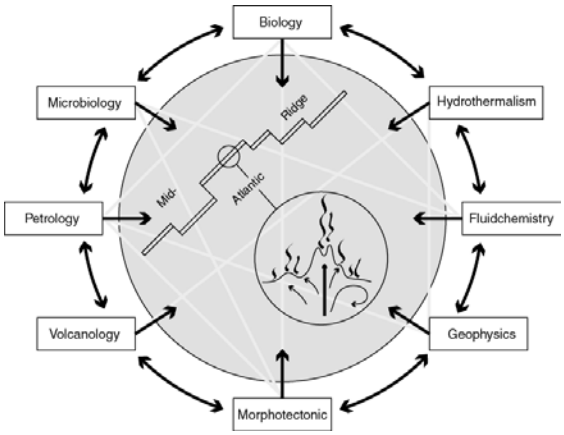


SPPreader

The bi-annual newsletter of the
DFG Priority Program SPP 1144

Issue 2, July 2004

The SPP 1144 web site is at:
www.deridge.de

Second Edition

The SPP 1144: „From Mantle to Ocean: Energy-, Material- and Life Cycles at Spreading Axes“ started on the first of October 2003, and with it this newsletter. In general, there will be two editions per year. We hope that you will find this newsletter useful. Please send any feedback you may have to klackschewitz@ifm-geomar.de. This is also the address to use if you have a contribution which you would like included in the next issue.
Our bi-annually newsletter aims to bring you all the latest developments and news around the SPP and other international activities at mid-ocean ridges.

In this issue

New funded projects in SPP 1144

Three proposals which were judged important but immature at the time of first evaluation in June 2003 were accepted now after revisions.
Below is a list of the recently accepted projects (links to more extended information on the projects is given on the SPP 1144 homepage www.deridge.de). People interested in

cooperation with the program or groups working inside this program structure are welcome to contact the respective scientists or the coordinator.

Short title of project	Project leader	Organization
Metagenomic studies of microbial communities	Amann, R.	MPI Bremen
U-Th-Ra disequilibria in basalts (MAR 6-11°S)	Haase, K.	Univ. Kiel
Micro-organisms within rocks in the MAR	Reitner, J.	Univ. Göttingen

Summary of Meteor cruise M60/3

The R/V METEOR cruise M60/3 (HYDROMAR I) taking place from January 14 – February 14, 2004 was the first research cruise within the new German Research Foundation (DFG) Priority Program # 1144. The Logatchev hydrothermal field situated at 14°45‘N/44°59‘W at the Mid-Atlantic Ridge was the main target area of this four weeks cruise. The ROV QUEST from the University of Bremen was the main working tool used to map, monitor and sample the active, ultramafic-hosted Logatchev-1 hydrothermal field. High-quality video and foto documentation of the active vent sites as well as targeted rock, fluid and fauna sampling was possible using QUEST. Apart from the ROV a TV-sled, a TV-grab, a CTD/rosette and the Hydrosweep system were used to map and sample the hydrothermal field and its surroundings. Another highlight of the cruise was the meeting with the Russian R/V PROFESSOR LOGATCHEV at sea.

The main scientific results of HYDROMAR I can be summarized as follows: (1) There are three factors which appear to control the location of the Logatchev hydrothermal field: cross-cutting faults, young basaltic volcanism, and slump structures probably forming thick talus deposits. (2) A new, but inactive hydrothermal field (Logatchev-4) was discovered about 5 nm ESE of the active Logatchev-1 field. (3) The hydrothermal activity of the Logatchev-1 field has a by far larger areal extend at the seafloor than previously known (at least 1km by 600m in NW-SE and SW-NE direction, resp.). (4) Hydrothermal activity is expressed in different ways: Three so-called “smoking crater”, round depressions with about 10 m diameter, 2-3 m deep occur along a rather steep slope. From the floor of the craters as well as from small chimneys sitting at the crater rim black smoke is venting. Hydrothermal fauna is very scarce at these features. A hydrothermal mound, about 60 m in diameter at its base and about 20 m high appears at the transition of the slope to a small plateau. A chimney complex is situated at the top of the mound expelling black smoke. Diffuse venting occurs at the surroundings of the chimney complex but also in patches all over the mound. Typical hydrothermal fauna is associated with both the chimneys and the diffuse fields.

