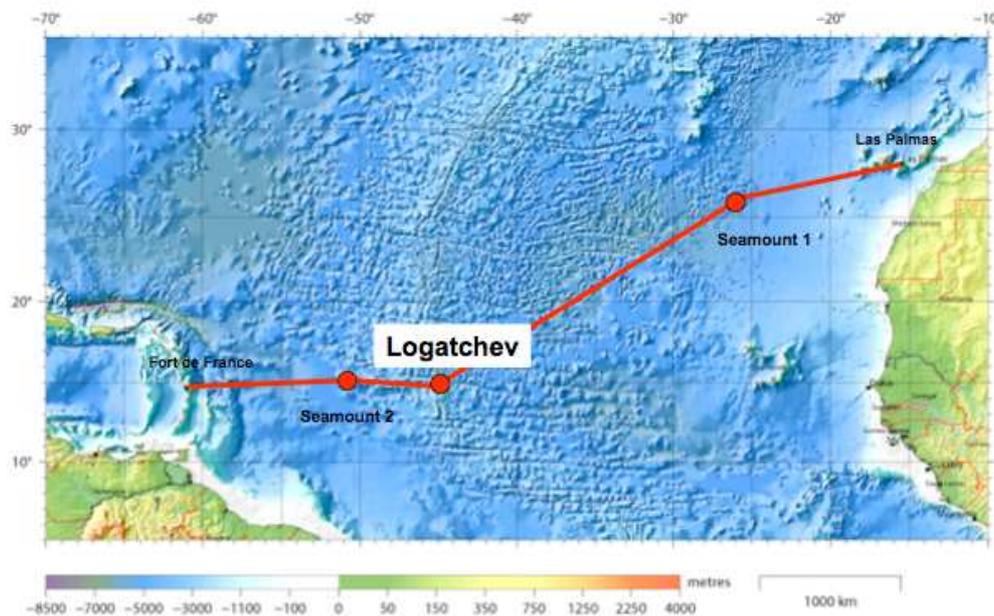


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**Short Cruise Report  
RV MARIA S. MERIAN Cruise MSM10-3**

**Las Palmas – Fort de France  
January 11 – February 13, 2009  
Chief Scientist: Nicole Dubilier  
Captain: Friedhelm von Staa**



Ship track of RV Maria S. Merian Cruise MSM 10-3 from Las Palmas to Fort de France. The main working area was the Logatchev hydrothermal vent field on the Mid-Atlantic Ridge. The bathymetry of two seamounts was mapped during the transit from Las Palmas to Logatchev (Seamount 1) and from Logatchev to Fort de France (Seamount 2).

## Objectives

RV Maria S. Merian cruise MSM 10-3 was the last in a series of nearly yearly cruises since 2004 to the Logatchev hydrothermal vent field at 15°N on the Mid-Atlantic Ridge (MAR). These cruises are part of the German Science Foundation's Priority Program SPP 1144 "From the Mantle to the Ocean" in which scientists are working together to better understand the geology, chemistry, and biology of hydrothermal vents on the slow-spreading MAR. Scientists from the Max Planck Institute for Marine Microbiology, the IFM-Geomar, the University of Kiel, the University of Hamburg, the Jacob's University Bremen, and the French CNRS (Biological Station of Roscoff) participated in this cruise.

The cruise, called Hydromar VII, was centered around three goals: 1) to continue and conclude time series studies on the spatial and temporal variability of vent fluids and their effect on vent biota, 2) to better understand how plumes that rise from the Logatchev vents are dispersed in the water column, and how currents and tides influence this dispersal, and 3) to determine the fine structure of the Logatchev hydrothermal vent field and adjoining areas using high-resolution bathymetric mapping. Our main working tools were the ROV (Remotely Operated Vehicle) Kiel 6000 for Goal 1, a CTD-Rosette, Miniature Autonomous Plume Recorders (MAPRs), and oceanographic moorings for Goal 2, and the ship's Kongsberg EM120 multibeam echosounder for Goal 3.

These investigations will help answer the following core interdisciplinary questions of the SPP 1144: 1) What factors govern where tectonic, magmatic, hydrothermal, and biological processes occur on spreading axes? 2) How do biological and hydrothermal processes interact? 3) What are the time scales at which processes at spreading axes occur?

## Narrative

The RV Maria S. Merian left Las Palmas on January 11<sup>th</sup>, three days later than originally planned, because problems with customs delayed the loading of the ROV and scientific containers onto the ship. On the second day of transit to our working area, the Logatchev hydrothermal vent field at 14°45' N, 44°58' W on the Mid-Atlantic Ridge (MAR), we used the ship's multibeam echosounder for bathymetric mapping of a seamount at 25°47' N, 26°15' W. A ROV test dive at the seamount down to 1800 m water depth was successful and revealed lava-like black structures and typical seamount fauna.

The total transit time of six days to Logatchev was used for safety instructions and a safety drill, and for setting up the labs and preparing instruments and equipment, including the ROV, for station work. In the evenings, the scientists gave talks about their research and the work planned for the cruise, including a more general talk for the ship's crew, while the ROV team gave an introduction to the Kiel 6000.

