NOTIFICATION OF PROPOSED RESEARCH CRUISE

GENERAL

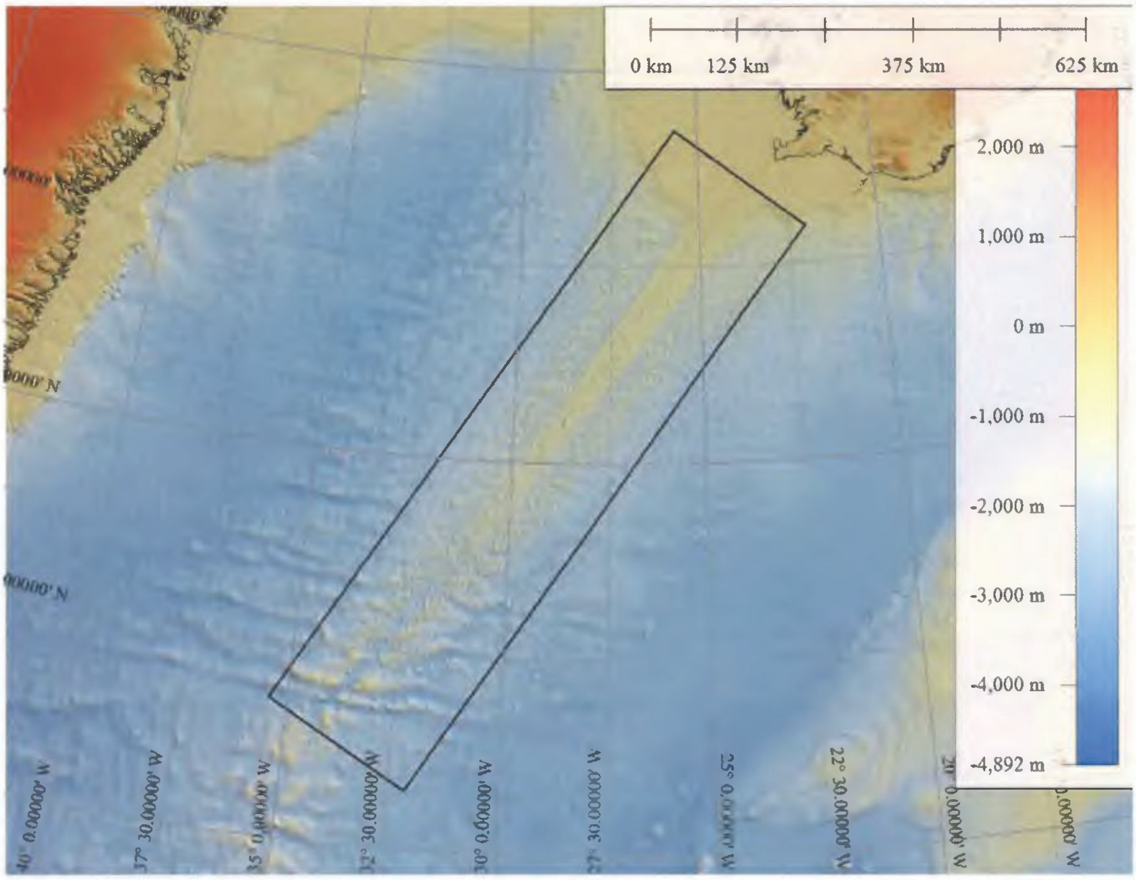
Part A

01.	Name of research ship:	***MARIA S. MERIAN***	Cruise No. ***MSM42***
02.	Dates of cruise	from **Tromsoe *16 Sept 2014* to Cork *25 Oct 2014***	
03.	Operating Authority	***Institut für Meereskunde / University of Hamburg*** ***Bundesstr. 53, 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	***1750 NRZ***
		Propulsion	***Diesel Electric***
		Call sign	***D B B T***
06.	Crew	Name of master	**Ralf Schmidt**
		No. of crew	***max. 23***
07.	Scientific personnel:	Name and address of scientist in charge	***Prof. Dr Colin Devey*** ***GEOMAR*** ***Wischhofstr. 1-3*** ***Kiel, 24148, Germany***
		Tel./Fax/Telex No.	***Tel: +49-431-600-2257*** ***Fax: +49-431-600-2924***
		No. of scientists	***max.23***

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

The operating area covers they Reykjanes Ridge area of the seafloor south of Iceland. The box in the map below defines the absolute extents of any work and the corners are defined by the following coordinates (to 2dp):

64.24°N 25.66°W
62.96°N 22.03°W
56.77°N 35.43°W
55.73°N 32.12°W



We would also like to collect bathymetric data on the transit in from Tromsø, Normay to the working area and out of the working area towards Cork, Ireland.