More details of the scientific results are published in InterRidge News (Kuhn et al., 2004; http://www.interridge.org/).

We are grateful to captain M. Kull, the officers and the crew of the R/V METEOR as well the ROV crew for their excellent performance and co-operation which was essential for the success of the cruise.

Summary of the first SPP 1144 workshop

From 2.-3. June the first annual SPP workshop took place in Schloß Etelsen near Bremen. More than 60 participants came together to discuss the first results of the Meteor expedition M60/3, to coordinate the future activities in the priority program, and to assess the applications of new technologies, especially AUV, to the DeRidge initiative.

M60/3 – Logatchev

All groups working on samples from M60/3 presented their first results from onshore laboratory work. The presentations demonstrated clearly why an SPP was and is necessary to study the active spreading axes - beside the further work of the individual groups on their samples, an intensive data transfer between the groups will be the only way to understand and interpret the complex processes in the Logatchev hydrothermal field.
The future studies in the Logatchev hydrothermal field will be strongly focused on long-term monitoring. An important observation during M60/3 was the changing currents in this area which makes a deployment of bottom current meters necessary for the next years. The first geochemical and biological results show varying parameters over short distances in mussel-covered areas with diffuse outflows. Therefore, sampling is required at scales ranging from cm- to several m-scale, so as to include all venting processes that are biologically important. A working group (Dubilier, Koschinsky and Villinger) was formed during the Workshop to organize and coordinate a “mussel bank experiment” in the Logatchev field for the next 4 years.
Understanding the complex interaction of volcanic, chemical and biological components of the hydrothermal system requires the measurement of a wide range of environmental parameters, collected simultaneously at Logatchev and other sites. Determinations of spatial gradients in chemical and physical parameters are particularly critical for understanding geochemical reactions and biological systems. The spatial and temporal measurement of geophysical, chemical, and biological parameters at spreading axes requires the development of new technologies. In some cases, instruments already exist or can be deployed with only minor modification; in other cases, entirely new technologies or extensive modification of existing technologies will be required. For example, there is a critical need for new chemical sensors (e.g. H_2S, CH_4); both existing and new sensors must be compatible with the AUV’s and capable of long-term deployment on the seafloor. The following list gives an overview of important tools which will be required for the development of the SPP activities:

- **AUV** with payloads for bathymetric surveying, side-scan sonar, water column sensors for plume-mapping, magnetics, gravimetrics, photo/video surveying, infrared camera surveying, water sampling, sediment echosounder, acoustic doppler current profiler, active EM source
- **Drilling devices**: Some versions are available, for example; BGS rockdrill II (up to 15 m cores), MEBO (in development at Uni. Bremen, up to 50m cores), ROV-mountable drill (for 2m cores; available at MBARI), BRIDGE drill for oriented cores
- **Plume mapping devices** such as the Klinkhammer sledge, the MEDUSA isosampler and an autoclave sampler to recover undegassed samples.
- **TV grab with a new telemetry**

Longer term planning

Another goal of this meeting was to establish a long-term plan for scientific cruises to realize the multidisciplinary studies of the priority program. In particular, discussion focussed on cruises which need to be requested for 2007 and 2008 and an outline of the scientific priorities for multidisciplinary time series sampling and long-term monitoring of the spreading segments at 15°N and 4-11°S.
The following is a list of tasks for the final phase of the 15°N studies:

- Design and deployment of navigation beacon network, this network should also stay available after the active SPP phase has ended to help follow-up studies at Logatchev.
- Coordination of the international expeditions in this region
- Identification of the heat source and its x,y,z location
- Time-scale experiments
- Detailed geological, tectonic and biological mapping and sampling
- Seismic experiments
- Deployment of a seismological array

A cruise proposal for the geophysical studies in the 15°N region will be coordinated by Ingo Grevemeyer, IFM-GEOMAR Kiel, and a cruise proposal for further time series sampling and long-term monitoring of the Logatchev field will be coordinated by Thomas Kuhn, IFM-GEOMAR Kiel.

