



8. Geographical areas in which ship will operate (with reference in latitude and longitude):

Northern Reykjanes Ridge (Mid-Atlantic Ridge) south of Iceland; the polygon defining the intended working area (WA) comprises the following points:

WA\_no1 63°45' N / 24°15' W

WA\_no2 63°0' N / 21°0' W

WA\_no3 61°18' N / 28°48' W

WA\_no4 60°25' N / 25°24' W

For reference we enclose a map of this area with the four WA corners labelled in accordance with the above.

9. Brief description of purpose of cruise:

The global importance of ridge axis circulation systems for crust-ocean exchange, deep biospheres and their role in the carbon cycle (including CO<sub>2</sub> mineral storage) cannot be overestimated. The cruise aims to establish a seafloor observatory using a drilling rig (MARUM-MeBo70) in sedimentary basins of the eastern flank of the southernmost tip of the Reykjanes Ridge in ca 1900m water depth in international waters. This site will be compared later to a segment of the Reykjanes Ridge in ca 800m water depth in the Icelandic EEZ. Here, the aspect of CO mineral storage is particularly important because of the proximity to the Carbfix project on Iceland, which will investigate offshore possibilities in the foreseeable future.

We have established a collaboration between the *Carbfix* project and the German research project *AIMS3* coordinated at MARUM (<https://aims3.cdrmare.de/en/>). For this request to do research in the Icelandic EEZ, only the northern location is relevant.

The work in the Icelandic EEZ will involve using sediment echosounder and heat flux lance. This way the temperature field and potential sub-seafloor flow in the ocean crust could be determined. Gravity cores in a few places may allow us to also measure thermal conductivity and hence heat flow calculations. No borehole is currently planned with MeBo due to time constraints, but in case the work in the deep-sea is impossible, we may try one close to the ridge axis with ca 20-30 m of sediment and ca 30-40 m of basaltic crust. Shore based, we will then analyse the solid phase of the sediments and crust using geochemical, mineralogical, and modeling methods to quantify solute exchange between the fluids of the basaltic crust and the overlying sediments, as well as carbon turnover and alteration of the primary sediment and rock composition.

10. Dates and names of intended ports of call:

No ports of call are planned in Iceland.

11. Any special logistic requirements at ports of call:

No ports of call are planned in Iceland.

**Part B: DETAIL**

1. Name of research ship: **R.V. MARIA S. MERIAN** Cruise No. **MSM 119**
2. Dates of cruise **from St. John's, Canada, 08.07.2023**  
**To St. John's, Canada, 12.08.2023**
3. Purpose of research and general operational methods:  
  
Site characterisation of young, off-axis mid ocean ridge basalt and overlying young sediment, plus bathymetric, hydroacoustic and geothermal environment around it. The key goal is to understand element fluxes in the upper crust and overlying sediment, characterise the physical properties (heat flow, permeability) and storage potential for CO<sub>2</sub>.
4. 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:

