Vol. 9 (1) *Spring 2000*

InterRidge News

Initiative for international cooperation in ridge-crest studies

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InterRidge Office Updates

Message from the Chair

Before the inception of InterRidge, ridge research activities were very limited in Japan. Since the initiation of InterRidge in 1992, the commitment of Japanese scientists and students to ridge research has dramatically increased by getting increased amounts of funding from Monbusho (Ministry of Education, Science, Culture, and Sports, funding agency for university group) and STA (Science and Technology Agency, funding agency for national institutions) under the umbrella of InterRidge. The current vast and intensive ridge research activities of Japan are heavily dependent on the success and the coordination of the InterRidge Office. Now, the Japanese community of ridge researchers, are very proud to host the InterRidge Office in Japan after 10 years of its successful history.

Our term to host the office, 2000 - 2003 is the latter half of the last phase, (Phase 3, 1997-2003), of the InterRidge science plan. We understand that, at this time, one of the important tasks is for us to coordinate and devise a new science plan for InterRidge, beyond 2003. Additionally, the Office will need to summarise a decade of achievements of InterRidge and the advancement of research as a result of its coordination efforts. All the while, the InterRidge Office will continue to coordinate international ridge researches to meet Phase 3 of the InterRidge Science Plan. Although these ambitions will require hard work, we view this as a positive opportunity to produce a new exciting research plan for InterRidge. We firmly believe that internationally coordinated ridge studies will become far more important in promoting 21st century's science, which will also be required to become more interdisciplinary and to be relevant to the life of human beings.

Because ridge studies need strong interdisciplinarity to understand these systems and the complexity of the system itself has an important role in the whole earth system, InterRidge will continue to strongly encourage and promote interdisciplinary research. ORI is an institute with a firm commitment in promoting integrated research of the oceans through atmosphere, sea water, and ocean floor and by the disciplines of chemistry, physics, biology (including fisheries), geology, and geophysics. With the opportunity to host InterRidge Office at ORI, we would like to expand and further promote the interdisciplinary activities of InterRidge.

During the recent few years China, Taiwan, and Korea became member country of ODP. Taiwan is now planning the construction of a full-equipped research ship. Japan, China, Russia, and Korea have a fleet of research vessels and they are operated in the western Pacific frequently. Through the activities I developed many connections with Asian scientists and realised that there are strong interests in ridge studies and in the InterRidge program itself. We would like to pursue increasing the number of member countries in Asia and enhance the commitment of current member countries while the InterRidge Office in hosted by Japan. As the western Pacific is occupied by a variety of back-arc basins, the enhanced participation of Asian countries will benefit the InterRidge Back-arc Basin Working Group. My intention, however, is to provide opportunities for the scientists of these countries to enter the science world of global ridge research activities. As the ridge process are fundamental to the earth's surface process, the commitment of increased number of countries will be important to devise a sound, new style of ridge studies plan for the next decade.

The current office of InterRidge is trying to enhance the Internet accessibility of our InterRidge Resources. We will publish this current issue of IR news on our website in PDF format as the first digital issue from the InterRidge Office. Thereafter most of publications from the office, such as workshop reports will also be published on the Internet. Agnieszka and myself also have made efforts to reorganize the InterRidge homepage with complete new designs of top and second pages to accommodate comfortable access to this resource. I have more plans to enhance Internet accessibility of these resources to ridge researchers with mid-oceanic ridge research preprint exchange pages, small application software for ridge research and mid-oceanic ridge slide sets for presentation, among others. All these services are supported by volunteer efforts of young scientists in my research laboratory.

We have spent most of our time in trying to set up a functional working environment here in Tokyo. The new office will fully enter normal operation after publication of this volume. We always welcome any inquiries, comments, new ideas, proposals, etc. to improve the InterRidge system. We hope our office to provide lots of exciting opportunities and valuable resources for ridge research to the worldwide community of InterRidge in the coming three years. So far Agnieszka and myself are enjoining this exciting new task. See you in next issue with more exciting content.

Kensaku Tamaki
InterRidge Chair
April 2000

InterRidge Office Updates

Coordinator Update

InterRidge Office Transfer

The transfer of the InterRidge Office from Paris to Tokyo, Japan in January 2000 went very smoothly. Kensaku Tamaki has taken over as the Chair of InterRidge and I have taken over the challenge of InterRidge Coordinator from Cara Wilson. Thanks to Mathilde Cannat and Cara Wilson for running theInterRidge Office. During the next 3 years the InterRidge office will be hosted by the Ocean Research Institute, so please note our new contact details as well as the new URL for our homepage. I you haven't already updated your browser bookmark for the IR web site, now is the time to do it.

InterRidge home page

In this age of technology the internet has become an important means for 'instantenaous' information transfer to all corners of the world. The InterRidge office maintains a web site containing several hundreds of pages. I'd like to encourage everyone to make good use of this resource and to submit information to the InterRidge office to ensure that our website contains accurate and up to date information.

All the web pages have been transferred to the Tokyo server and we have redesigned the InterRidge home page. Take a look for yourself, we are always interested in your feedback, particularly if you see any information that should be updated or if you find any errors! Just remember to tell us exactly where to look! The basic menu structure that you have been familiar with has been retained but the menus are now grouped into three main categories: Information, Activities and Databases. There a number of new features on our website, including the latest Cruise schedule, listing ridge related cruises. So if you know of any cruises that are not listed please let us know by filling in the electronic form or sending us an email. There is a short introduction to InterRidge itself in the 'About us' menu. Furthermore, there are two new databases that should be of interest to everybody: 1) A database containing the locations of hydrothermal vent sites along ocean ridges around the world and 2) a "reference search" database containing close to 1000 references concerned with all aspects of Ocean Ridges. For a brief summary of the features found on the InterRidge website please visit http://triton.ori.u-tokyo.ac.jp/~intridge/latest.htm

Member Nations

We are pleased to announce that India has upgraded its membership to an Associate member from this year. Dr Ranadhir Mukhopadhyay will represent India at the Steering Committtee.

Also, we would like to welcome two new Corresponding member nations; China and the Philippines. The national correspondent for China is Dr Wang Zhihong from the Chinese Academy of Sciences, Beijing and the correspondent for the Philippines is Dr. Graciano P. Yumul, Jr. from the University of the Philippines, Quezon City. Full contact details for national correspondents are listed at the back of this issue and in the member directory on the IR web site.

InterRidge Office - new contact details

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Check out the NEW InterRidge home page:

http://triton.ori.u-tokyo.ac.jp/~intridge

InterRidge Office Updates

Upcoming meetings

2000 Western Pacific Geophysics Meeting

The InterRidge Back-Arc Basin working group and SEAS (Science of East Asia Seas) group will have a joint business meeting during the Western Pacific Geophysics Meeting, on the 28th June. Topics of discussion will include recent research activities of Asian countries in the western Pacific and the possibility of future cooperative research beyond the EEZ national boundaries.

Workshop on the Management of Hydrothermal Vent Ecosystems

The workshop was motivated by the realization that impacts of scientific researchers, mining consortia and tour groups on vent habitats may be substantial, and the activities of one group are likely to have a negative effect on others. The main objectives of the workshop are to provide guidelines and recommendations for wise and sustainable use of these unique habitats. The workshop will be held at the Institute of Ocean Sciences, Victoria Is., B.C., Canada, 28-30 September 2000. For more information see the "Meetings" calendar on the web and "Upcoming Meetings" section in this issue. For the most up to date information visit our web site: http://triton.ori.u-tokyo.ac.jp/~intridge/ventsman.html

InterRidge Theoretical Institute (IRTI): Thermal Regime of Ocean Ridges and the Dynamics of Hydrothermal Circulation

This IRTI is being jointly organized by the 4D-Architecture of the Oceanic Lithosphere working group and the Global Distribution of Hydrothermal Venting working group. It will have a short course component which will focus on the modelling aspects of the dynamics of hydrothermal circulation in the crust, and a workshop component to synthesize the current models, debate controversies, and outline the future directions for collaborative research. The IRTI workshop is scheduled to be held in the year 2001.

The 2nd International Symposium on Deep-sea Hydrothermal Vent Biology,

After the success of the 1st International Symposium on Hydrothermal Vent biology in 1997, Madeira, Portugal, the second meeting is scheduled for 8-12 October 2001 in Brest, France. The first circular for this meeting can be foud in the 'Calendar and Upcoming Meetings section' in the back of this issue but for the latest information please follow the link from the 'Meetings' menu on the InterRidge web page or go directly to http://triton.ori.u-tokyo.ac.jp/~intridge/brestvent.html

Steering Committee

Thank you to Eirik Sundvor and Peter Herzig for serving on the Steering Committee as national representatives. The new representative for Norway at the SC will be Rolf Pedersen. The new representative for Germany is still to be announced. India has joined InterRidge as an Associate member from 2000 and Ranadhir Mukhopadhyay will be the Indian representative at the Steering Committee.

Lauren Mullineaux, the Chair of the Biology working group, and Hiromi Fujimoto, the Co-Chair of the Back-Ark Basins working group, will both end their term as Chairs and, thus, as ad hoc members of the Steering Committee. The future activities of these working groups and the new Chairs will be discussed during the Steering Committee meeting, to be held 2-3 June in Woods Hole, USA and will be announced later this year.

Agnieszka Adamczewska
InterRidge Coordinator
April 2000

Notice of Award

Dr. Peter M. Herzig (AGU 1988) is the recipient of the Leibniz Prize for 2000 from the German Research Foundation (DFG). The prize, named after the German philosopher, mathematician and physicist Gottfried Wilhelm Leibniz (1646-1716), is the highest honor bestowed by the DFG and comes with an award of 3 million German Marks (1.7 million US$) for research in the recipients field. Professor Herzig is currently the Dean of the Faculty of Geosciences at the Freiberg University of Mining and Technology. He is recognized for his outstanding achievements in the field modern seafloor hydrothermal systems and their ancient analogs. He has participated on 16 research cruises, including two cruises aboard the JOIDES Resolution (co-chief scientist on ODP Leg 158). In recent years, he has worked extensively in the submerged arc environments of the western Pacific, discovering the first known submarine epithermal gold deposit off Papua New Guinea in 1994 (EOS 75, p. 279-284). Dr. Herzig continues to be a leading figure in German geoscience, serving on numerous scientific advisory boards, and internationally with ODP and InterRidge. The Leibniz Prize was presented to Dr. Herzig in Bonn on 10th February, 2000.

InterRidge Mailing List Sign up Form

Or sign up on the web at:

http://triton.ori.u-tokyo.ac.jp/~intridge/signup.htm

You can use this form to join are regular mailing list to receive *InterRidge News,* to be placed on our electronic mailing list or to be put on the electronic directory on the web (**http://triton.ori.u-tokyo.ac.jp/~intridge**). Currently there are more than 400 people who are active in mid-ocean ridge research listed on this electronic directory. The directory contains a listing of each researcher's field of interest and expertise as well as their full address information. Links are also provided to personal or departmental web pages.