To characterize the Mid-Atlantic Ridge segments between 4° and 11°S , we need to consider the following requirements for a cruise in 2007:

- Seismic station on Ascension
- Drilling
- Bathymetric mapping
- Ore formation
- Occurrence of intrusive and mantle rocks

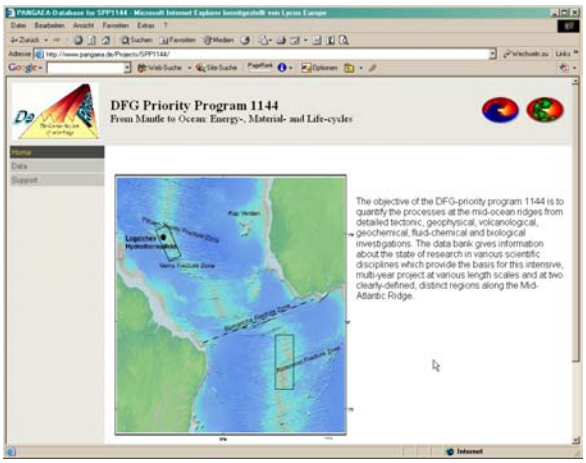
A cruise proposal for 2007 will be coordinated by Jon Snow, MPI Mainz.

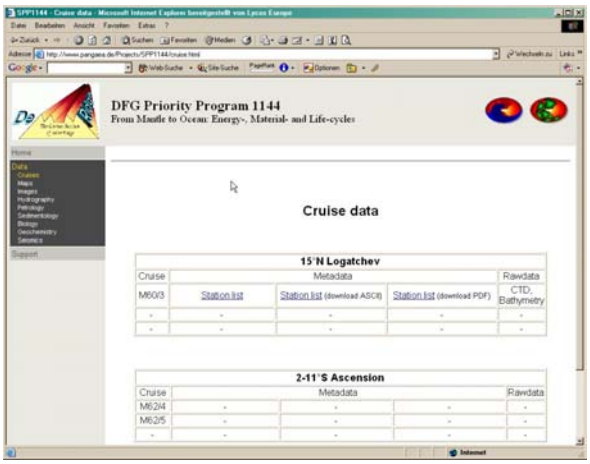
SPP 1144 data management

SPP1144 Database

WDC-MARE/PANGAEA has established the SPP1144 sub archive to store the project related data. In a first step the metadata of the Meteor 60/3 cruise are stored and the data transfer has been started importing the CTD measurements. These data are available by using the PangaVista search tool (search e.g. for "Hydrography +M60/3", login required, for password please ask K. Lackschewitz). To provide an easier access to the SPP1144 data, a data website has been set up (basic version, www.pangaea.de/Projects/SPP1144/). The site is structured according to scientific

fields with regional sub divisions. The site will be linked to the SPP1144 homepage when the final layout is accepted.





Upcoming events

Meteor-cruise M62/4

M62/4 will start on 1 October 2004 from Mindelo and finish 3 November 2004 in Recife. Chief scientist is Tim Reston from IFM-GEOMAR. The target of the proposed investigations is the region of the Ascension Transform system at about 7°S and the spreading segment immediately south of this transform (Figure M62/4-3). The Ascension Transform is actually a "double transform fault" consisting of two parallel transform fault / fracture zone systems (referred to here as the North Ascension Fracture Zone - NAFZ - and the South Ascension Fracture Zone - SAFZ) sandwiching a very short segment. Such double transform faults are a fairly common feature of the MAR, particularly in the South Atlantic, but are as yet not fully understood. The segment within the Ascension double transform forms an elongated massif characterised by transform-parallel corrugations that can be followed for over 100 km. If this corrugated surface represents the slip surface of a major fault, then this fault must have been active for several million years. If fault activity occurred during largely amagmatic spreading within the segment, this in turn would imply that virtually the entire segment within the double transform must correspond to exhumed mantle rocks. Apart from the collection of bathymetric data and of gravity data, little geophysical work has been carried out here. As a result, this forms one of the main foci of this study.

