

SPP-reader

The bi-annual newsletter of the DFG Priority Program SPP 1144
Issue 6, December 2006

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

Sixth 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 Klas Lackaschewitz (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-annual newsletter aims to bring you all the latest developments and news related to the SPP and other international activities at mid-ocean ridges.

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We wish all SPP participants and their families a Merry Christmas and a Happy New Year!!!

Summary of Merian cruise MSM 03/2

The main objective of this cruise was the investigation of the shallow subsurface in the Logatchev hydrothermal field at 14°45'N on the Mid-Atlantic Ridge by using the lander-type, remotely operated Rockdrill 2 of the British Geological Survey. We wanted to investigate and understand the depth zonations of the mineralization and alteration as well as their age relationships and the establishment of the variability of the subsurface biosphere and their influence on the formation and alteration of hydrothermal mineral precipitates. Other instruments used include the multibeam EM120, gravity corer, multi corer and a dredge.

This Rockdrill 2 is lowered to the seafloor and is capable of drilling up to 15 m deep holes in water depths up to 3100m. This newly built instrument was used for the first time and we were able to achieve 14 drilling stations within the Logatchev field as well as at the eastern rift valley wall. Several active sites were targeted within the Logatchev field including the “Quest”, “Irina 1” and “B” smoking craters in order to understand their formation. The deepest hole reached a depth of 10.5 m at site “B”. Massive sulfides are rare in the drill core suggesting that most parts of the Logatchev hydrothermal field are underlain by fine-grained, altered talus material of highly-variable

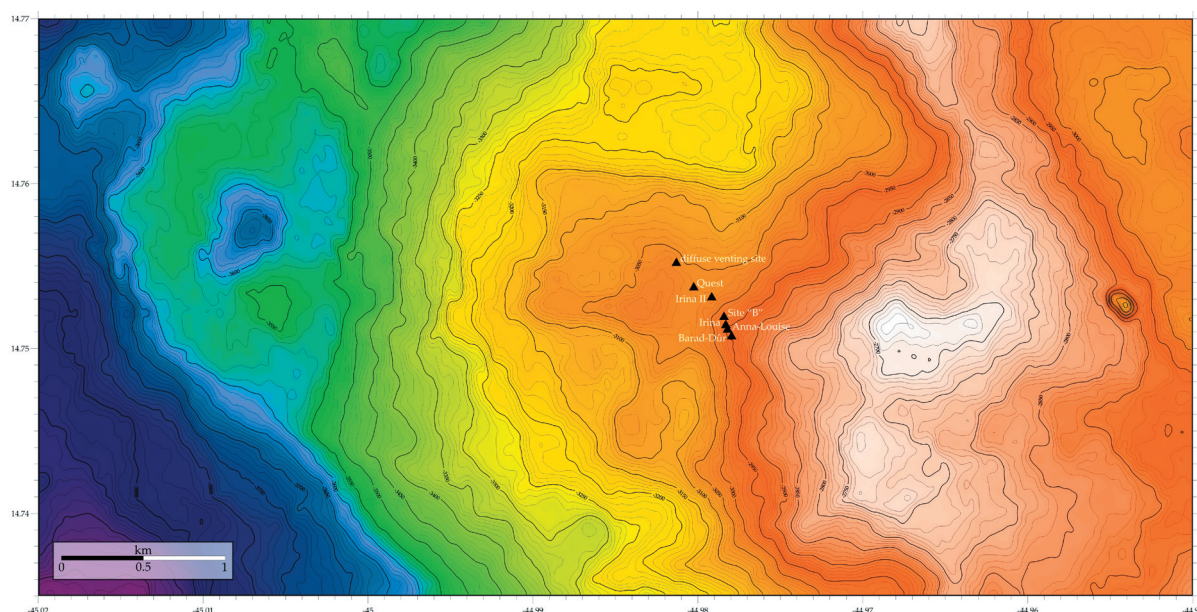


Fig.1: Detailed bathymetric map of the vicinity of the Logatchev field. The pillow volcano is seen in the west. The sharp boundaries between the lifted block immediately west of Logatchev to the surrounding is clearly visible in this image. The triangles show the location of individual vent sites at Logatchev. Map processed by N. Augustin