Indicate whether you would like to

☐ *receive electronic notices and information (include your e-mail address)*
☐ *receive the IR news and be on our mailing list*
☐ *This is a hange of address notice.*

Name (First, Last) _____
Department/Institute_____
Address_____
_____
City_____ **State/County**_____
Post Code_____ **Country**_____
Phone:_____ **Fax:**_____
country code area code number country code area code number
E-mail:_____
WWW: _____

What are your fields of interest/expertise?

☐ Back-Arc Basins	☐ Gravity	☐ Plate kinematics
☐ Biochemistry	☐ Heat Flow	☐ Rheology
☐ Biogeography	☐ Hydrology	☐ Seafloor Morphology
☐ Biology	☐ Hydrothermal vents/plumes	☐ Sedimentology
☐ Crustal structure	☐ Larval Dispersion	☐ Seismology
☐ Ecology	☐ Law/Policy	☐ Structural geology
☐ Electromagnetism	☐ Magnetism	☐ Sulfide Ores
☐ Engineering/Instrumentation	☐ Microbiology	☐ Tectonics
☐ Event detection and response	☐ Modeling	☐ Undersea Technology
☐ Genetics	☐ Ophiolites	☐ Volcanology
☐ Geochemistry	☐ Petrology	☐ Other_____

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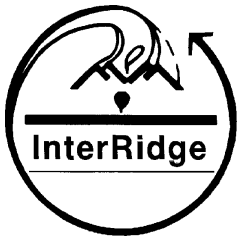

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InterRidge Office Updates

NEW InterRidge Website

http://triton.ori.u-tokyo.ac.jp/~intridge

The new InterRidge homepage overview

We have redesigned the InterRidge home page. Basically the new home page contains all of the menus always found there, except they are now grouped into three categories.

1) Information section

This section provides links to Ridge related meetings, cruises and other miscellaneous information, as well as a little bit about InterRidge structure and its role.

Below you will find a brief summary of each of the eleven menus found on the InterRidge homepage.

News

This is the section of our web page that will be changed and updated most frequently based on the information that is received by the InterRidge office. The date of the latest update appears at the bottom right hand corner of the InterRidge home page, as well as the News page itself.

In the News menu you will find a link to the latest broadcast (distributed by email from the InterRidge Office) and new announcements, as well as a link to an archive of past broadcasts.

I will continue to send out e-mail broadcasts with urgent or important information to all our members that have indicated they wish to receive e-mail notices.

This page also provides a link to vacant job positions that are forwarded to the InterRidge office.

The News page will also contain miscellaneous information of interest to Ridge scientists and relevant to InterRidge activities.

About us

An introduction to what is InterRidge, as well as InterRidge Office contact and mailing address details. A short description of the InterRidge program, including the objectives of the program as well as management structure and membership of InterRidge.

Meetings

A calendar of upcoming conferences and meetings relevant to ridge studies, with links to further information as they become available.

Upcoming cruises

This table has appeared in the back of the IR news for a long time, but we now also posted it on our website where the information on upcoming cruises can be updated on a regular basis.

2) Activities section

This section is concerned with the scientific and management structure of InterRidge. The menus in this section are relatively unchanged from the ones that were present on the original home page.

InterRidge Office Updates

Science plan

An outline of the scientific purpose of InterRidge.

Projects and Working Groups

Currently there are nine Working Groups responsible for different aspects of ridge research. An outline of the current working groups and updates of their activities can be found here.

Additionally this section provides links to major projects that InterRidge is currently involved in and projects that are directly relevant to InterRidge activities - such as MOMAR and Marine Protected Areas project.

IR publications

A list of all the publications distributed by the InterRidge office. Many of which are available on request.

Member Nations

A list of the InterRidge National Correspondents, and their contact details, from all of our Member Nations.

3) InterRidge databases section

One of the major objectives of InterRidge is to facilitate the advancement of ongoing work of individuals, national and international groups by providing centralised information and data-exchange services. Thus, we maintain a number of databases that contain data submitted from Ridge scientists from around the world. We rely on contributions from individuals to continuously update the information and increase the number of records. I would like to take this opportunity to encourage everyone to become familiar with the databases on our website and contribute information on a regular basis to ensure that this important resource contains current and up to date information. An overview of the databases maintained by InterRidge appears below and can also be found on our website.

Member directory

If you want to find the contact details of somebody involved in Ridge research, this is the place to look for them. Is your name in our database? If its not and you are involved in Ridge related research then you might like to fill in our electronic membership: just click the "Mailing list sign up" on the home page or fill in the signup form in this issue.

Reference search

A new database with references related to all aspects of Ridge research. Make sure you check this out and add your ridge related publications to this database!

Other services

Here you will find links to two more reference databases maintained by InterRidge. Again, the reference databases are a great resource and it requires your regular input.

Furthermore, you can calculate the spreading rate of the sea floor at any place around the globe!

Hydrothermal Ecological Reserves Page

http://triton.ori.u-tokyo.ac.jp/~intridge/reser-db.htm

This page lists all the current ecological reserves that have been proposed at hydrothermal vents. These vary in breadth and scope; at Juan de Fuca the Canadian government has proposed the Endeavour vent field as a pilot marine protected area, while other reserves consist of requests from individual scientists conducting experiments in specific areas. There is also an on-line form to submit reserves to the page.

Overview of databases:-

International MOR & BAB Cruise Database

A database of over 300 cruises compiled since 1992, which have taken, place on mid-ocean ridges or in back-arc basins. The database contains the principal investigators, the ship, the study region and a short summary of the cruise objectives. The information for these cruises can also be accessed from an on-line map.

International Vessel & Vehicle Database

A database of vessels and vehicles (submersibles etc) capable of conducting mid-ocean ridge science. Links are provided to that ship's homepage, for access to up-to-date scheduling information.

Hydrothermal Vent Faunal Database

A database of almost 500 species of faunal found at hydrothermal vents listing the general geographic range of the species and references.

MOMAR References Database

A database of over 300 references from the MOMAR region (the Mid-Atlantic Ridge near the Azores).

Hydrothermal Vent Database

A database listing the known (i.e. ground-truthed) and suspected (i.e. plumes observed, vents not yet ground-truthed) vents, including the location, general description, and references. Its one of a kind! Have you discovered a new vent site or confirmed an existence of a suspected one? Let us know about it!

Hydrothermal Vent Biology Samples

Data on existing hydrothermal vent biology. Samples are presented in two ways: (1) short summaries of the major collections of hydrothermal vent biology samples and (2) a database of existing samples (still under development). Researchers with hydrothermal biology samples are strongly encouraged to submit information to either form.

InterRidge Office Updates

InterRidge Publications

All of the following InterRidge publications are available upon request. Fill out our WWW form at **http://triton.ori.u-tokyo.ac.jp/~intridge/act3.html** or contact us by e-mail at **intridge@ori.u-tokyo.ac.jp.**

InterRidge News:

InterRidge News, 1999, 8 (2) pp. 72
InterRidge News, 1999, 8 (1) pp. 72
InterRidge News, 1998, 7 (2) pp. 68
InterRidge News, 1998, 7 (1) pp. 72
InterRidge News, 1997, 6 (2) pp. 64
InterRidge News, 1997, 6 (1) pp. 72
InterRidge News, 1996, 5 (2) pp. 68
InterRidge News, 1996, 5 (1) pp. 52
InterRidge News, 1995, 4 (2) pp. 52
InterRidge News, 1995, 4 (1) pp. 72
InterRidge News, 1994, 3 (2) pp. 44
InterRidge News, 1994, 3 (1) pp. 28
InterRidge News, 1993, 2 (2) pp. 4
InterRidge News, 1993, 2 (1) pp. 32
InterRidge News, 1992, 1 (1) pp. 26

Workshop and Working Group Reports:

InterRidge **MOMAR (*MO*nitoring the *M*id-*A*tlantic *R*idge)** workshop report, April, 1999.
InterRidge **Mapping and Sampling the Arctic Ridges: A Project Plan**, pp. 25, December 1998.
ODP-InterRidge-IAVCEI Workshop Report: **The Oceanic Lithosphere and Scientific Drilling into the 21st Century**, pp. 89.
InterRidge Global Working Group Workshop Report: **Arctic Ridges: Results and Planning**, pp. 78, October 1997.
InterRidge **SWIR Project Plan**, pp. 21, October 1997 (revised version).
InterRidge Meso-Scale Workshop Report: Quantification of Fluxes at Mid-Ocean Ridges: **Design/Planning for the Segment Scale Box Experiment**, pp. 20, March 1996.
InterRidge Active Processes Working Group Workshop Report: **Event Detection and Response & A Ridge Crest Observatory**, pp. 61, December 1996.
InterRidge Biological *Ad Hoc* Committee Workshop Report: **Biological Studies at the Mid-Ocean Ridge Crest**, pp. 21, August 1996.
InterRidge Meso-Scale Workshop Report: **4-D Architecture of the Oceanic Lithosphere**, pp. 15, May 1995.
InterRidge Meso-Scale Project Symposium and Workshops Reports, 1994: **Segmentation and Fluxes at Mid-Ocean Ridges: A Symposium and Workshops & Back-Arc Basin Studies**: A Workshop, pp. 67, June 1994.
InterRidge Global Working Group Report 1993: **Investigation of the Global System of Mid-Ocean Ridges**, pp. 40, July 1994.
InterRidge Global Working Group Report 1994: **Indian Ocean Planning Meeting Report**, pp. 3, 1994.
InterRidge Meso-Scale Working Group Meeting Report, Cambridge, UK, pp.6, 1992.

Workshop and Symposium Abstract Volumes:

InterRidge Workshop: **MOMAR (*MO*nitoring the *M*id-*A*tlantic *R*idge)** Abstract Volume, pp. 82, Oct. 1998.
InterRidge Workshop: **Mapping and Sampling the Arctic Ridges** Abstract Volume, pp. 30, Oct. 1998.
First International Symposium on **Deep-Sea Hydrothermal Vent Biology** Abstract Volume, pp. 118, Oct. 1997.
Fara-InterRidge **Mid-Atlantic Ridge Symposium Results from 15°N to 40°N**. J. Confer. Abs. 1(2), 1996.
ODP-InterRidge-IAVCEI Workshop: **The Oceanic Lithosphere and Scientific Drilling into the 21st Century**, pp. 126, 1996.

Steering Committee and Program Plan Reports:

InterRidge STCOM Meeting Report, Bergen, Norway, 1999.
InterRidge STCOM Meeting Report, Barcelona, Spain, 1998.
InterRidge STCOM Meeting Report, Paris, France, 1997.
InterRidge STCOM Meeting Report, Estoril, Portugal, 1996.
InterRidge STCOM Meeting Report, Kiel, Germany, pp. 22, 1995.
InterRidge STCOM Meeting Report, San Francisco, USA, 1994.
InterRidge STCOM Meeting Report, Tokyo, Japan, 1994.
InterRidge STCOM Meeting Report, Seattle, USA, pp. 6, 1993.
InterRidge Meeting Report, York, UK, 1992.
InterRidge Meeting Report, Brest, France, pp. 39, 1990.
InterRidge Program Plan Addendum 1997, pp. 10, January 1998.
InterRidge Program Plan Addendum 1996, pp. 10, April 1997.
InterRidge Program Plan Addendum 1995, pp.10, 1996.
InterRidge Program Plan Addendum 1994, pp.15, 1995.
InterRidge Program Plan Addendum 1993, pp. 9, 1994.
InterRidge Program Plan, pp. 26, 1994.

