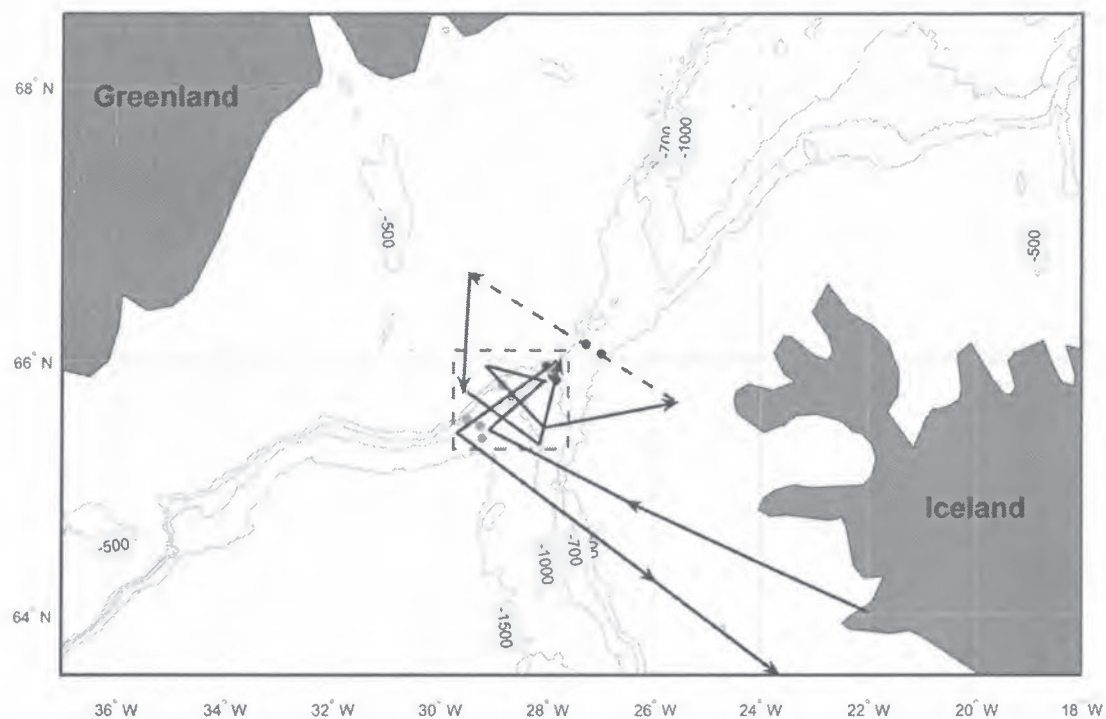


Figure 2: A closer look to the Denmark Strait working area. Moorings that are going to be recovered and deployed and recovered are marked with blue and green colour respectively. CTD stations are planned along a standard CTD line from Iceland to Greenland (**black** dashed line in map) and in high spatial and temporal resolution between the moorings (**red** dashed box).

Appendix 2

Table 1: Instruments to be recovered

Acronym	deployed	type	Latitude	Longitude	Depth [m]
DSM1	During expedition	ADCP,CTD	65° 24.0'N	029° 12.0'W	1250
DSM2	During expedition	ADCP,CTD	65° 30.0'N	029° 15.0'W	1000
DSM3	During expedition	ADCP,CTD	65° 33.0'N	029° 30.0'W	750
DSM4	During expedition	ADCP,CTD	65° 55.0'N	027° 57.0'W	600
DSM5	During expedition	ADCP,CTD	65°48.4'N	028°49.5'W	700
DSM6	During expedition	ADCP,CTD	65°43.5'N	028°40.1'W	900
DS2-17	19/09/17	ADCP	66°07.3'N	027° 16.7'W	589
DS23-17	19/09/17	RCM	66°02.9'N	026° 59.7'W	531
DS26-17	19/09/17	RCM	65°57.4'N	028° 01.7'W	543
DS27-17	19/09/17	TRBM	65°52.9'N	027° 53.9'W	630
DS28-17	19/09/17	TRBM	65°51.0'N	027° 49.8'W	686
WICE-P1-16	14/08/16	PIES	64°27.0'N	012° 03.8'W	400
WICE-P2-16	14/08/16	PIES	64°17.1'N	012° 27.0'W	460
EGS 1	04/10/17	CTD	77°04.0'N	010° 00.1'W	425
EGS 2	05/10/17	ADCP, CTD	76°32.8'N	007° 22.6'W	763
EGS 3	03/10/17	ADCP, CTD	77°54.4'N	009° 59.8'W	233
EGS 4	03/10/17	ADCP, CTD	77°29.0'N	010° 00.2'W	262
79N2-2	27/09/17	ADCP, CTD	79°34.0'N	019° 28.0'W	476
F1	23/07/16	ADCP, CTD	79°00.0'N	008° 32.5' E	345
F2	24/07/16	ADCP, CTD	79°00.0'N	008° 19.8' E	785
F3	24/07/16	ADCP, CTD	79°00.1'N	007° 59.8' E	1075
F4	24/07/16	ADCP, CTD	79°00.0'N	007° 00.0' E	1218
F5	24/07/16	ADCP, CTD	79°00.0'N	005° 40.1' E	2100
R1-1	16/08/16	ADCP, CTD	78°10.2'N	000° 0.04' E	3019

Table 2: Instruments to be deployed during the cruise

Acronym	type	Latitude	Longitude	Depth [m]
DSM1	ADCP,CTD	65° 24.0'N	029° 12.0'W	1250
DSM2	ADCP,CTD	65° 30.0'N	029° 15.0'W	1000
DSM3	ADCP,CTD	65° 33.0'N	029° 30.0'W	750
DSM4	ADCP,CTD	65° 55.0'N	027° 57.0'W	600
DSM5	ADCP,CTD	65°48.4'N	028°49.5'W	700
DSM6	ADCP,CTD	65°43.5'N	028°40.1'W	900
DS2-17	ADCP	66° 07.3'N	027° 16.7'W	589
DS23-17	RCM	66° 02.9'N	026° 59.7'W	531
79N2-3	ADCP, CTD	79° 34.0'N	019° 28.0'W	476
F1	ADCP, CTD	79° 00.0'N	008° 32.5' E	345
F2	ADCP, CTD	79° 00.0'N	008° 19.8' E	785
F3	ADCP, CTD	79° 00.1'N	007° 59.8' E	1075
F4	ADCP, CTD	79° 00.0'N	007° 00.0' E	1218
F5	ADCP, CTD	79° 00.0'N	005° 40.1' E	2100
F4-O-1	ADCP, CTD	79°10.00'N	006° 20.0'E	1260