On January 17<sup>th</sup>, an oceanographic mooring was deployed about 5 nautical miles from Logatchev in 4000 m water depth (Fig. 4). The 120 m long mooring was anchored on a sill between two valleys north of the Logatchev area to continuously measure the temperature, salinity, and current velocities using 5

MicroCats and 5 RCM current meters. The mooring will be recovered during a SPP 1144 cruise with the RV Poseidon in March 2009.

During the first week at Logatchev (Jan. 18 – 25), twelve Ocean Bottom Seismometers (OBS) were deployed in a grid across the Logatchev vent field to record seismic activity. These will also be recovered during the Poseidon cruise in March 2009. Research work was interrupted from the evening of Jan. 18<sup>th</sup> to the morning of Jan. 20<sup>th</sup> to rescue a couple on a sailboat with a broken mast that was over a 100 nm away from us. The couple abandoned their sailboat and stayed with us for the rest of the cruise. As strong winds and rough seas did not allow the deployment of the ROV, a series of CTD-rosette casts, tow-yos, and yo-yos were run to investigate how vent fluids are dispersed into the water column. MAPRs (Miniature Autonomous Plume Recorders) were attached to the CTD cable for additional information on turbidity and Eh. The first ROV dive was possible on Jan. 25<sup>th</sup>, and fluids and biota were sampled from the Irina II vent structure. During the dive, an in situ mass spectrometer (designed by Peter Girguis) was successfully deployed, providing, for the first time, online measurements of dissolved gases in vent fluids of Logatchev.

Seas were too rough for ROV deployment during most of the second week (Jan. 26 – Mar. 1) as well, so we continued our plume studies with CTD-rosette casts, tow-yos and yo-yos. Hump Day was celebrated on Jan. 29<sup>th</sup> with a barbecue on the afterdeck. On March 1<sup>st</sup>, the seas quieted down enough for a 2<sup>nd</sup> ROV dive, during which instruments left on the seafloor during previous cruises were recovered (the Ocean Bottom Pressuremeter and SMoni from Irina II). Mussels were collected for biological analyses and hot vent fluids from Irina II were sampled for microbiological and chemical analyses.

During the third and last week at Logatchev (Mar. 2 – 9), the CTD-rosette was deployed as during the previous weeks for plume studies. Three out of four OBSs that had been deployed during the SPP 1144 cruise to Logatchev in December 2007 with the RV L'Atalante were successfully recovered. Seas were quiet enough for ROV diving on Feb. 4<sup>th</sup>, 8<sup>th</sup>, and 9<sup>th</sup>, and despite the limited number of dives possible during the cruise, most of the instruments that had been left on the seafloor were recovered including the Ocean Bottom Tiltmeter, the SMoni from Site B, and temperature loggers deployed in a mussel bed at Irina II. Samples for biological and chemical analyses were collected at Quest, Irina II, Site B, and Anna Louise and the in situ mass spectrometer collected data on the dissolved gases from all sampled sites. A large woodpile that had been deployed two years earlier was extensively penetrated by wood-boring bivalves, and samples were collected and brought to the ship, but no live shipworms were found. As during the previous weeks, the night program consisted of bathymetric mapping of the Logatchev vent field and surrounding areas using the ship's multibeam echosounder.

We began our transit to Fort de France, Martinique the evening of Feb. 9<sup>th</sup> and made a small detour en route for bathymetric mapping of a seamount at 15°20' N, 50°30' W from Feb. 10<sup>th</sup> – 11<sup>th</sup>. We arrived in Fort de France as scheduled, early in the morning of Feb. 13<sup>th</sup> and were able to unload our containers and ship our airfreight by noon, despite a strike that crippled

almost all of Martinique. Most of the scientific crew flew home the evening of Feb. 13<sup>th</sup>, with the ROV crew flying home a day later on Feb. 14<sup>th</sup>.

### List of Participants

1	Nicole Dubilier, chief scientist	MPI-Bremen
2	Reinhard Müller, ship's doctor	
3	Verena Kleven, fluid geochemistry	JU Bremen
4	Phillip Hach, fluid geochemistry	JU Bremen
5	Dieter Garbe-Schönberg, fluid geochemistry	Uni. Kiel
6	Marc Peters, fluid geochemistry	Uni. Münster
7	Marco Warmuth, fluid geochemistry	Uni. Hamburg
8	Annette Heddaeus, fluid geochemistry	Uni. Hamburg
9	Mirjam Perner, microbiology	Uni. Hamburg
10	Nicolas Rychlik, microbiology	Uni. Hamburg
11	Chia-I Huang, microbiology	MPI-Bremen
12	Christian Borowski, symbioses	MPI-Bremen
13	Dennis Fink, symbioses	MPI-Bremen
14	Stephane Hourdez, mass spec	Biological Station Roscoff
15	Fritz Karbe, oceanography	IFM-Geomar, Kiel
16	ROV crew, Fritz Abegg	IFM-Geomar, Kiel
17	ROV crew, Martin Pieper	IFM-Geomar, Kiel
18	ROV crew, Claus Hinz	IFM-Geomar, Kiel
19	ROV crew, Hannes Huusmann	IFM-Geomar, Kiel
20	ROV crew, Inken Suck	IFM-Geomar, Kiel
21	ROV crew and OBS, Erik Labahn	KUM, Kiel
22	ROV crew, Wolfgang Queisser	IFM-Geomar, Kiel
23	ROV crew, Phillip Franke	Marum, Bremen

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