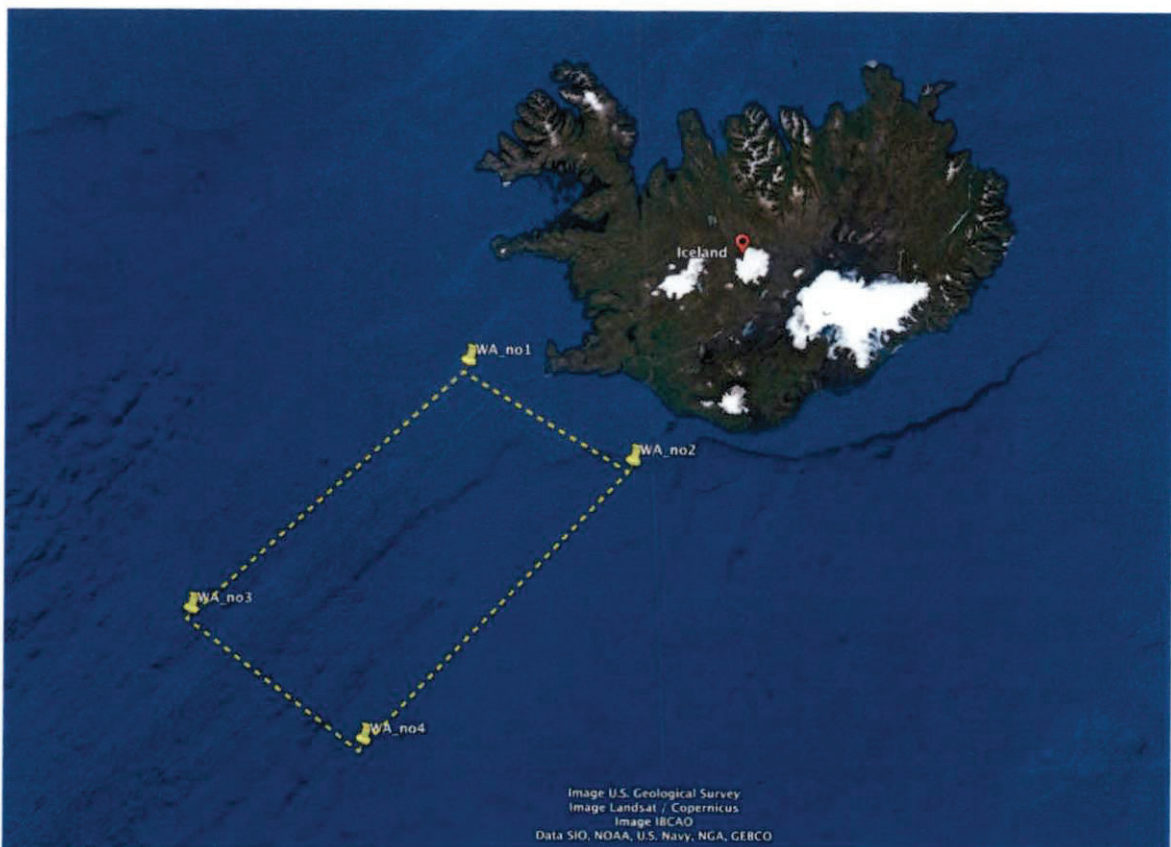


Figure 1: Map of the intended working area offshore Iceland. For details regarding the coordinates, refer to Part A, Section 8.

Estimated date of first entry into EEZ of coastal state:	<b>25.07.2023</b>
Estimated last exit from EEZ of coastal state:	<b>11.08.2023</b>
Multiple EEZ entries/exits during the research cruise?	<b>NO</b>

5. Types of samples required (e.g., Geological / Water / Plankton / Fish / Radioactivity / Isotope) and (b) methods by which samples will be obtained (including dredging / coring / drilling/ fishing etc.).

(a) Type of samples	(b) Method
Geological samples (sediment)	gravity coring
Geological samples (crust)	MeBo70 seafloor drilling*

\* See: <https://www.marum.de/en/Infrastructure/Sea-floor-drill-rig-MARUM-MeBo70.html>

6. Details of moored equipment: **Not equipment will be moored.**
7. Explosives: **No explosives.**
8. Detail and reference of  
(a) Any relevant previous / future cruises:

We had MARUM cruise M183 on German RV Meteor in summer 2022 to characterise the southernmost Reykjanes Ridge (deep water site at ca 1900 m) with ROV, hydroacoustic profiling, multibeam bathymetry, T measurements and gravity coring (July/Aug. 2022).

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

The above cruise report is available here: [https://doi.org/10.2312/cr\\_msm86](https://doi.org/10.2312/cr_msm86)

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

**Dr. Martin Voigt, Univ. of Iceland**

**Dr. Sandra Ósk Snæbjörnsdóttir, Carbfix**

**Bergur Sigfusson, Carbfix**

10. State:

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

**No ports of call are planned in Iceland.**

- (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:

**All persons on board must be both fully vaccinated and boosted against COVID-19 with a WHO-approved vaccine. Further, the embarkation requires a negative COVID-19 Antigen Test result not older than 24 hours.**

**Embarkation: St. John's, Canada, 07<sup>th</sup> July 2023**

**Disembarkation: St. John's, Canada, 12<sup>th</sup> August 2023**

- (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 publication within the following three years.**

**Part C: SCIENTIFIC EQUIPMENT**

COASTAL STATE: Iceland

11. Complete the following table - (indicate 'YES' or 'NO'):  
**Please add in "b" the equipment you will bring to the vessel and complete the table with yes or no. Note that forgotten equipment can led to restrictions in research.**

List of all major marine scientific equipment it is proposed to use.	Fisheries research within fishing limits	Research concerning continental shelf out to State's margin	Waters in which equipment will be deployed			
			within 3 NM	between 3-12 NM	between 12-50 NM	between 50-200 NM
<b>a. vessel mounted systems</b>						
ADCP current profiler	NO	YES	NO	YES	YES	YES
USBL underwater positioning	NO	YES	NO	YES	YES	YES
Multibeam echosounder	NO	YES	NO	YES	YES	YES
Sub-bottom profiler Parasound P70	NO	YES	NO	YES	YES	YES
Permanent surface water sampling / analysis (incl. Thermosalinograph)	NO	YES	NO	YES	YES	YES
<b>b. mobile equipment</b>						
Sound velocity probe AML SV PlusX	NO	YES	NO	NO	YES	NO
Meteorological Sensors	NO	YES	NO	YES	YES	YES
Temperature probe (5m)	NO	YES	NO	YES	YES	YES
Gravity corer (6m)	NO	YES	NO	YES	YES	YES
MeBo70 seafloor drill	NO	YES	NO	YES	YES	YES

Hamburg, 25.01.2023

Date



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(On behalf of the principal scientist)

NB IF ANY DETAILS ARE MATERIALLY CHANGED REGARDING DATES/AREA OF OPERATION AFTER THIS FORM HAS BEEN SUBMITTED, THE COASTAL STATE AUTHORITIES MUST BE NOTIFIED IMMEDIATELY