09. Brief description of purpose of cruise

Hotspot-influenced spreading axes are characterized by a shallow axis, thickened crust, and possibly higher than normal eruption frequency, all the signs of an excess of magma and heat being supplied to such ridges by the hotspot. Despite this, these ridges are also characterized by an apparently lower than average incidence of high-temperature hydrothermal venting, raising questions about their thermal budget. The type example for hotpot-ridge interaction is the Reykjanes Ridge south of Iceland, which shows abnormally shallow bathymetry between the Reykjanes Peninsula at ca. 63°N and the Charlie Gibbs Fracture Zone at 53°N. The seafloor surrounding the present spreading axis is also characterized by V-shaped bathymetric ridges, thought to be produced by regions of excess melting migrating along the axis through time. Although the Reykjanes Ridge has been extensively mapped and sampled, many fundamental questions of plume-ridge interaction remain unanswered. This cruise aims to address the following:

1. ***Is the reduction in crustal thickness observed away from Iceland coupled to fewer eruptions or to eruptions with the same frequency but smaller volume? Does the eruption frequency at any one locality change significantly over time?***
2. ***Are the V-shaped ridges related to areas of increased eruption frequency/volume?***
3. ***How is the thick crust cooled despite the apparent paucity of high-temperature vent fields? What form does hydrothermal venting take on such thick crust?***

4. ***Can we model the relationship between crustal thickness, eruptive history and observed heat release?***

10. Dates and names of intended ports of call

none

11. Any special logistic requirements at ports of call

none

Page 2

DETAIL

Part B

01. Name of research ship **_MARIA S. MERIAN_** Cruise No. **_MSM42_**

02. Dates of cruise **from Tromsoe 16 Sept 2014** **to Cork 25 Oct 2014**

03. Purpose of research and general operational methods

The purpose of the research is to answer the following questions:

1. ***Is the reduction in crustal thickness observed away from Iceland coupled to fewer eruptions or to eruptions with the same frequency but smaller volume? Does the eruption frequency at any one locality change significantly over time?***

2. ***Are the V-shaped ridges related to areas of increased eruption frequency/volume?***

3. ***How is the thick crust cooled despite the apparent paucity of high-temperature vent fields? What form does hydrothermal venting take on such thick crust?***

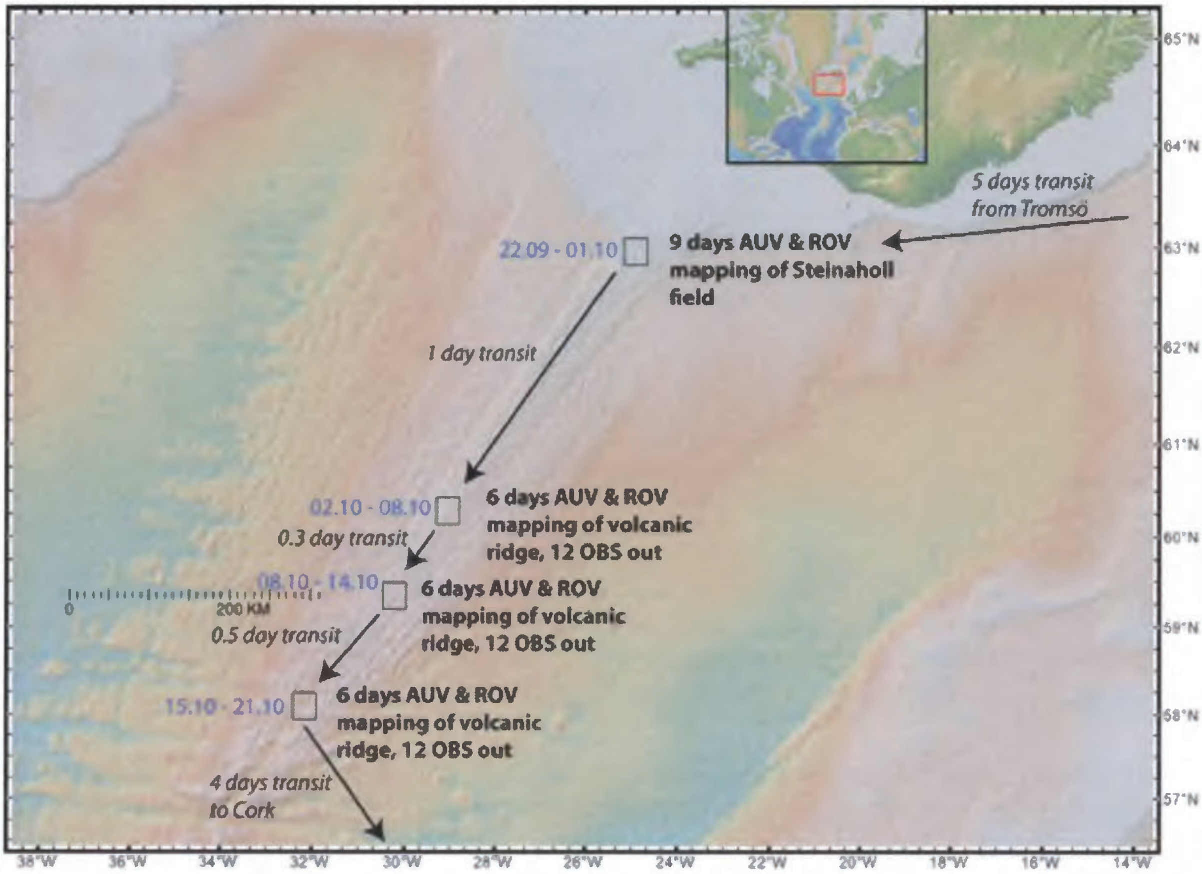
4. ***Can we model the relationship between crustal thickness, eruptive history and observed heat release?***