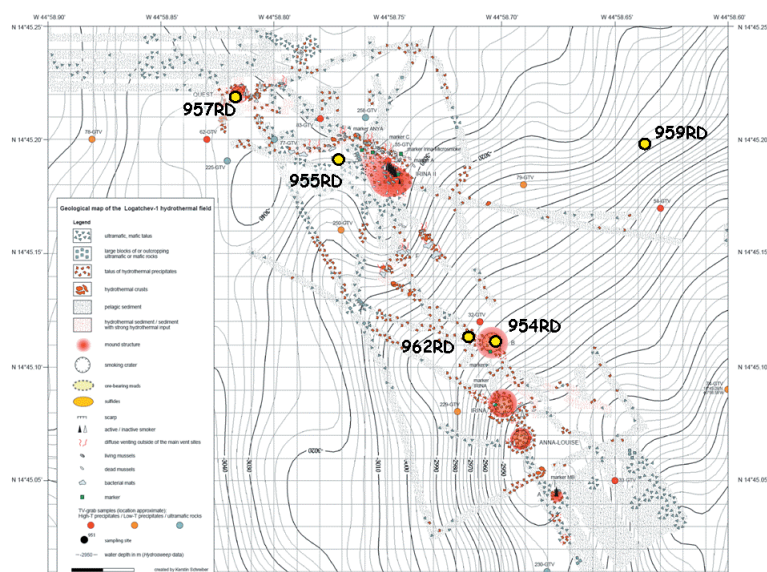


Fig.2: Location of drill holes in the area of LHF-1.

composition with the massive sulfides only forming a thin veneer on top of a clay-altered substrate.

Gravity and multi corer provided additional information about the shallow seafloor and especially the past hydrothermal activity along and across the NW-SE trending axis of the hydrothermally activity.

We also mapped the area surrounding Logatchev with a multibeam EM120 (Fig.1). Dredging of a number of locations along the rift valley floor and at a circular depression close to the eastern wall recovered pristine pillow basalt or fragments of glassy basalt. Other dredges along the eastern rift valley floor contain mafic intrusive material and ultramafic rocks in variable amounts. Mafic intrusive material often dominates over ultramafic material in the vicinity of the Logatchev field indicating the importance of magmatic processes in the area. Notable is a dredge targeted at the horst structure adjacent to the Logatchev field which recovered coarse-grained gabbro-noritic cumulate.

Scientists from Germany representing the fields of economic geology, petrology, geochemistry and microbiology, technicians and engineers from the UK as well as scientists from Russia, China and Switzerland took part in the cruise.

Upcoming events

Merian-cruise 2007 MSM 04/3 “Time-series measurements at LHF”

The HYDROMAR III cruise with RV Maria S. Merian to Logatchev (MAR, 14°45' N) will start on 23 January 2007 in Fort de France and ends in Las Palmas on 14 February 2007 (PI: C. Borowski, MPI-Bremen). As the Quest ROV is not available, we chartered the Jason II ROV from Woods Hole Oceanographic Institute.

The main objective of this cruise is to continue time series investigations of temporal variability patterns of the physico-chemical environment that began in 2005 on the RV Meteor cruise M64/2. The recovery of monitoring devices for temperature, pressure and seismicity deployed during M64/2 will provide the first continuous long-term data sets from the Logatchev field and will cover a period of 20 months.

Further investigations include organic and inorganic fluid geochemistry and sulfur isotopes, biogenicity

of iron oxidation, microbial diversity and activity, metagenomics, in-situ sensor measurements and in-situ experiments to study activity patterns of hydrothermal symbiosis. For some of these investigations, long-term in-situ experiments and monitoring devices will be deployed. The Kongsberg multibeam echo sounder installed on RV Maria S. Merian will be used for high resolution swath bathymetry mapping, which will provide a better understanding of the MAR median valley topography around the Logatchev field and may help us locate other hydrothermal structures.