InterRidge Office Updates

Overview of InterRidge Working Groups

More information on working groups can be found on our website; http://triton.ori.u-tokyo.ac.jp/~intridge/act2.html

Arctic Ridges

Objective: Coordinate planning efforts for mapping and sampling the Arctic Ridges.

Current Activities: Coordination of international cruise to the Gakkel Ridge in 2001.

Chair: Colin Devey (Germany)

WG members: G. A. Cherkashov (Russia), B. J. Coakley (USA), K. Crane (USA), O. Dauteuil (France), V. Glebowsky (Russia), K. Gronvold (Iceland), H. R. Jackson (Canada), W. Jokat (Germany), Y. Kristoffersen (Norway), P. J. Michael (USA), N. C. Mitchell (UK), H. A. Roeser (Germany), H. Shimamura (Japan), K. Tamaki (Japan)and C. L. Van Dover (USA).

Back-Arc Basins

Objectives: Summarize past work on Back-Arc Basins and coordinate future studies.

Current Activities: Compiling report on past work in Back-Arc Basins.

Chairs: H. Fujimoto (Japan) and J.-M. Auzende (France)

WG members: Ph. Bouchet (France), J.-L. Charlou (France), K. Fujioka (Japan), E. Grácia (Spain), P. Herzig (Germany), J. Ishibashi (Japan), Y. Kido (Japan), R. Livermore (UK), S. Scott (Canada), R. J. Stern (USA), K. Tamaki (Japan), and B. Taylor (USA).

Biological Studies

Objectives: Increase international collaboration in hydrothermal biological studies and work on integrating ridge-crest biological and geological research.

Current Activities: See page 12.

Chair: L.S. Mullineaux (USA).

WG members: P. R. Dando (UK), J. R. Delaney (USA), D. Desbruyères (France), D. R. Dixon (UK), S. S. Drachev (Germany), A. Fiala-Médioni (France), C. R. Fisher (USA), H. Fricke (Germany), F. Gaill (France), J. Hashimoto (Japan), S. K. Juniper (Canada), R. A. Lutz (USA), T. Naganuma (Japan), Douglas C. Nelson (USA), S. Ohta (Japan), A.-L. Rey-senbach (USA), K.O. Stetter (Germany), and V. Tunnicliffe (Canada).

Global Digital Database

Objective: Establish a database of global multibeam bathymetry and other data for mid-ocean ridges and back-arc basins.

Current Activities: Compiling data.

Chair: Philippe Blondel (UK)

WG members: J. S. Cervantes (Spain), C. Deplus (France), M. Jakobsson (Sweden), K. Okino (Japan), M. Ligi (Italy), R. Macnab (Canada), T. Matsumoto (Japan), K. A. K. Raju (India), W. Ryan (USA), and W. Weinrebe (Germany).

Global Distribution of Hydrothermal Activity

Objectives: Target key areas of the global MOR that should be explored for hydrothermal activity and coordinate international collaboration to explore them.

Current Activities: Organizing the InterRidge Theoretical Institute on the Thermal regime of Ocean Ridges and the Dynamics of Hydrothermal Circulation to be held in the Spring of 2001.

Chair: Chris R. German (UK)

WG members: E. Baker (USA), Y. J. Chen (USA), D. Cowan (UK), T. G. Gamo (Japan), E. Grácia (Spain), P. Halbach (Germany), S.-M. Lee (Korea), G. Massoth (N.Z), J. Radford-Knoery (France), A-L. Reysenbach (USA), D. S. Scheirer (USA), S. D. Scott (Canada), K. G. Speer (France), C. A. Stein (USA), V. Tunnicliffe (Canada) and C. L. Van Dover (USA).

4-D Architecture

Objective: Promote international efforts to constrain the composition and structure of the oceanic lithosphere, and their along- and across-axis variability.

Current Activities: Organizing the InterRidge Theoretical Institute on the Thermal regime of Ocean Ridges and the Dynamics of Hydrothermal Circulation to be held in the Spring of 2001.

Chair: Jian Lin (USA)

WG members: S. Allerton (UK), D. K. Blackman (USA), M. Cannat (France), J. Dyment (France), J. E. Escartín (France), P. Gente (France), K. M. Gillis (Canada), P. B. Kelemen (USA), L. M. Parson (UK), N. Seama (Japan), M. C. Sinha (UK), and M. Tolstoy (USA).

Event Detection and Response & Observatories

Objectives: Develop detection methods of transient ridge-crest seismic, volcanic and hydrothermal events, and the logistical responses to them.

Current Activites: Development of MOMAR project.

Chair: Chris Fox (USA)

WG member: K. Mitsuzawa (Japan)

SWIR

Objective: Coordinate reconnaissance mapping and sampling of the Southwest Indian Ridge.

Current Activities: Coordinating upcoming cruises.

Chair: Catherine Mével (France)

WG members: M. Canals (Spain), C. German (UK), N. Grindlay (USA), C. Langmuir (USA), A. Le Roex (South Africa), C. MacLeod (UK), J. Snow (Germany), T. Kanazawa (Japan) and C. L. Van Dover (USA).

Undersea Technology

Objective: Foster the development of undersea technology and disseminate information about it.

Current Activities: Development of MOMAR project.

Chair: Alan Chave (USA)

WG members: J. R. Delaney (USA), H. Momma (Japan), J. Kasahara (Japan), M. Kinoshita (Japan), A. Schultz (UK), D. S. Stakes (USA), P. Tarits (France), and H. Villinger (Germany).

Updates on InterRidge Projects

Global Distribution of Hydrothermal Activity

Chris German, Chair (cge@soc.soton.ac.uk)

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There have been a number of areas of activity within the Working Group's organisation in the past few months which affect all of a) Working Group Membership; b) Effectiveness in communication; c) Continuing exploration of the global mid-ocean ridge crest.

a) New Members of the Working Group

Following recommendations from the InterRidge Steering Committee we have continued to expand the membership of our Working Group, expanding both scientific expertise and geographic representation. To that end we have been pleased to welcome two experts in the field of microbiology to the working group: Prof. Anna-Louise Reysenbach (University of Portland, Oregon, USA) and Dr. Don Cowan (University College London, UK). In addition, we are pleased to welcome Dr Gary Massoth of the Institute of Geological and Nuclear Sciences, New Zealand (Gary was formerly part of the highly successful NOAA-PMEL Vents programme in Seattle, USA).

Full membership and contact details of this Working Group can now be found at:
http://triton.ori.u-tokyo.ac.jp/~intridge/wg-flux2.htm#mem

b) Launch of the New Global Vents Data-Base

Second, with the launch of the new InterRidge Web-Site as a whole, comes an upgraded facility from the "Global Distributions" Working Group. This was an idea stimulated by the Spring 1999 meeting of our Working Group at the European Geophysical Society meeting in Den Haag. It has now reached fruition thanks to the careful efforts of past and present InterRidge Co-ordinators, Cara Wilson and Agnieszka Adamczewska. The original database was largely compiled by Mark Hannington. The idea of this data-base is that it should become the international standard for all known sites of submarine hydrothermal activity which can be updated simply by submitting an electronic message to the InterRidge Office.

The Global Vents Data-base can be found in a matter of clicks from the new IR Home Page, either by following the first link from the "Global Distribution" WG's page:
http://triton.ori.u-tokyo.ac.jp/~intridge/wg-flux.htm
or by following links from the IR home-page via "InterRidge Data Bases".

The Vents Data-base comprises a searchable text-based compilation of 208 separate entries together with a global summary map which identifies and differentiates between all of:

- Known sites of present-day activity
- Known sites of inactive venting
- Areas with hydrothermal sediments
- Unconfirmed Areas (plume signals reported, but no vents yet found)

The long-term plan is that a simple click on the summary map will lead you straight to the relevant data-base entry (but give us time!). In the interim, the text database can already be searched by any of its fields which are: Name, Latitude, Longitude, Region, Spreading Rate, Activity etc, etc, etc.

Each listed area includes some basic key-facts such as x-y-z (Lat.-Long-Depth) coordinates, nature of venting present, basic biological description and citation of first paper (peer-reviewed wherever possible) to discuss the location of the site.

If you now of any other sites, or believe a more accurate description of a site is already listed then suggested corrections to the data-base are only a click away.

We'll look forward to receiving a healthy and steady flow of information to this site so that we can maintain the best hydrothermal data base that we can all benefit from, worldwide.

c) Recent Scientific Highlights

Two recent areas of exploration for new sites of hydrothermal activity have been along the East Scotia Ridge (see report by Roy Livermore *et al.*, InterRidge News 8.1) and the Havre Trough Back-Arc Basin (see report by De Ronde *et al.*, InterRidge News 8.2).

In addition, in 1999 KORDI (S.Korea) conducted a 7-day cruise to the eastern Manus Basin, including the PACMANUS area (to be visited by ODP Leg 193, later this year) and a search for a new hydrothermal field in the northern Pual Ridge using underwater camera. The work consisted of shipboard geophysics, hydrocasts, dredging, piston-coring and deeptow camera work.

d) Forthcoming Cruises

In the 2000-2001 time-frame two new areas of exploration and detailed study are currently receiving internationally-coordinated attention.

The first area of interest is within the Arctic Basin. Dr Rolf Pedersen (U.Bergen, Norway) is currently leading a five-year Norwegian programme to study the Arctic Ridges which is planned to include a component of hydrothermal exploration. The same is the case for a joint cruise between InterRidge Japan and Russian Colleagues in September 2000 aboard the RV

Updates on InterRidge Projects

Logatchev. Finally, in Summer 2001, a seventy-day bi-lateral two-ship (Polarstern, Healy) research expedition is proposed between the USA and Germany to investigate the western Gakkel ridge.

The second area of interest in the immediate future is in the Central Indian Ocean. In early 2001 Dr Cindy Van Dover will lead a US expedition involving all of the DSL-120 sidescan and Argo and JASON vehicles to investigate hydrothermal activity close to the Rodriguez Triple Junction. An InterRidge Japan cruise (PI J.Hashimoto, JAMSTEC) involving the Kairei, and the ROV Kaiko is also proposed for the same portion of the Indian Ocean in Aug-Sept 2000 and UK scientists at the Southampton Oceanography Centre have recently submitted a proposal to continue hydrothermal exploration north along the Central Indian Ridge away from the Rodriguez Triple Junction and toward the Rodriguez Hot-Spot – watch this space!