These questions can only be answered with a knowledge of the geology of the ridge - flow sizes, flow ages, locations of hydrothermal venting, localization of deformation - at different points along the crustal thickness gradient. To answer them we will produce geological maps of four key areas along the ridge – one with thickened crust where a V-shaped ridge intersects the present-day axis, one with thickened crust but no on-axis V-shaped ridge anomaly, a third with more normal crustal thickness and an axial valley and a fourth at the only known, but up to present unsampled, Reykjanes hydrothermal site Steinaholl. Producing these geological maps will require a combination of detailed bathymetric mapping, precise sampling and innovative dating methods.

During the cruise this will be achieved by collecting areas of multibeam and sidescan sonar data using the ship mounted sonar (20 – 50 m resolution) and the GEOMAR Autonomous Underwater Vehicle (AUV) Abyss (better than 1m resolution). The AUV will also record temperature, turbidity and Eh measurements, capable of detecting hydrothermal plumes in the water column near to the seafloor. These high-resolution AUV surveys will them be used to plot routes for the Remotely Operated Vehicle (ROV) Kiel 6000, which will take video footage of the seafloor and accurately positioned fluid and rock samples. Additional dredging and wax coring may be conducted to complete sample sets where less accurately positioned sampling is required and/or during bad weather when the ROV cannot be deployed.

The AUV will fly at altitudes of between 10 and 100 m above the seafloor with a typical autonomous mission length of 12 – 18 hours (followed by a 12 hour battery rechanrge period). The ROV will be operated from the ship (with the ship positioned above or just ahead of the vehicle on the seafloor) with typical mission lengths of less than 24 hours.

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



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

water, hydroacoustic data, rock samples and sediments for dating and geochemical analysis

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

pumping, hydroacoustic measuring, dredging, wax corer, sampling with ROV

06. Details of moored equipment: ***None***

Dates				
Laying	Recovery	Description	Latitude	Longitude

07. Explosives: ***None***

(a) Type and Trade name

(b) Chemical content

(c) Dept of Trade class and stowage

(d) Size

(e) Depth of detonation

(f) Frequency of detonation

(g) Position in latitude and longitude

(h) Dates of detonation

08. Detail and reference of

(a) Any relevant previous / future cruises

A number of sampling and surveying cruises addressing crustal construction and evolution as well as the effect of the Icelandic hotspot on a slow-spreading mid-ocean ridge have been conducted in the area. Bathymetric data from cruises CD81, EW9008, EW9302, KM108-04 and CD87 will be used for cruise planning.

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

Many geological and geophysical studies have been published relating to the Reykjanes Ridge. This cruise will address questions directly relating to the following publications:

Appelgate, B., and A. N. Shor (1994), The northern Mid-Atlantic and Reykjanes ridges: Spreading center morphology between 55°50´n and 63°00´n, J. Geophy. Res., 99(B9), 17935-17956.

Devey, C. W., C. R. German, K. M. Haase, K. S. Lackschewitz, B. Melchert, and D. P. Connelly (2010), The relationships between volcanism, tectonism and hydrothermal activity on the southern equatorial Mid-Atlantic ridge, in Diversity of hydrothermal systems on slow spreading ocean ridges, edited by P. Rona, C. W. Devey, J. Dyment and B. J. Murton, American Geophysical Union, Washington D.C.