Cruise MSM 06/2 with R/V Maria S Merian: HYDROMAR V

Under the auspices of the DFG SPP 1144 the overall goal of cruise MSM 06/2 at the Logatchev hydrothermal field is the investigation of causes for temporal and spatial compositional differences of hydrothermal fluids and their effect on the vent communities. To achieve this goal, the Logatchev field has been, and will be, visited annually since 2004 during HYDROMAR I-IV and the proposed cruise is a continuation of this work. At specific sites within the hydrothermal field we plan to monitor local seismicity and seafloor tilt related to tectonic and magmatic activity, to measure and sample hydrothermal plumes and high-temperature hydrothermal fluids, to measure small-scale vertical geochemical gradients in situ in low-temperature diffuse discharge areas, and to sample these fluids and the associated vent biota.

The detailed working program for all groups is based upon the results of the HYDROMAR I - IV cruises, which help to develop a very focussed strategy to map, sample and monitor relevant locations at the working areas. The ROV KIEL 6000 from IFM-GEOMAR will be the main tool for our work at the seafloor. All sampling techniques have improved with each HYDROMAR cruise and will ensure that the environmental parameters and the composition of the vent fluids can be investigated at a scale relevant to the microorganisms and animals that occur at Logatchev. We currently plan for 15 ROV stations to fulfill our working plan.

Deployment of OBS is also planned during this cruise within the Project HYDROPLUMB funded within the SPP 1144 (c/o Dr. I. Grevemeyer; IFM-GEOMAR Kiel). Together with other geophysical experiments like

passive seismology, magnetotelluric and compliance measurements both the structure and properties of the crust and upper mantle will be investigated. The OBS will stay on the seafloor for approx. 1 year before they will be recovered during another cruise.

Cruise MSM 06/2 will start in Las Palmas (Canary Islands) on Oct. 18, 2007 and end in Fortaleza (Brasil) on Nov. 18, 2007. 23 scientist can join this cruise including the ROV crew.

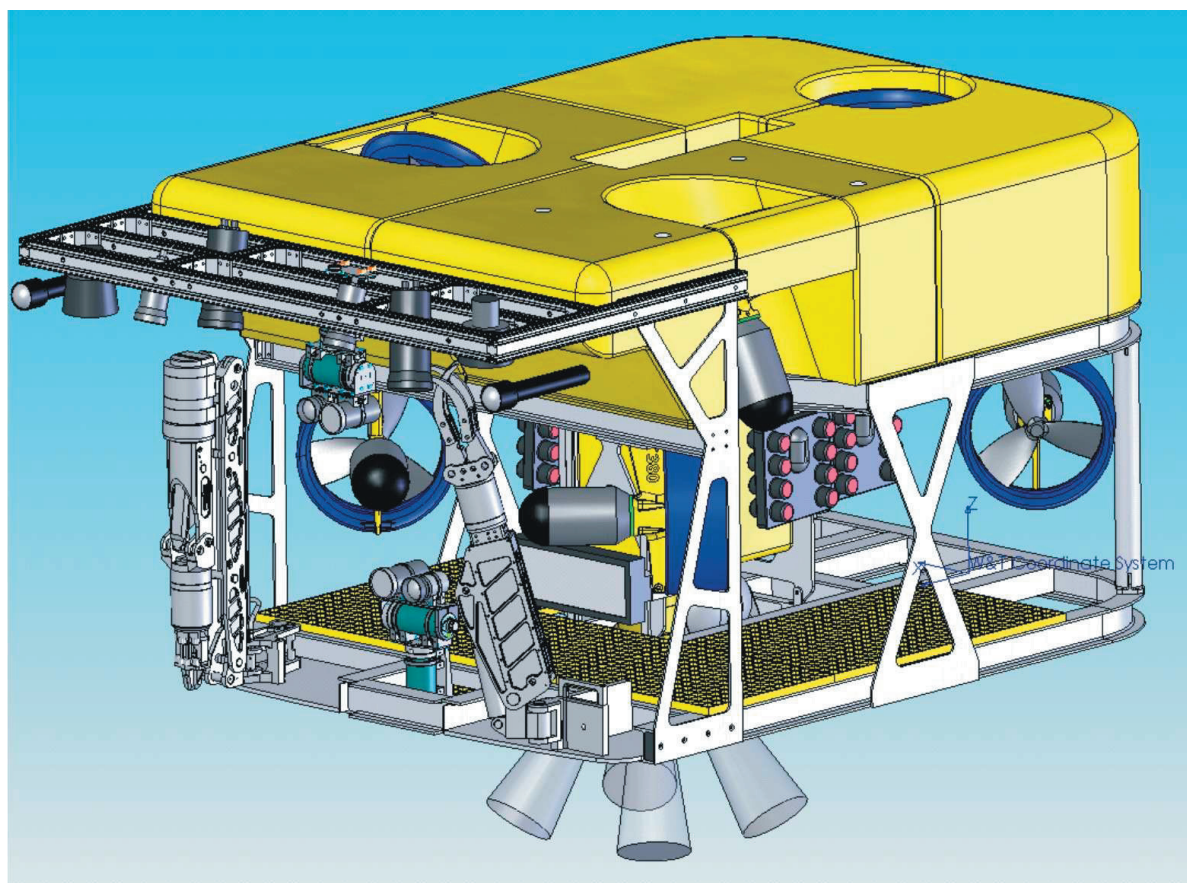
ROV Kiel 6000: A New Research Platform for Ocean Observatories and Deep-Sea Investigations Down to 6000m Water Depth