Meteor-cruise M62/5

M62/5 is divided in two legs. M62/5A (chief scientist is C. Devey) is scheduled to depart from Recife on the 7 November 2004 and end in Ascension on the 3 December 2004, whereas M62/5B (chief scientist is K. Lackschewitz) will start at 5 December 2004 from Ascension and end in Walvis Bay on the 30 December 2004.
The aim of the cruise is to determine, using the British TOBI device, amongst others,

the volcanological and tectonic nature of the seafloor in a portion of the Mid-Atlantic Ridge between 4-11°S. Several segments which are separated from one another both by transform- and non-transform faults will be studied. Using the BRIDGET probe mounted on TOBI, we will be able to collect real-time nephelometry coincident with the side-scan coverage. With this basic information about the nature and activity of the seafloor, we will use a ROV, dredges and corers to sample the seafloor and CTD to sample the water column, analyses for methane in the water will be carried out on board, helium determinations will be made in the laboratory after the cruise. Additionally we will make LADCP and XCP measurements to examine the vertical mixing within the water column above the hydrothermal vent fields.
Although this work is relatively equipment- and time-intensive, it is the best way to get a maximum of information during this cruise.

Schedule and main objectives of Meteor cruises M64/1 and M64/2

M64/1 is scheduled to depart from Abidjan on 2 April, 2005 and end in Fortaleza on 3 May, 2005 (chief scientist is K. Haase, Kiel University). The overall goals of the investigation are (1) to obtain insight into the volcanic and tectonic dynamics of the slow-spreading Mid-Atlantic Ridge (MAR between 4 and 11°S) and geochemical and biological processes at active hydrothermal vent areas with emphasis on variations in time and space, and (2) to link the hydrothermal processes to the volcanic activity on the axis. The southern MAR is geologically and biologically much less well investigated than the northern MAR. However, indications for the occurrence of hydrothermal venting of hot and gas-rich fluids have been found.

M64/2 is scheduled to depart from Fortaleza on 6 May, 2005 and end in Dakar on 6 June, 2005 (chief scientist is H. Villinger, Bremen University). The investigations of this cruise are a continuation of the program started at 15°N on the Mid-Atlantic Ridge in 2004 (cruise M60/3). The emphasis of this cruise lies on the temporal variability of fluid emanations, fluid temperature and chemistry, microbial activities and associated fauna at selected hydrothermal vent sites. In order to assess longterm monitoring stations will be installed which will be recovered in 2006.
The main tool for both cruises will be the 4000m workclass ROV Quest 5 (www.rcom-bremen.de/ROV_QUEST.html) provided by the University of Bremen (c/o Prof. G. Wefer, Dr. V. Ratmeyer, MARUM).

The proposals of both cruises are presented as pdf-file at www.deridge.de.

Dahlem Science Course „Marine Hydrothermal Systems“

Geosciences at a high level: Dahlem Science Course „ Marine Hydrothermal Systems: Set-up and Structure, Mineral Formation Processes, Mass- and Energy-transfer“

From March 22 to 26, 2004 the Dahlem Science Course “Marine Hydrothermal Systems: Set-up and Structure, Mineral Formation Processes, Mass- and Energy-

transfer" took place at the Department of Geosciences of the Free University of Berlin under the leadership of Professor Dr. P.E. Halbach.

The course was based on the Dahlem Conference "Energy and Mass Transfer in Marine Hydrothermal Systems" which was carried out very successfully in November 2001, with the results presented in the Dahlem Workshop Report 89 as a hardcover book (ISBN 3-934504-12-4). Already then we had the intention to present the scientific contents of the conference as high-level teaching course. This was now realized as the Dahlem Science Course.

Besides the help of the president of the FU Berlin this course was also supported by the German Mineralogical Society and DeRidge.