In addition to the two focussed areas of research listed above, in March-April 2000 there will be a US (Fornari, Embley, Tolstoy *et al.*) "response" cruise to the eastern Equatorial Pacific spreading centers investigating the ridge axis in areas where seismic events - thought to arise from active volcanism - have been recorded by NOAA's moored acoustic hydrophone array over the past few years. The study will focus on an area that has received no prior detailed study and will "interpolate" across some reasonably large gaps between previous study areas of the NEPR, Galapagos and SEPR. The cruise will involve near-bottom sonar and visual imaging, rock dredges, bio-hauls, hydrocasts - and MAPRs attached to just about everything!

In late May 2000, KORDI will conduct a fresh hydrothermal cruise to the Woodlark Basin, in the Solomon Is. The Woodlark Basin has been geophysically mapped by the scientists at University of Hawaii and other institutions, but no systematic seafloor rock sampling has been conducted along this ridge axis to date. The goal is to take dredge samples systematically along the spreading axis together with a series of CTD-profiling measurements and, where appropriate, underwater camera runs to seek out new active vent-fields.

Global Distribution of Hydrothermal Vents Database

http://triton.ori.u-tokyo.ac.jp/~intridge/vent.htm

Biology Working Group Update

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The last Biology Working Group update in the IR News was November 1999; since then the group has concentrated on two major topics: organizing a workshop on *Management of Hydrothermal Vents*, and planning of the *2nd International Symposium on Deep-Sea Hydrothermal Vent Biology*.

Management of Hydrothermal Vent Ecosystems Workshop

Recognition of the possible impacts of mining, tourism and scientific activities on vent faunas has inspired the international vent science community to enter into a dialogue with policy and industry representatives over the management of vent ecosystems. This workshop will be convened by Kim Juniper (Canada) and Paul Dando (UK) in Vancouver BC on Oct. 28-30.

2nd International Symposium on Deep-Sea Hydrothermal Vent Biology

Due to the great response to the 1st International Symposium on Deep-Sea Hydrothermal Vent Biology in Madeira, a second is being planned for Brest during October 8-13, 2001. The motivation for this symposium has come through Daniel Desbruyères, and the Chair of the Scientific Committee is Verena Tunnicliffe. The organization of the symposium will follow the general model of the Madeira meeting, and information on sessions and registration will be available soon.

My tenure as Chair of the Working Group comes to a close this year, and the InterRidge Steering Committee will be re-evaluating the need for, and mandate of, the group, and selecting a new Chair. The membership of the working group may be reconstituted in the future, perhaps at the Brest symposium.

International Ridge-Crest Research: **Biological Studies**

Toxic vents and DNA damage

David R. Dixon[1], James T. Wilson[1], and Linda R.J. Dixon[1,2]

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An intriguing vent paradox is how to reconcile the fast growth rates and abundant biomass that typify vent communities with the highly toxic and stressful nature of their deep-sea environment. Research started during the PICO (MAR, June-July 1998) and HOPE 99 (EPR, April-May 1999) cruises is providing new insights into how vent organisms are able to survive and thrive in what is one of the most toxic environments on the face of the planet.

Apart from the extreme temperature and pressure, hydrothermal vent organisms are exposed to high levels of radioactive elements (e.g. radon) and heavy metals (e.g. Cd, Hg, Cu, Pb, Zn, Fe, Ag). Both groups of substances have well-documented capabilities to damage DNA, leading in come cases to birth defects and cancer. Preliminary experiments have shown that the MAR mussel (*Bathymodiolus azoricus*) can survive with higher levels of DNA damage in its cells than is typical of its shallow-water relatives (e.g. *Mytilus edulis*) (Fig. 1). Moreover, small mussels appeared to repair DNA damage more efficiently than did their larger (i.e. older) relatives. This points to fast growth rate and early maturation having another important role in the life of vent organisms. Previously, it was assumed that these characters were life-history adaptations (i.e. *r*-strategists) to deal with ephemeral and spatially disjunct of venting (e.g. Grassle, 1986; Tunnicliffe, 1991). Our recent findings suggest that fast growth and early reproduction may also play an important part in toxicity resistance. Our experiments showed that as mussels age they lose much of their ability to repair DNA damage, with the result that they become vulnerable to cellular damage and disease. It is already recognised that certain DNA repair enzymes are only active in the normal cell during early stages in the life-history (e.g. telomerases during embryogenesis). By growing fast and reproducing early, it appears that vent organisms are able to stay one jump ahead of the harmful effects of their environment.

It is interesting to note that Chuck Fisher and colleagues at Pennsylvania State University, have recently published data which suggests petroleum cold-seep tubeworms (*Lamellibrachia*) may live for between 100 and 500 years (Fisher *at al*., 1997; C. Fisher, pers. com.). In contrast, hydrothermal vent tubeworms grow much faster and die younger (e.g. Lutz, 1993, Lutz et al., 1994; Bergquist *et al*., 2000). It is interesting to note that oil-derived contaminants represent less of a threat to wildlife than do some other types of environmental contamination (Royal Society Commission on oil pollution). Unfortunately, there have been no reports to date dealing with disease demographics in vent organisms, but anecdotal evidence suggests that

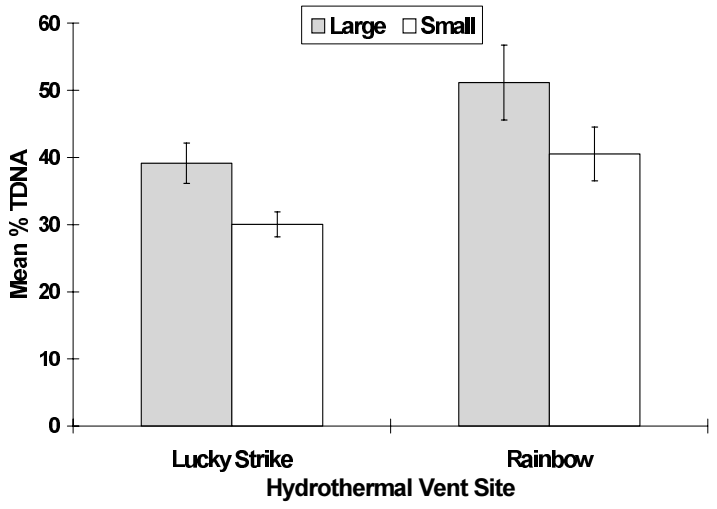

Figure 1. Background levels of DNA damage in small (4.5 ± 0.5 cm; open bars) and large (7.0 ± 1.0 cm; shaded bars) vent mussels from the Lucky Strike and Rainbow vent fields. Both size and site-related differences were recorded in this study. The site difference correlates with the known levels of toxic emissions at the two sites: Lucky Strike, moderately active; Rainbow, highly active. DNA damage was measured using the comet (single cell gel electrophoresis) assay applied to gill cells (*e.g.* Dixon and Wilson, 2000). Error bars indicate SEM.

International Ridge-Crest Research: **Biological Studies:** Dixon *et al.* continued...

those at the more active vent sites such as Rainbow, are subject to increased amounts of damage as they grow older. For example, the eye damage described recently in vent shrimps by Herring *et al.* (1999), which they attributed to retinal damage inflicted by submersible floodlights, could equally well have a toxicological aetiology. Given their close proximity to the hot, contaminant-laden vent effluents, feeding swarms of *Rimicaris exoculata* might be expected to be particularly vulnerable to chemical injury. There is already evidence that suggests that large shrimps were more prone to eye damage than small ones (D.R. Dixon, unpublished data). However, an unambiguous cause-effect relationship has yet to be demonstrated.

Vent communities because of their geological longevity (e.g. Little *et al.*, 1999) provide a unique historical perspective on environmental contamination and species adaptation; anthropogenic pollution by comparison is a very recent phenomenon (<100 years). The study of the special adaptations of vent organisms may also lead to new discoveries of relevance to the fields of biotechnology and medicine (e.g. novel DNA repair enzymes). Further work on this subject is planned as part of the EU-funded Fifth Framework project, VENTOX, which will commence shortly.

Acknowledgements

Our grateful thanks to Dr Daniel Desbruyères and Dr Francois Lallier, chief scientists of the PICO and HOPE 99 cruises, for providing access to research material and facilities. We are also grateful to Mr Vincent Bombail for technical assistance. This research was funded by the EU- Fourth Framework Programme (AMORES: PL950040) and the UK Natural Environment Research Council (GR9/3835).

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Workshop on Management of Hydrothermal Vent Ecosystems

28 -30 September 2000,
Institute of Ocean Sciences, Vancouver Is. Canada

The workshop is motivated by the realization that impacts of scientific researchers, mining consortia and tour groups on vent habitats may be substantial, and the activities of one group are likely to have a negative effect on others. Its main objective will be to provide guidelines and recommendations for wise and sustainable use of these unique habitats.

Co-convenors:
Paul Dando, UK (p.dando@bangor.ac.uk)
Kim Juniper, Canada (juniper.kim@uqam.ca)

International Ridge-Crest Research: **Biological Studies:**

Mariner, a mobile DNA transposon in the genomes of several hydrothermal invertebrates

N. Casse [1], E. Pradier [1], Y. Bigot [2], C. Loiseau [1] and M. Laulier [1,3]

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Introduction

Due to the severe environmental conditions in and around the hydrothermal sources, the fauna of these ecosystems has been submitted to strong genetic selection over time. But there is no information as to whether these conditions are extreme enough to modify the genomic features of these species. One possible way of answering this question is to study the repetitive components in the genomes of hydrothermal invertebrates, and to compare their features with those of their phylogenetically related coastal species. These genomic components can also be used as markers for studying of the evolution of these species.

Transposable elements are repeated and interspersed genetic elements present in the genomes of all eucaryotic organisms that have been examined to date. They represent from 5% to over 10% of the host genome. Because of the deleterious features of the mobility of transposons, the maintenance and the regulation of their activity is crucial for their long-term persistence as well as that of the host. This ability to move is also considered to be a source of genetic variability for the genome of their host. The *mariner*-like elements (MLE) are a diverse and taxonomically widespread superfamily of eucaryotic transposons that are present in most terrestrial and freshwater vertebrates and invertebrates (for review, see Plasterk *et al,*. 1999). They are small class II elements about 1280 base pairs (bp) long and flanked by inverted terminal repeats (ITRs), each 28-30 bp long (Fig.1a). These elements move about in genomes *via* a DNA intermediate by a conservative cut-and-paste transposition, similar to that used in several bacterial insertion sequences (IS; for review, see Mahillon and Chandler, 1998). The isolation of hydrothermal species means that they can be used as models to study the transmission of mobile elements. These elements can be vertically transmitted from parent to offspring, but horizontal transfer of elements also occurred occasionally between taxa during evolution (Kidwell, 1992). This study used classical molecular biology tools to detect MLEs in hydrothermal and coastal invertebrate species in order to compare the features of MLEs within and between these communities. This report describes preliminary findings of MLEs in deep-sea species.

Materials and Methods.

The hydrothermal specimens were collected during the autumn 1994, HERO94 mission, East Pacific Rise (9°50' Nord), and during August 1997 by the MARVEL II mission (Açores), IFREMER. Specimens were frozen in liquid nitrogen for transport.