The Leibniz Institute of Marine Sciences in Kiel, Germany, is currently acquiring a deep-sea remotely operated vehicle (ROV) with a depth rating of 6000m. This electric, work-class ROV built by SCHILLING ROBOTICS LLC within their Quest production line will be equipped with 7 brushless thrusters each with 210 kgf peak thrust, 1x 7-function, spatially-controlled and 1x 5-function, rate-controlled manipulator, a sonar system as well as 1 HDV video camera, 2 high-resolution color zoom cameras, 4 b/w observation cameras and 1 digital still camera. All color cameras are mounted

on pan and tilt units. Scientific tool packages include a laser video measurement system and CTD as well as a tool sled mounted underneath the ROV frame with 2 hydraulically driven trays, a sample basket and up to 300 kg of scientific payload.

The heart of the ROV is a digital telemetry system (DTS) with its basic unit, the communication node. The node features a Gigabit Ethernet backbone, and each of its 16 ports can be individually configured for serial, video, or Ethernet. The DTS™ node routes power and telemetry between the system and all instruments on the WROV and tool skids. Four (4) nodes with 64 ports will be supplied with the ROV Kiel 6000 system to operate all standard on board equipment, 24 ports are available for additional scientific instruments.

ROV Kiel 6000 will be run in life boating mode, i.e., the ROV is directly linked to the surface vessel via a steel-armoured, fiber-optical umbilical. No tether management will be used. The ROV control system allows station keeping (± 0.3 m) and automatic flight control such as automatic displacement, cruise and trim. Navigation will be realized by the USBL-based POSIDONIA™ system supported by the SONARDYNE ROV-Homer™ system. An inertial navigation system such as IXSEA's PHINS™ is planned to be implemented



Model of ROV KIEL 6000 without tool sled (c/o Schilling Robotics LLC).

at a later stage.

The ROV system works with a 19mm, 6500m fiber-optical umbilical wound up in 19 layers on an electrically-driven winch. Two fibers will be used simultaneously during a dive and a third backup fiber is also connected.

The ROV is currently being built by SCHILLING ROBOTICS LLC at their factory sites in Davis, California. A frame load test has been successfully completed in October 2006 and delivery for the first deep-sea test is planned for July/August 2007.

Announcements:

4th SPP1144-Workshop, Etelsen, 26.- 28.6.07

This is the first announcement for the 4th SPP1144 workshop that will take place in July 2006. The workshop will be used to present the results of the Merian cruises MSM 03/2 and MSM 04/3 and the results of the funded SPP1144 DFG-projects. Furthermore, it will give us the opportunity to coordinate the evaluation of data from the Mid-Atlantic ridge segments and hydrothermal vent fields in the selected areas at 15°N and between 4 and 11°S as well as discuss how best to go about publishing these.

The workshop will bring together scientists and graduate students from all disciplines interested in both field areas. Based on our positive experience during the last years, the workshop will be held again in Etelsen (near Bremen) from 26.-28.6.07. An official invitation together with a registration form will be sent out by the DFG during spring 2007.