The 25 participants came from all over Germany and were students of higher semesters, Ph.D. students as well as scientists with a Ph.D. degree. Most of the 10 lecturers from Germany and France had already participated in the Dahlem Conference itself.
The course took place all day from Monday to Friday, and was credited with 2 ECTS (European Credit Transfer System) points.
Besides the papers for the respective talks and/or practical courses each participant received a copy of the Dahlem Workshop Report 89 which served as basis for the course.
The compact course was scientifically demanding, and probably also rather exhausting for some since it meant 8 hours of concentration every day. This included practical exercises, 2 video presentations and also several coffee breaks which were used for intensive discussions. "This is real good science, but exhausting" was the comment of some of the young scientists.

This was the first time that the FU Berlin tried to turn the topic of a Dahlem Conference into a compact teaching course. Thus, the course had important pilot character. This was also stressed by the Vice President of the FU, Prof. Keupp, when he gave an introductory talk on Monday, March2, as well as by the Vice Dean of the geoscientific Department, Prof. Heubeck.

The individual talks dealt with set-up and structure of the oceanic crust, petrography of the oceanic crustal rocks, tectonic processes, ophiolite formation and the appearance of ophiolites, heat budget and heat transport, the hydrothermal circulation model, composition and development of hydrothermal fluids, material balancing, as well as ore deposit formation under defined conditions and, finally, the evolution of a specifically adapted fauna. An important part was the hydrothermal reaction modelling which was taught practically working with the PC. Without modelling, the geochemical and geophysical study of such complex systems is not feasible any more. The chemical transport and heat dissipation under increased hydrostatic pressure characterize these specific conditions. To understand these processes in time and space including bioproductivity is a big challenge to modern sciences. Highlights were also the video shows; a video about hydrothermal biology which will soon appear in IMAX cinemas, could be seen even if only in parts, and in 2-dimensions.

The lecturers, internationally recognized experts taught the sometimes very complex matter extremely well, also with excellent figures, and presented the latest state of

the art; the participants have shown their great interest and motivation also by their steady readiness to give critical questions.
We could show that it makes a lot of sense, and that it is successful to give a course for young scientists based on a Dahlem Conference, especially if the topics have such interdisciplinary character. Open questions, which had already been discussed during the Dahlem Conference were taken up again; some could be answered in the meantime, others will be an incentive for the participants to further discussions.

We would like to thank the Free University of Berlin, the Dahlem Conferences, DMG and DeRidge who helped to realize the course.

Participants, students of higher semester, Ph.D. students and scientists with a Ph.D. degree, with 5 lecturers of the Dahlem Science Course at the FU Berlin

InterRidge-Office

The relocation of the InterRidge chair Colin Devey and his group to the Leibniz Institut für Meereswissenschaften in Kiel also meant moving the InterRidge Office. This was somewhat unfortunate timing as the InterRidge Steering Committee meeting was held shortly afterwards in Korea. Thanks to great work by the Coordinator Katja Freitag all went smoothly however. Important information from the Steering Committee meeting of direct relevance to the SPP is:

- The initiation of a working group “Biogeochemical interactions at deep-sea vents” to be led by Nadine Le Bris (IFREMER) and including Antje Boetius as a German representative.

- The decision, for the first time since its inception in 1993, for InterRidge to raise its fees to reflect the general price (and particularly salary) increases over the last decade. It was decided that principle member fees will be increased by US$ 5000 as soon as feasible but at the latest by the time the office leaves Germany. The new fee structure will therefore look as follows:
    - Principle Members: US$ 25.000
    - Associate Members: US$ 5.000
- As a Principle Member, Germany has the right to two seats at the Steering Committee meeting. To achieve a good disciplinary balance, the Steering Committee requested that Nicole Dubilier (MPI Bremen) fulfil this role. She will also become a member of the Biology Working Group, allowing synergies with meeting organisation to be used to the best effect.

You can find further information about all these issues, including the full Steering Committee report, on the InterRidge website www.interridge.org.

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