Hydrothermal species: - Arthropoda: *Bythograea thermydron*, *Chorocaris chacei*, *Chorocaris* sp, *Rimicaris* sp and *Segonzacia mesatlantica*; Mollusca: - *Bathymodiolus thermophilus*, Pogonophora: - *Riftia pachytpila* sp.; Annelida : - *Branchypolynoe seepensis*.

Coastal species: Arthropoda: - *Nephrops norvegicus*, *Galathea strigosa, Palaemon serratus* and *Portunus puber*.

Genomic DNAs were purified as described by Laulier *et al.* (1995). Fragments, 460-510 bp long, encoding an internal conserved region of the MLE transposase, were amplified by the polymerase chain reaction (PCR; Robertson, 1993). These fragments were cloned in the pGEM-T Easy plasmid (Promega), sequenced and used as labeled probes in Southern blot/hybridization experiments.

International Ridge-Crest Research: **Biological Studies:** Casse *et al*., continued...

Results

We successfully amplified 460-510 bp fragments by PCR from one of the costal species and three of the hydrothermal species (Fig. 1b). The amplified PCR products from the three hydrothermal species; *B. thermydron* (crab), *B. thermophilus* (bivalve), *R. pachyptila* (gutless worm) and one coastal species: *N. norvegicus* (Norway lobster) were subsequently cloned and sequenced. Analysis of their translated sequences revealed that they were internal sequences encoding MLE transposases. Similar to most of the MLEs described to date, these sequences contained several frame shifts and stop codons, indicating that they encode inactive transposases. The nucleic acid sequences reported in this paper appear in the DDBJ/EMBL/GenBank sequence database under accession numbers AJ276070-AJ276073.

All these results were checked by Southern blot/hybridization analyses using the cloned MLE fragments as probes. At least four to eight fragments hybridizing with the MLE probe were detected in *B. thermydron* (Fig. 1c, lanes 1-2) but only a single fragment was found in *R. pachyptila* (Fig. 1c, lanes 3-4). While, we were not successful in amplifying fragments from *G. strigosa, P. serratus* or *P. puber* genomic DNA, Southern blot/ hybridization analyses revealed hybridizing fragments in these 3 species. Thus, we found MLE sequences in 3 out of 8 hydrothermal and all 4 of the coastal species examined.

The MLEs from *B. thermydron*, *B. thermophilus* and *N. norvegicus* had nucleic acid sequence that were 98% similar. In contrast, the *R. pachyptila* MLE nucleic acid sequence was only 48% similar to those of *B.*

Fig.1

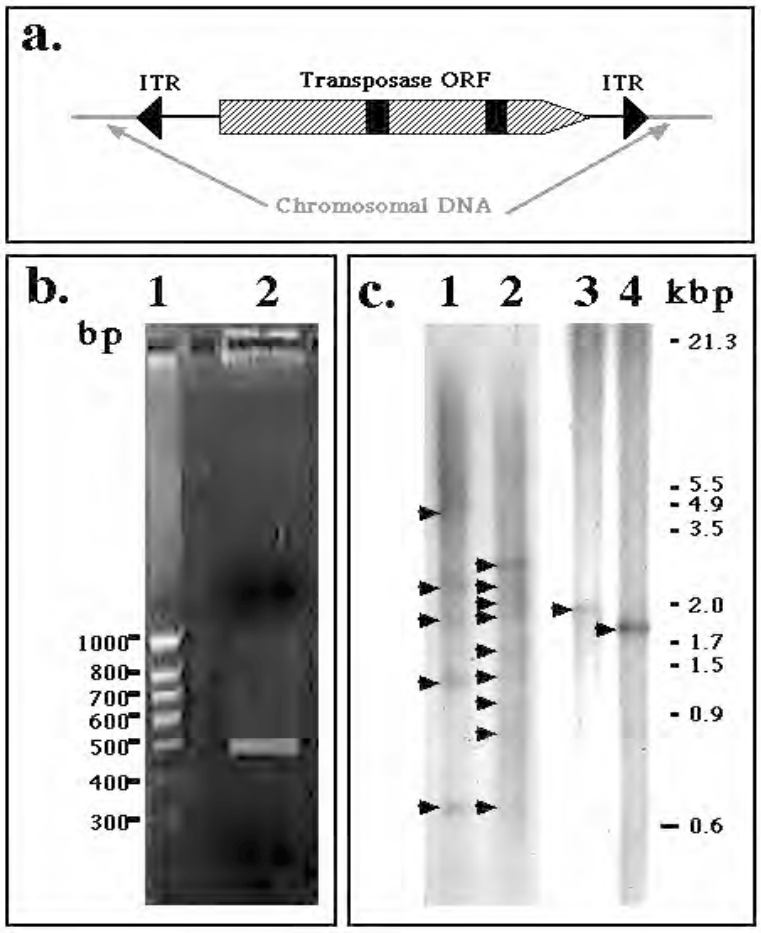

Figure 1. (**a**) Diagram showing the structure of the *mariner* transposon. These elements are flanked by two Inverted Terminal Repeats (ITR; black triangle) and contain a single open reading frame (dashed arrow) encoding a protein, the transposase, necessary and sufficient to carry out all the biochemical reactions needed for their mobility. The two black boxes inside the transposase ORF indicate two conserved amino acid domains (WVPHEL and YSPDLAP), used to design the primers for the PCR amplifications. (**b**) Detection of a 500 bp DNA fragment amplified by PCR using *B. thermydron* genome as the DNA source. Amplification products (lane 2) were separated by electrophoresis (0.8% agarose gel), stained with ethidium bromide and photographed. The molecular weight markers are visible in lane 1 ; sizes in bp are indicated in the left-hand margin. (**c**) Southern blot analysis of genomic DNA samples from *B. thermydron* (lanes 1 and 2) and *R. pachyptila* (lane 3 and 4) were digested with *Eco*RI *(*lane 1 and 3*)* or *Bam*HI (lanes 2 and 4). Blots were hybridized with the *B. thermydron* (lanes 1 and 2) and *R. pachyptila* (lane 3 and 4) MLE probes. Molecular weights are indicated in the left-hand margin. Arrows locate the fragments hybridizing with the MLE probes.

thermydron, *B. thermophilus* and *N. norvegicus*. The amino acid sequences of the transposases encoded by these 4 MLE fragments were compared to those in databanks. We found that *B. thermydron*, *B. thermophilus* and *N. norvegicus* MLEs were very probably related to the *irritans* MLE sub-family. The MLE in *R. pachyptila* does not appear to be directly related to any of the known MLEs and may be a member of a new MLE subfamily.

Few studies have investigated the MLEs in marine species. Robertson (1997) studied 25 marine species and described MLEs in the flatworms *Stylochus zebra* and *Bdelloura candida*. He suggested that MLE were restricted to terrestrial and freshwater animals. However, we have found MLEs from two sub-families in 7 of 12 marine species analyzed. MLEs related to the *irritans* sub-family were found in 4 coastal and 2 hydrothermal species, whereas 1 new kind of MLE was identified in the hydrothermal species *R. pachyptila*.

Acknowledgements

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Biology databases

Hydrothermal Biology Sample Database:

http://triton.ori.u-tokyo.ac.jp/~intridge/samp-db.htm

A database of existing biological samples from hydrothermal vents, designed to facillitate the exchange of samples among researchers.

A summary of various individual collections:

A general summary of some of the major collections of hydrothermal vent fauna, including the approximate size of the collection, the geographical and taxonomical emphasis, and a contact person.

Hydrothermal Vent Faunal Database:

http://triton.ori.u-tokyo.ac.jp/~intridge/fauna/

A database of almost 500 species of faunal found at hydrothermal vents. The general geographic range of the species is given, along with references.

International Ridge-Crest Research: **Back Arc Basins**

Parece Vela Rift and Central Basin Fault revisited - STEPS-IV (Structure, Tectonics and Evolution of the Philippine Sea) - Cruise summary report

K. Fujioka[1], T. Kanamatsu[1], Y. Ohara[2] , H. Fujimoto[3], K. Okino[3], C. Tamura[3], S. E. Lallemand[4], A. Deschamps -Boldrini[4], J. A. Barretto[5], N. Togashi[6], H. Yamanobe[6], A. So[6]

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Introduction

An enigmatic large linear structure in the Philippine Sea, the Central Basin Fault (CBF) was first found and named by Hess (1948). It occupies the central part of the West Philippine Basin (WPB), one of several backarc basins in the Western Pacific. The CBF is a WNW-ESE trending 1,000 km-long linear structure with a notable rift valley like a slow spreading ridge.

We mapped areas around the CBF during the KR98-01, KR98-12, and KR99-10 cruises. Our results made it clear that the CBF was a slow spreading center in a backarc basin. French R/V L'Atalante cruises (DAVAPUS from Davao to Pusan in 1994 and KAONOUM from Kaoshiung to Noumea in 1996) had two long single transect lines across the West Philippine Basin by using SIMRAD EM-12-Dual multibeam swath mapping system and major structures of the CBF were mapped (Deschamps *et al*., 1999). We also took sediment and rock samples and performed heat flow measurements at several points of the CBF and West Philippine Basin during the KR98-01 and KR99-10 cruises. Two Shinkai 6500 dives were performed in 1996. These dives collected photographs, videos and basalt samples from both walls of the CBF axial valley. Based on chemistry, the basalts were found to have a backarc basin affinity (Fujioka *et al*., 1999). However, despite these advances, numerous unsolved questions regarding the geology and geophysics of the West Philippine Basin still remain.

East of the West Philippine Basin lies the Parece Vela Basin which exhibits two trends of magnetic lineations. The analyses of these magnetic lineations made it clear that the Parece Vela Basin had two episodes of spreading history; the 1st was an EW fast spreading event, having several propagations to the north, followed by a NE-SW trending, slow spreading stage accompanied by amagmatic spreading (Ohara *et al*., 1996, 1997; Kasuga and Ohara, 1997;

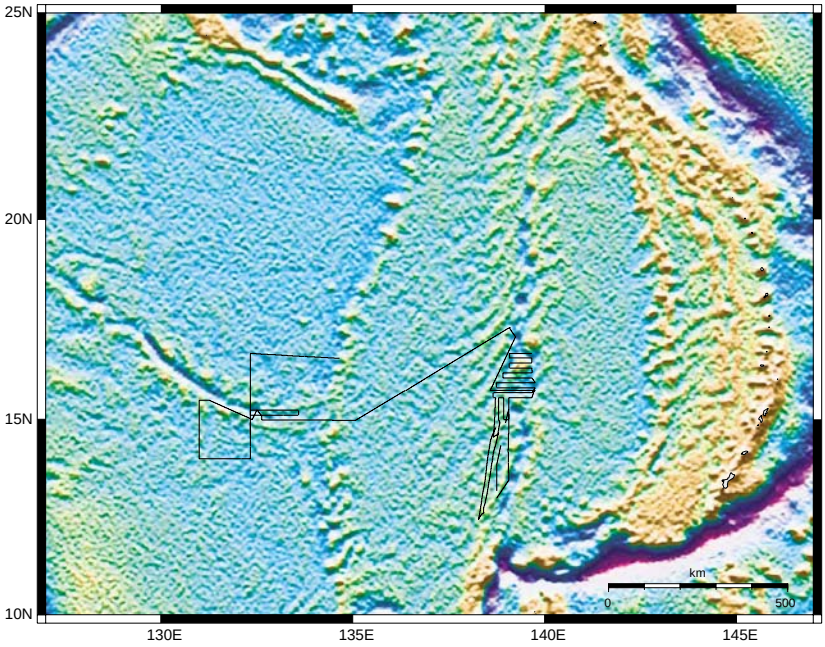

Figure 1. Map of the survey areas showing the ship's tracks during the STEPS-IV cruise.