17th Annual V.M. Goldschmidt Conference 2007 in Köln

The 17th Annual V.M. Goldschmidt Conference will take place from August 19 - 24, 2007 in Köln. Prof. Francois Holtz and Dr. Jürgen Koepke have announced a symposium "Oceanic crust" with three sessions which are related to different processes in the oceanic crust:

1) The Oceanic crust - Magma chamber processes and high-temperature reactions

This session is intended to bring together researchers working in the in-situ oceanic crust and on ophiolites to

discuss the variety of chemical and physical processes related to MORB magma chambers beneath the ocean ridges. Topics will include: (1) shallow-level differentiation of MORB including related experimental studies, (2) formation of cumulate gabbros, (3) mantle-crust interactions, (4) the transition zone between gabbro and sheeted dikes, as recently drilled by IODP expedition 312, (5) reactions between gabbroic rocks and seawater-derived fluids at very high temperatures.

Conveners:

Dr. Juergen Koepke (koepke@mineralogie.uni-hannover.de)

Prof. Sumio Miyashita (miyashita@geo.sc.niigata-u.ac.jp)

Department of Geology

Faculty of Science, Niigata University

Japan

2) The Oceanic crust - Hydrothermal processes

Studying modern submarine hydrothermal systems provides important insights into the formation and development of seafloor vent sites, which have a global impact on the chemical composition of seawater and the alteration of the oceanic crust. The complex origin and evolution of hydrothermal systems is caused by diverse oceanic and tectonic settings, and complex hydrothermal circulation, which is a function of varying geochemical and geological conditions. The physico-chemical conditions and the alteration of the crust, the sulfide textures as well as the structure and the geological setting of the deposits can be studied in these natural laboratories. This symposium is intended to bring together a wide range of scientists working on specific aspects helping to reconstruct processes, reactions and the nature of the fluid flow paths in marine hydrothermal systems.

Conveners:

Prof. Colin W. Devey (cdevey@ifm-geomar.de)

Prof. Wolfgang Bach (wbach@uni-bremen.de)

3) The Oceanic crust - Bio-geochemistry of hydrothermal fluids

Hydrothermal circulation plays a key role for the

heat and mass transfer from the Earth's mantle and crust to the shallow subsurface and the water column. Information on subsurface processes are encoded in the physicochemical parameters of emanating fluids. New data from field campaigns, laboratory experiments, and rigorous theoretical modelling have considerably contributed to reading this record. Studies of organic compounds present in hydrothermal fluids and organisms thriving in hydrothermal environments have delivered insights into the evolution of early life in terms of prebiotic organic synthesis and chemoautotrophic life.

This session is aimed to combine diverse approaches addressing a wide variety of topics in organic and inorganic geochemistry of hydrothermal fluids to assist in a better understanding of the functioning and significance of hydrothermal systems in energy and mass transfer from the crust to the ocean.

We solicit papers that provide information from direct observations, modelling, or experimental results towards fingerprinting the geochemical processes in hydrothermal systems. Topics of emphasis include: physiochemical controls on fluid composition, supercritical fluid behaviour, catalytic reaction networks at high pressure and temperature, organometallic complexes in fluids, imprint of fluid composition on the vent fauna, abiotic formation of organic compounds, bio-geochemical processes in hydrothermal plumes, heat and mass transfer, and temporal evolution of hydrothermal systems.

Conveners:

Dr. Richard Seifert (seifert@geowiss.uni-hamburg.de)

Prof. Andrea Koschinsky (a.koschinsky@iu-bremen.de)

A further interesting symposium is:

Biogeochemistry in Extreme Marine Environments

Extreme biogeochemical ecosystems, like the hydrothermal cells of the mid-ocean ridges and the cold seeps at subduction zones where microbial communities exist in tandem with minerals, water, dissolved molecules, and gases are environments which are well outside the 'normal' realm of life. The study of these geochemical extremes has provided important insights and substantial discoveries regarding the limits, origin,

and evolution of life. Extreme environments serve as a setting for investigating relationships between biology and geochemistry in detail - enhancing our understanding of microbe/mineral interactions, effects of ecological stresses, and connections between members of microbial consortia. This symposium brings together an array of researchers investigating geochemical/biological processes in extreme environments – settings typified by extremes of pH, temperature, pressure, metal content, organic contaminants, UV stress, radiation, and desiccation.