German, C. R., and L. M. Parson (1998), Distribution of hydrothermal activity along the Mid-Atlantic ridge: Interplay of magmatic and tectonic controls, Earth Planet. Sci. Lett., 160, 327-341

Hannington, M., P. Herzig, P. Stoffers, J. Scholten, R. Botz, D. Garbe-Schonberg, I. Jonasson, and W. Roest (2001), First observations of high-temperature submarine hydrothermal vents and massive anhydrite deposits off the north coast of Iceland, Marine Geology, 177(3-4), 199-220.

Hannington, M. D., C. De Ronde, and S. Petersen (2005), Sea-floor tectonics and submarine hydrothermal systems, in Economic geology 100th anniversary volume, edited by J. W. Hedenquist, J. F. H. Thompson, R. J. Goldfarb and J. P. Richards, pp. 111-141.

Ito, G. (2001), Reykjanes "v"-shaped ridges originating from a pulsing and dehydrating mantle plume, Nature, 411, 681-684.

Johnson, G.L, S.P, and Jakobssson (1985), Structure and petrology of the Reykjanes ridge between 62 55 N and 63 48 N, J. Geophys. Res., 90, 10, 073 - 010, 083.

Madge, L., and D. Smith (1995), Seamount volcanism at the Reykjanes ridge - relationship to the Iceland hot-spot, J Geophys Res-Sol Ea, 100(B5), 8449-8468.

Murton, B. J., and L. M. Parson (1993), Segmentation, volcanism and deformation of oblique spreading centres; a quantitative study of the Reykjanes ridge, Tectonophysics, 222, 237- 257

Navin, D. A., C. Peirce, and M. C. Sinha (1998), The ramesses experiment - ii. Evidence for accumulated melt beneath slow spreading ridge from wide-angle refraction and multichannel reflection seismic profiles, Geophys J Int, 135(3), 746-772.

Parson, L., et al. (1993), En echelon axial volcanic ridges at the Reykjanes ridge ridge: A life cycle of volcanism and tectonics, Earth Planet. Sci. Lett., 117, 73-87.

Searle, R. C., J. A. Keeton, R. B. Owens, R. S. White, R. Mecklenburgh, B. Parsons, and S. M. Lee (1998), The Reykjanes ridge: Structure and tectonics of a hot-spot-influenced, slow-spreading ridge, from multibeam bathymetry, gravity and magnetic investigations, Earth Planet. Sci. Lett., 160, 463-478.

Sinha, M. C., S. C. Constable, C. Peirce, A. White, G. Heinson, L. M. Macgregor, and D. A. Navin (1998), Magmatic processes at slow spreading ridges: Implications of the RAMESSES experiment at 57 degrees 45 ' n on the Mid-Atlantic ridge, Geophys J Int, 135(3), 731-745.

Sinha, M. C., D. A. Navin, L. M. Macgregor, S. Constable, C. Peirce, A. White, G. Heinson, and M. A. Inglis (1997), Evidence for accumulated melt beneath the slow-spreading Mid-Atlantic ridge, Philos T Roy Soc A, 355(1723), 233-253.

Smallwood, J., and R. White (1998), Crustal accretion at the Reykjanes ridge, 61 degrees-62 degrees n, J Geophys Res-Sol Ea, 103(B3), 5185-5201.

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.

- Bryndís Brandsdóttir
Senior Research Scientist, Geophysics
Náttúrufræðahús, Askja, herbergi 327 Sturlugata 7, IS-101 Reykjavík

- Ögmundur Erlendsson
Jarðfræðingur / Geologist
Íslenskar orkurannsóknir / Iceland GeoSurvey
Grensásvegur 9, 108 Reykjavík

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 – it is currently planned that Ögmundur Erlendsson will join the cruise as an observer

(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**

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
a) vessel mounted systems: hydroacustic mapping / measuring (incl. ADCP, Parasound and multibeam)	**No**	**Yes**	**No**	**No**	**Yes**	**Yes**
permanent surface water sampling / pumping (incl. Thermosalinograph)	**No**	**Yes**	**No**	**No**	**Yes**	**Yes**
b) mobile equipment:						
AUV	**No**	**Yes**	**No**	**No**	**Yes**	**Yes**
ROV	**No**	**Yes**	**No**	**No**	**Yes**	**Yes**
Dredge	**No**	**Yes**	**No**	**No**	**Yes**	**Yes**
Wax Corer	**No**	**Yes**	**No**	**No**	**Yes**	**Yes**