Okino *et al*., 1998, 1999). Recently Ohara and others (in preparation) recognized three megamullion structures along the Parece Vela Rift and of these they noted the existence a huge megamullion-like structure called Giant Core Complex (GCC) in the area surrounded by 15°30'N, 16°30'N, 138°30E, 139°30'E. This structure has notable transform-parallel mullion-like structure.

In the light of these prior discoveries, we set out to further investigate the origins and evolution of the West Philippine Basin. This latest cruise focused on data collection from three different areas, the Parece Vela Rift, GCC and CBF, using the R/V Yokosuka, JAMSTEC. The scientific plan consisted of surface ship observations of gravity, bathymetry and magnetics (both proton and three-component magnetometer) and deep-towed proton magnetometer apparatus. The cruise, YK00-01 "STEPS-IV", Structure, Tectonics and Evolution of the Philippine Sea-IV, started at Guam pier on 26th January and ended at Guam pier again on 14 February. The cruise was conducted as a JAMSTEC project, under the umbrella of SEAS (Science of South East Asian Seas) and the InterRidge program. Scientists from France, the Philippines as well as Japanese universities and research institutions assembled onboard the Yokosuka in order to address the above stated scientific objectives.

The major objectives of this cruise were two-fold: 1) to investigate the precise magnetic reversal pattern of an extinct spreading ridge by the deep-towed proton magnetometer and 2) investigate the evolution of the Parece Vela Basin and the West Philippine Basin by elaborated swath mapping. The areas studied included segments of the Parece Vela Rift, the megamullion GCC, the eastern part of the CBF axis, as well as several transit lines from Parece Vela Basin to CBF across the Kyushu Palau Remnant Arc.

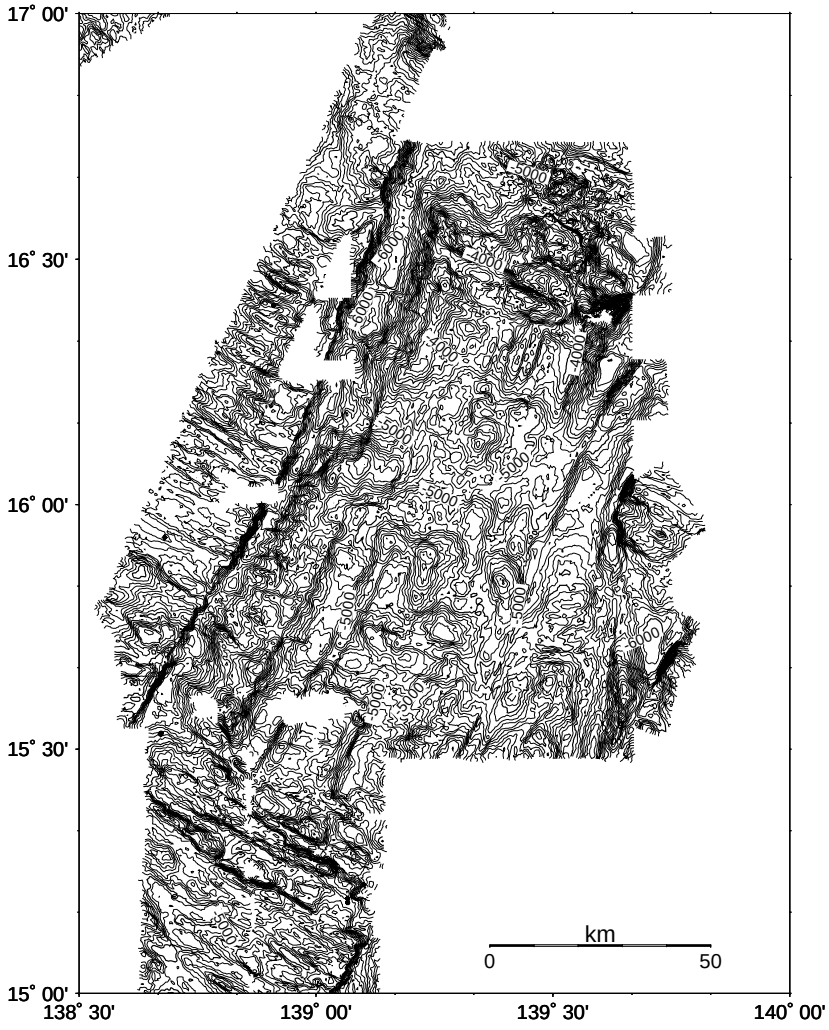

Figure 2a. Bathymetric map of the Giant Core Complex (GCC) in the Parece Vela Basin.

Results

During the YK00-01 STEPS-IV cruise, the following results were obtained for the Parece Vela Basin and the CBF. Figure 1 shows the ship' tracks of the STEPS-IV cruise.

1. Bathymetry and morphology

We conducted swath surveys using the SeaBeam 2112 system. The survey covered 930 miles of track in box surveys around the GCC and 730 miles in the eastern Central Basin Fault (E-CBF).

Morphology of the GCC

Previous results conducted by the Hydrographic Department of Japan allowed us to recognize at least three megamullion-like structures near three segments of the

International Ridge-Crest Research: **Back Arc Basins:** Fujioka *et al.*, continued...

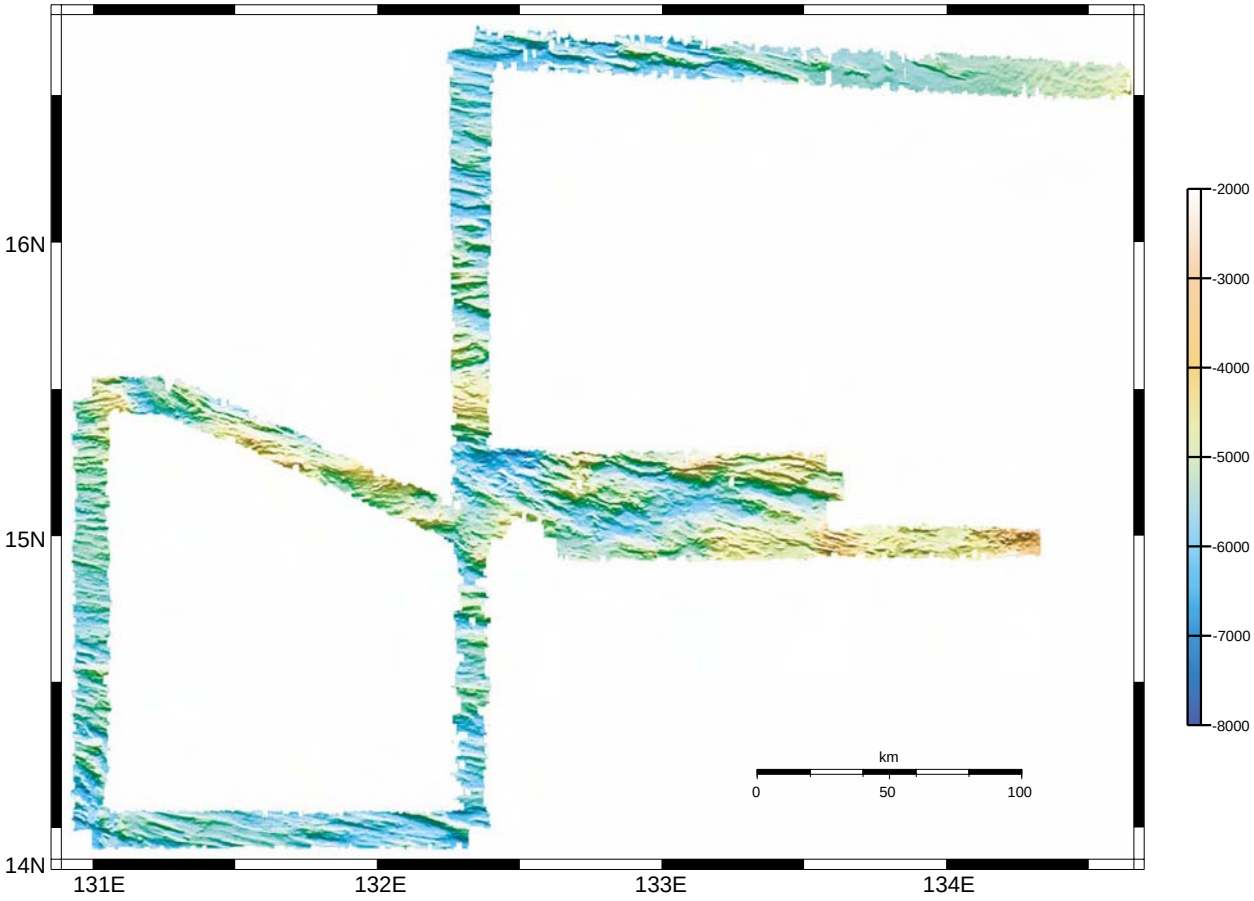

Figure 2b. Bathymetric map of the Eastern Central Basin Fault (E-CBF).

Parece Vela Rift from 16° - 19°N, and 139° - 140°E including the IPOD Trough named by the Russian scientists. This was the first finding of the megamullion structure from the backarc basins in the world (Ohara *et al*., in prep.). During this cruise we mapped one of the three mullions called the Giant Core Complex. The GCC occupies the southwestern half of the extinct spreading segment at around 16°N and the surface of the GCC is characterized by corrugations running parallel to the fracture zones. (Fig. 2a). We recognized three types of structures, prominent fracture zone-parallel mullion structures orientated NE-SW, as well as clear Break Away and Termination structures. The size of GCC is 120 km long and 57 km wide and covers an area of 7125 km^2, which is ten times greater than those reported from the Atlantic Ridge (Tucholke *et al*., 1997). This is the largest megamullion ever reported, therefore this should be called "Gigamullion". Serpentinized peridotites and gabbros were recovered from the IPOD Trough and the GCC (Shcheka, *et al*., 1995; Ohara *et al*., 1996; Fujioka *et al*., 1998). The peridotite composition varied from fertile lherzolite to depleted harzburgite. Many peridotite samples had evidence of mantle-melt interaction (Ohara *et al*., in prep.). Proton magnetometer survey across the GCC was also conducted across segment 3 and the result was compared with other segments.