Conveners:

Prof. Klaus Wallmann (kwallmann@ifm-geomar.de)

Dr. Peter Linke (plinke@ifm-geomar.de)

Prof. Antje Boetius (aboetius@mpi-bremen.de)

We hope that a great number of SPP 1144 members will attend this meeting.

More Informations about other sessions, dates and deadlines are available under:

www.goldschmidt2007.org

News from the InterRidge Office

The InterRidge office will move to the USA at the beginning of next year and will be hosted at the Woods Hole Oceanographic Institution under the leadership of Jian Lin and Chris German.

Office activities: The hand over of the InterRidge office took place with the new co-chair Chris German in the first week of December. The last issue of InterRidge News, Vol. 15 has been printed and just been mailed to our members. The InterRidge News are also available at the InterRidge website (www.interridge.org)

Education and Outreach activities: InterRidge is sponsoring an entire ridge-focussed issue of Oceanography magazine that will be published in March 2007. The issue will feature a spate of ridge-related research topics, including: mid ocean ridge ecosystems, biogeography, mineralization and fluid chemistry, deep earth sampling, mantle flow and magma production, slow and ultraslow spreading ridges, hot spot interactions, back-arc spreading systems, monitoring and observatories, vent research technology, policy Issues, education outreach, origin of Life and a special feature in honor of the 30th anniversary of vent

discovery.

Since the successful pilot test of the Science Writer-at-Sea program in the summer of 2005 InterRidge is now in the process of seeking long-term funding. In March-April 2007 another science writer will get the chance to experience life on board of a research vessel. This will be the first science cruise of the new British research ship, the RMS James Cook, under the leadership of Roger Searle (University of Durham, UK) to the Mid-Atlantic-Ridge (14-16°N).

InterRidge will assist in a meeting to be held in the Galapagos in June 2007 to honor the 30th anniversary of vent discovery. This includes help with the media outreach and general design of the public outreach part of the program.

Kristen Kusek continues working for InterRidge as Education and Outreach coordinator. Please contact Kristen for all further information (Kristenkusek@aol.com).

Recent event: In September InterRidge, together with ChEss and R2K, co-hosted the Polar Ridges Meeting and Workshop in Sestri Levante, Italy. This successful meeting was attended by 60 scientists to discuss the future of research on polar mid-ocean ridges. There was also a pre-meeting field trip to the Ligurian ophiolites and three one day post-meeting field trips to Brione and to the Lanzo peridotite. The abstract volume of this workshop is available on the InterRidge website.

Upcoming event: The next Steering Committee Meeting is planned to coincide with the congress of the Brazilian Geophysical Society in Rio de Janeiro in mid November 2007.

First SPP1144 data publication in Pangaea

As a new outcome of the SPP1144 the first data publication is available at <http://doi.pangaea.de/10.1594/PANGAEA.552468>. This data set contains the CTD data of M60/3 measured and published by Richard Seifert. In this context we are providing some information on data archiving and data publication as established through the information system PANGAEA®, also for a sustainable use of SPP1144 data.

Publications are a cornerstone of science and even more important are their underlying data. However, data

which is not used in publications often disappears for certain reasons. It is therefore highly desirable to make scientific data citable comparable to publications. A data set must be attributed to its investigators as authors should have a title and identify its source. Besides being part of a scientific publication, data may also have its own identity. With the information system PANGAEA® archived data can be made citable. Further, citations are included in library catalogs (e.g. TIBOrder, <http://tiborder.de/services/index.html>) or distributed through portals. Similar to text publications, data publications can not be changed after the editorial and publication process.

The central technical feature of data publications is a DOI (Digital Object Identifier, www.doi.org) which is in some way a similar identifier as the well known ISBN number for books. DOIs provide persistent links to scholarly content, helping users get to the authoritative, published version of the content they are searching for, even when the content changes location or ownership. With about 20 Million registered DOI for publications, the system is established and consequently used by publishers. Within the STD-DOI project, funded by the DFG, four agents consisting of the German WDC cluster (WDC-Climate, WDC-MARE, WDC-RSAT) and GFZ have established the DOI-system for data citations/publications (Klump et al. 2006).