Morphology of the E-CBF

We conducted three EW and two NS lines at the E-CBF, close to the junction with the Kyushu-Palau Ridge. We used two more lines, one transit line tracing a previous JAMSTEC cruise and a French cruise line obliquely crossing the CBF for the morphologic analysis. We made a small box at the E-CBF (Fig. 2b). The spreading fabrics trend at 290° was almost parallel to the axial valley. The boundary of the CBF and the Kyushu-Palau Remnant Arc was identified as a negative gravity anomaly along the 134°E line based on the Satellite Gravity Anomaly map (Sandwell and Smith, 1997) but the spreading fabrics of the CBF continue as far as 133°40'E. The axial valley of the CBF terminated at 133°40'E getting shallower to the east from

133°10'E. The rough spreading fabrics of the seafloor on both sides of the E-CBF, in comparison with western and central parts of the West Philippine Basin, can be interpreted either by a slower spreading rate or a smaller magmatic supply when compared with those of the slow spreading, Mid-Atlantic Ridge and fast spreading, East Pacific Rise.

Transit lines

We had two long transit lines from the Parece Vela Rift to the E-CBF across a "chaotic terrain" of the west half of the Parece Vela Basin. This terrain consisted of isolated and elevated dome-like blocks (maximum relief was up to 1500m), capped by axis-normal lineations and associated deeps. Ohara *et al*. (in prep.) interpreted these isolated dome-like blocks to be analogues of megamullion structures.

2. *Geophysics*

We conducted geophysical surveys on the gravity and magnetic properties together with swath mapping by using a gravity meter, a proton magnetometer, the shipboard three-component magnetometer and a DTPM system. An additional three component magnetometer, which was recently developed by scientists at Chiba University was also used parallel to the shipboard three component magnetometer. Gravity and magnetic data will be analysed in the near future to elucidate the crust and upper mantle structure, as well as the magnetic lineations of the West Philippine Basin and the Parece Vela Basin.

3. *Deep Tow Proton Magnetometer*

We conducted surveys along a transect (195 nautical miles, NE to SW) by using DTPM under the following conditions. The ship's speed was 1.7-2.4 knot, (average, 2.2 knot) with respect to the ground, and the towing depth was 2100-3000 m below sea surface. The chosen line was across one segment of the Parece Vela Rift covering both NE and SW sides of the extinct spreading centers. High resolution magnetic intensity peaks were identified along the line and we correlated small peaks with theoretical magnetic reversal pattern to get a more precise evolutionary history of the later stage of the Parece Vela Basin formation (Fig. 3). Online data transmission system worked successfully during the survey.

Summary

A geophysical swath survey and a Deep-Towed Proton Magnetometer survey were carried out using the R/V Yokosuka, JAMSTEC in the vicinity of the Parece Vela Rift and the CBF during a 20 day cruise in Jan-Feb 2000. A huge megamullion called Giant Core Complex was fully mapped, including its corrugated

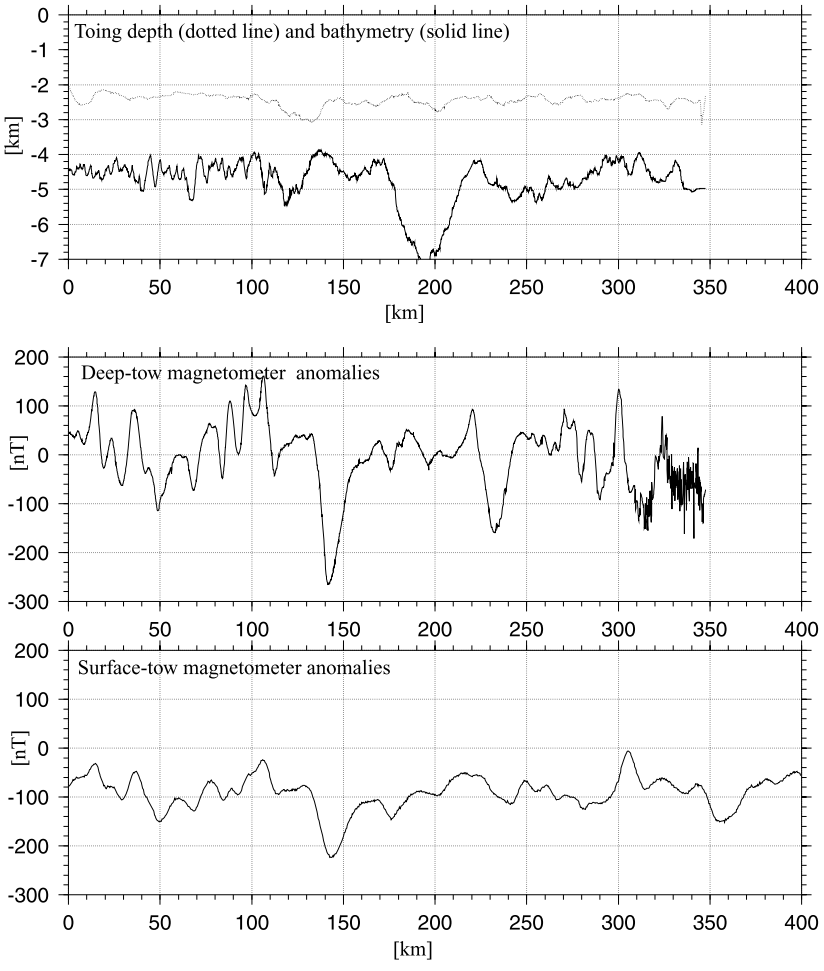

Figure 3. Deep Tow Proton Magnetometer (DTPM), a comparison with the surface proton magnetometer. A topographic cross section along the NE-SW survey line across one segment of the Parece Vela Basin.

surface structure, as well as termination and break away points. A deep-towed proton magnetometer survey was performed across one segment of the Parece Vela Basin to obtain fairly good magnetic signals for a better understanding of the spreading history. The easternmost segment of the CBF was also mapped near its junction with the Kyushu Palau Ridge. Two N-S lines were acquired across the extinct spreading center, perpendicular to the spreading fabrics for age determination from magnetic anomalies. These new data contribute to our knowledge on the last spreading phases of both the Parece Vela Basin and the West Philippine Basin.

Acknowledgments

The scientific party of STEPS-IV cruise expresses its thanks to all the officers and crew of the Yokosuka who assured the smooth and safe operations of geophysical swath mapping and Deep-Towed Proton Magnetometer survey in the Philippine Sea even under rough sea condition. We thank K. Suyehiro, K. Tsujii and all the JAMSTEC personnels for their vigorous support and help in the preparation of the cruise. Thanks are also due to K. Tamaki of ORI, University of Tokyo and to N. Seama of Chiba University.

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2000 Western Pacific Geophysics Meeting

SEAS and InterRidge Joint Business Meeting

Evening of 28th June , 2000

Convernors: Masataka Kinoshita (SEAS) and Hiromi Fujimoto (IR Back-Arc Basin WG)

Place: Meeting room in the WPGM conference building in Tokyo

SEAS (Science of East Asia Seas) and InterRidge Back-arc Basin Working group will exchange the information of recent activities of offshore research of the western Pacific by the Asian countries. We also discuss about the possible coordination of future researches in the western Pacific.

International Ridge-Crest Research: **Mid-Atlantic Ridge**

New data describing the nature of Magnetic anomalies and Earth Crust structure in a zone of the Mid-Atlantic Ridge

Alexander M. Gorodnitsky and Konstantin V. Popov

P.P. Shirshov Institute of Oceanology Russian Academy of Sciences, Russia

In the laboratory of Geomagnetic Research, investigations into the nature of magnetic and gravity anomalies and their connection with the Earth's crust structure in the rift zone of the Mid-Atlantic ridge continue. Recent work includes the study of the petromagnetic characteristics of serpentinized hiperbazite, dredged in the zone of the Northern Mid-Atlantic Ridge (N-MAR) and the transform faults at Cape Verde, 15°20' (Fig. 1). Additionally, data from magnetic and gravity surveys were used to model and calculate the magnetization and average density of the crust.

The collection of the serpentinized peridotite was dredged in the zones of transform faults of Northern Atlantic and their crossings with the axis of the N-MAR. Fifteen samples were collected using the submersible *Nautile* and during the sixteenth cruise r/v-*the Academician Boris Petrov* 7 samples were dredged from the bottom and the boarder faults of the rift valley of northern and southern segments of the N-MAR, and 5 samples were dredged from the southern slope of the transform fault and the southern margin of the active part of the transform fault.

Examination of the magnetic characteristics (Table 1) and comparison of average values of the measured parameters, revealed distinctions between groups of samples from the rift valley and the active part of the fault. Together with the small number of researched samples from this cruise, for comparison of these distinctions, we have attracted data from the Oceanographer transform fault, the Snake-Pit hydrothermal area, not far from the Kane transform fault (Popov and Scherbakov ,1996) and also the active part of the transform fault at 15°20', studied on the 3rd cruise with the r/v-*Academician Nikolay Strachov* (Burakov *et al.*, 1989).

The distinction between the samples in magnetic properties is apparent in the ferromagnetic mineral content. The magnetic susceptibility (κ) of samples taken directly from the rift valley was more than twice that of the samples from the transform fault (Table 1). The distinctions in ferromagnetic mineral content were evident in the saturation magnetization, which, for the rift valley was 5.07 (10^3A/m) but only 2.01 (10^3 A/m) for the fault.

To determine the magnetic minerals present in the samples, thermomagnetic analysis was conducted. Curie points obtained from the thermomagnetic curve, show a dependence of saturation magnetization (*Is*) on temperature in the range of 580-610°C. The *Is* (*T*°) curves suggest a lack of a second magnetic phase. Such types of curves, together with the increased Curie temperatures $T_c > 600$°C are characteristic for presence maghemite alongside with magnetite (for pure magnetite the $T_c = 578$°C). It is known that magnetite in serpentinites is a product of a progressive metamorphism of the

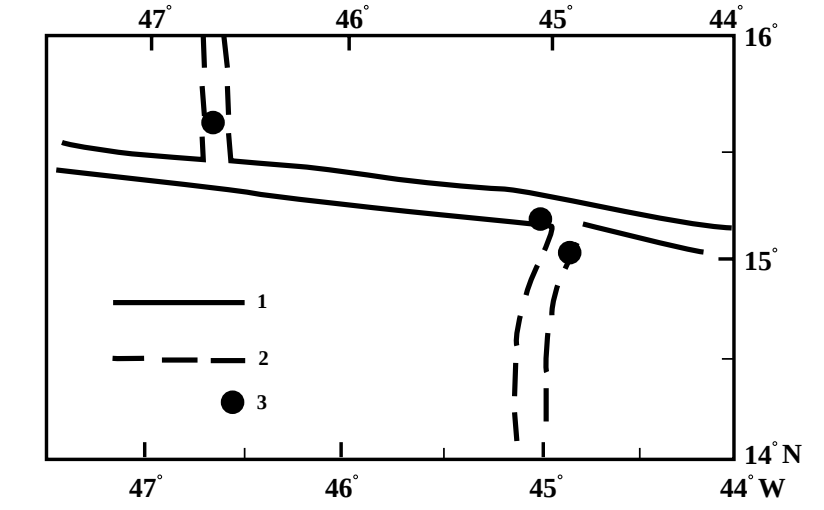

Figure. 1 Location map of Mid-Atlantic Ridge section at the Fifteen-twenty transform fault (Cape Verde); 1- active part of transform fault; 2- northern and southern segments of the rift valley of the Mid-Atlantic Ridge ; 3-Study sites.