Within the project STD-DOI the registration agency providing DOI for scientific primary data is the Technical Information Library (TIB) in Hannover. PANGAEA® among four data providers is one of the first data systems on the Internet using DOI for persistent identification of scientific data. A data DOI consists of the prefix **10.1594** which is assigned to the publication of primary data through the TIB and a suffix, separated by a slash. The suffix is composed of the data system or center and a system-specific part. A valid Pangaea-DOI may look like **10.1594/PANGAEA.552468**. A resolver is required to identify a DOI and link to the corresponding document. Resolvers are www.doi.pangaea.de, www.doi.org. Additionally some web browsers are able to use DOIs, e.g. the 'DOI Protocol Handler' Ad-on for Mozillas Firefox. The PANGAEA® search engine PangaVista and the DOI resolver of PANGAEA® can be used for any registered DOI (including preliminary/technical DOIs of PANGAEA®). In summary, the DOI

system together with PANGAEAs long-term archiving perspective now enables scientists to publish their data and making it citable.

Similar to the peer-review process, the PANGAEA publishing process requires data quality control data have to follow a certain standard including a minimum of metadata description.

If published data sets are used in publications, it should be cited in the related reference list.

Publishing data is the final step in data management after archiving. All SPP1144 participants are requested to provide revised/validated cruise data and final scientific data for the SPP1144 data archive including metadata. Basic information necessary to describe a data set is listed below:

General data: Cruise label, basis (ship), Responsible scientist (PI) for the provided data

Complete core/sample/measurement ("event") metadata: Site information-core label, latitude/longitude, elevation/depth, device, date/time, comments.

Data: Definition of investigated parameters (fossil species, phys. properties, chem. elements, etc.) with units (SI units, generally accepted/used units), depth (in sediment/in water), distance from a base point, age; always explain abbreviations used in the data table. The data should be arranged in simple tables: 1. column: site/sample label, 2. to n column: depth/age/date-time, following columns: parameters.

Exact description of the analytical or calculation methods: laboratory device[s], analytical process, age model, reference[s] for the used method.

Source of data (reference[s] of published data, cruise report)

Any kind of available information is useful and will be archived.

Depending on the amount, the data files can be send by email attachment or by regular mail on Disk, CD-ROM. Established file formats are recommended (e.g. Excel, ASCII-Text, GIF, JPG, PDF).

Please contact the support page of the project data website for further information and examples <http://www.pangaea.de/Projects/SPP1144/supp.html>.

Contact: hwallrabe@pangaea.de or phone +49 (0)421

218 65592.

Please check the project data webpage at <http://www.pangaea.de/Projects/SPP1144/>.

Reference

Klump, J., Bertelmann, R., Brase, J., Diepenbroek, M., Grobe, H., Höck, H., Lautenschlager, M. Schindler, U., Sens, I. and Wächter, J., 2006, Data publication in the Open Access Initiative - Data Science Journal, 5:79-83; http://www.jstage.jst.go.jp/article/dsj/5/0/79/_pdf

List of submitted and accepted SPP manuscripts

- **Almeev, R., Holtz, F., Koepke, J., Parat, P., and Botcharnikov, R.E.** The effect of H₂O on olivine crystallization in MORB: Experimental calibration at 200 MPa. American Mineralogist (in press). #0006
- **Amini, M., Eisenhauer, A., Böhm, F., Fietzke, J., Bach, W., Garbe-Schönberg, D., Bock, B., Lackschewitz, K.S. and F. Hauff.** The calcium isotope systematic in fluids and precipitates along the hydrothermal pathway of the Logatchev Field. Submitted to Geochimica et Cosmochimica Acta
- **Devey, C.W., Lackschewitz, K.S. and E. Baker** (2005) Hydrothermal and volcanic activity found on the southern Mid-Atlantic Ridge. EOS, 86(22), 209, 212. #0001
- **Duperron, S., Bergin, C., Zielinski, F., Pernthaler, A., Dando, P., McKiness, Z.P., DeChaine, E., Cavanaugh, C.M., Dubilier, N.** In press. A dual symbiosis shared by two mussel species, Bathymodiolus azoricus and B. puteoserpentis (Bivalvia: Mytilidae), from hydrothermal vents along the northern Mid-Atlantic Ridge. Environmental Microbiology. (Early Online publication date: 26-Apr-2006). #0002
- **Fabian, M. and H. Villinger,** The Bremen Ocean Bottom Tiltmeter (OBT) - A new instrument to monitor deep sea floor deformation and seismicity level. Submitted to Marine Geophysical Research
- **Haase, K.M., S. Petersen, A. Koschinsky, R. Seifert, C. Devey, N. Dubilier, S. Fretzdorff, D. Garbe-Schönberg, C.R. German, O. Giere, R. Keir, J. Kuever, K. Lackschewitz, J. Mawick, H. Marbler, B. Melchert, C. Mertens, H. Paulick, M. Perner, M. Peters, S. Sander, O. Schmale, J. Stecher, H. Strauss, J. Süling, U. Stöber, M. Walter, S. Weber, U.**

Westernströer, D. Yoerger, and F. Zielinski, Young volcanism and related hydrothermal activity at 5°S on the slow-spreading southern Mid-Atlantic Ridge. Submitted to G3.

• **Haase, K.M., Koschinsky, A., Devey, C.W., Fretzdorff, S., German, C., Lackschewitz, K.S., Melchert, B., Petersen, S., Seifert, R., Stecher, J., Giere, O., Paulick, H., Yoerger, D. and the M64/1 and M68/1 Scientific Parties**, Diking, young volcanism and diffuse hydrothermal activity on the southern Mid-Atlantic Ridge: the Lilliput field at 9°33'S. Submitted to G3.

• **Ivanenko, V.N., Arbizu, P.M. and J. Stecher**, 2006. CopepodsofthefamilyDirivultidae(Siphonostomatoida) from deep-sea hydrothermal vent fields on the Mid-Atlantic Ridge at 14°N and 5°S. Zootaxa 1277: 1-21. #0003

• **Ivanenko, V.N. and J. Stecher**, 2006. Lecithotrophic nauplius of the family Dirivultidae (Copepoda; Siphonostomatoida) hatched on board over the Mid-Atlantic Ridge (5°S). Special volume of Marine Ecology on Vents, Seeps and Whale Falls. #0007

• **Pašava, J., Vymazalová, A. and S. Petersen**, PGE fractionation in seafloor hydrothermal systems: examples from mafic- and ultramafic-hosted hydrothermal fields at the slow-spreading Mid-Atlantic Ridge. Accepted for Mineralium Deposita. #0008

• **Perner, M., Seifert, R., Weber, S., Koschinsky, A., Schmidt, K., Strauss, H., Peters, M., Haase, K. and J.F. Imhoff**, Sulfur cycling as the prominent microbial metabolism associated with low-temperature emissions at the Lilliput hydrothermal field, southern Mid-Atlantic Ridge (9°S). Accepted at Environmental Microbiology. #0005

• **Perner, M., Kuever, J., Seifert, R., Pape, T., Koschinsky, A., Schmidt, K., Strauss, H. and J.F. Imhoff**, The role of hydrothermal fluids influenced by serpentinization processes on microbial communities

at the Logatchev hydrothermal field, 15°N on the Mid-Atlantic Ridge. Submitted to FEMS Microbiology Ecology.

• **Schmidt, K., Koschinsky, A., Garbe-Schönberg, D., de Carvalho, L.M. and R. Seifert**: Geochemistry of hydrothermal fluids from the ultramafic-hosted Logatchev hydrothermal field, 15°N on the Mid-Atlantic Ridge. Accepted at Chemical Geology. #0004

• **Sander, S.G., A. Koschinsky, G. Massoth, M. Stott and K.A. Hunter**: Organic complexation of copper in deep-sea hydrothermal vent systems. Submitted to Geophysical Research Letters online

SPP1144 Newsletter is published bi-annually by

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We thank C. Borowski, T. Kuhn, S. Petersen and H.-J. Wallrabe-Adams for their contributions.