International Ridge-Crest Research: **Mid-Atlantic Ridge:** Gorodnitsky and Popov cont...

Table 1. The petromagnetic parameters of dredging samples.

Sites of dredging	*In*, A/m	κ, 10^3 SI units	Q	Is, 10^3 A/m	*Irs/Is*	*Hc*, mT	T_c, (°C)	*Ist/Is*	Hm, mT
Slopes and bed of rift valley to the north and south from the transform fault 15°20'	2.14	38.95	1.34	5.07	0.15	11.7	595	0.72	12.2
Transform fault 15°20', southern internal angular raising and southern margin. Active part of fault 15°20'	1.36	18.22	1.54	2.01	0.21	15.6	604	0.52	20.0
Snake-Pit hydrothermal area. West slopes of the rift valley of Mid-Atlantic Ridge. (23°50' N). (Popov and Scherbakov, 1996)	6.23	67.86	2.2	9.0	0.14	10.0	575	0.95	---
Transform fault Oceanographer, active part of fault	1.34	28.70	1.23	6.25	0.26	238	595	0.44	30.0
Transform fault 15°20', Active part. (Burakov et al., 1989)	1.0	22.82	2.0	5.02	0.15		530	0.58	---

Notes: *In* - natural remanent magnetization; κ- a magnetic susceptibility; $Qn = In/\kappa H_E$ – Koenigsberger ratio, where: H_E - intensity of a geomagnetic field; *Is* - saturation magnetization; *Irs* - saturation remanent magnetization ; *Íñ* – coercive force; *Hcr* - coercive force on residual magnetization; *Ím* – median destructive field of *In*, T_c, (°C) – Curie temperature.

ultrabasites. In this case, magnetite appears to have formed during single-phase oxidation. Such a conclusion also follows from the ratio of *Ist/Is*, which as a rule of thumb, is <1. Bearing in mind that, a decrease in *Is* after heating is usually explained by the transition of magnetite to maghemite grains by single-phase oxidation in haematite.

A comparison of the average *Ist/Is* ratios for the two groups (samples from the fault had *Ist/Is* = 0.52 and samples from rift valley had *Ist/Is* = 0.72) shows that the process of oxidation of magnetite in samples from the fault occurred more actively than in the samples from the rift valley. The *Ist/Is* ratios of 0.44 for samples originating from the Oceanographer transform fault and 0.58 for the 15°20' transform fault (Burakov *et al.,* 1989), confirm the oxidation of magnetite in transform faults. In contrast, samples from the rift valley in the Snake-Pit area had *Ist/Is* = 0.95, which suggests an absence of maghemit (Popov and Scherbakov, 1996).

Domain structure (DS) of magnetite gains was determined based on the ratio of *Irs/Is* and *Hcr/Hc*. According to the standard estimations (Shcherbakov and Shcherbakova, 1980), a true multidomain (MD) of grains occurs if the *Irs/Is* < 0.05 and *Hcr/Hc* > 4, while for a single domain (SD) of particles the *Irs/Is* > 0.3 and *Hcr/Hc* < 2; the intermediate intervals of these parameters correspond to pseudo-single-domain(PSD) grains. Based on these definitions, the serpentinites showed properties of SD or PSD grains, in practically all the samples analysed. However, it is important to note, that some of the samples from the rift valley had magnetite grain size closer to multidomain (*Irs/Is* = 0,15; *Hcr/Hc* = 2.21) and fine grained magnetite (*Irs/Is* = 0,21; *Hcr/Hc* = 1.59) was apparent in some samples from the transform fault.

Analysis of the magnetic properties of samples of the serpentinized ultrabasite from the 15°20' transform fault zone and segments of the rift valley to the north and south of the transform fault shows the following:

1) The ferromagnetic mineral content in serpentinized ultrabasite from the rift valley is higher, than from the transform fault.

2) Multidomain structure in the transform fault zone was practically absent in contrast to the rift valley samples.

3) The degree of the magnetite oxidation in the transform fault zone was much greater than in the rift valley. Probably this is the result of differing oxidating conditions found around the structures in these areas. In transform faults the contact of serpentinized ultrabasites with ocean water occurred over a longer time frame. Thus, with increased age,

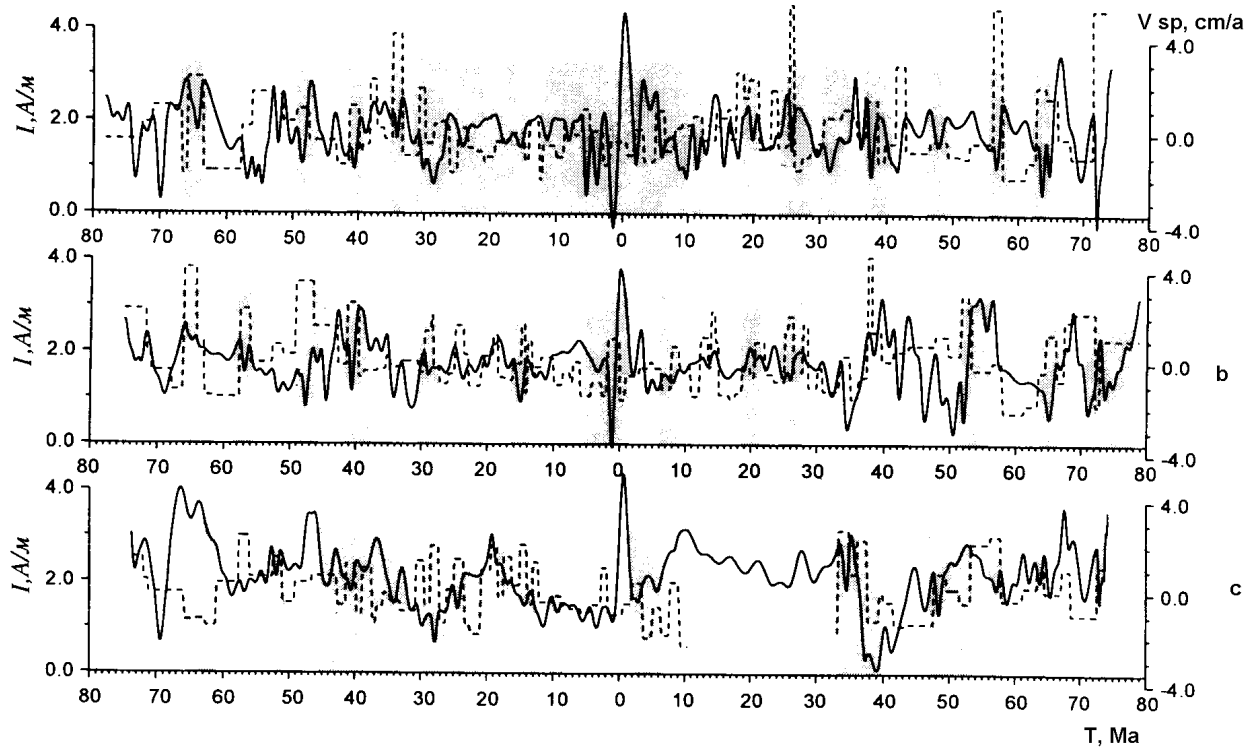

Figure 2. The lateral change in the velocities of the spreading (dotted line) and effective magnetization (solid line) on reference geophysical profiles at: (a) 28°5N'; (b) 25°8'N and (c) 23°3' N. Dotted areas – areas of negative correlation.

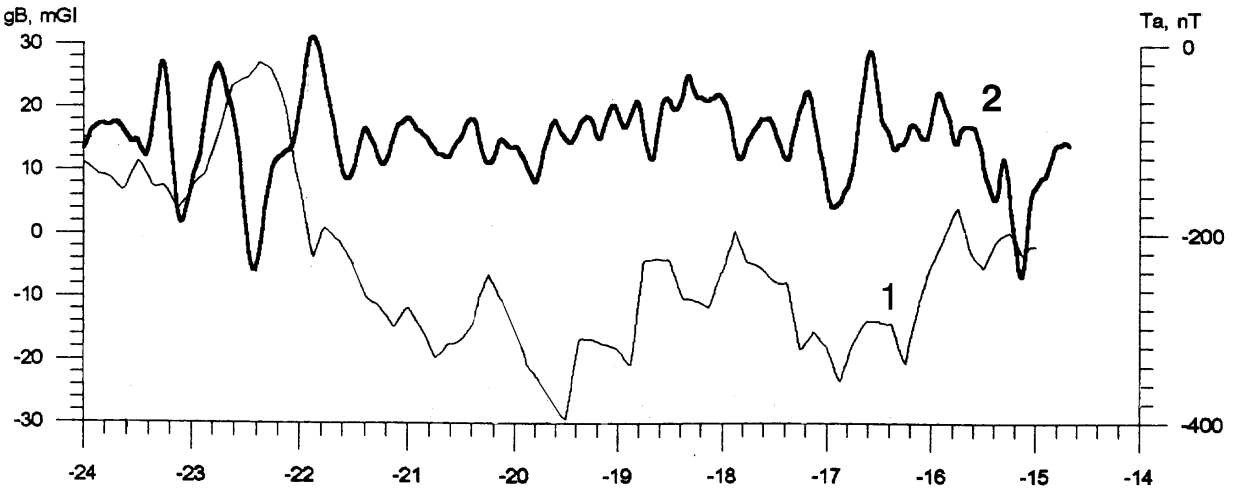

Figure 3. The geophysical profile across the Mid- Atlantic Ridge in area of Angolo-Brasilian geotraverse (South Atlantic), 1 - The resudial Bouguer anomalies and 2 - The magnetic anomalys.

serpentinized ultrabasite, as well as the basalts of the 2A layer were subjected to oxidation at low temperature which can reduce the intensity of magnetic anomalies.

The magnetic modelling was carried out on the basis of the seismic profiles using materials obtained from magnetic and gravimetric surveys carried out by the r/v VNIIO keangeologiya at the Canary-Bahama geotraverse and Angola-Brazilian geotraverse (Astafurova *et al.*, 1996), and at the Charlie-Gibbs transform fault on the Mid Atlantic Ridge (Mercuriev *et al.*, 2000). The computation of the effective magnetization was based on the joint decision of a direct and return task method using a generalized linear inversion.

For example, a lateral change in the effective magnetization during and average integrated density is shown in Figure 2. A comparison of lateral change with the effective magnetization during a change in the speed of spreading was modelled (Fig. 3). The following preliminary conclusions were based on the modelled data.

1. In a number of cases the correlation between increased magnetization and decreased density and symmetry of these zones in relation to an axis of the Mid Atlantic Ridge is marked.

2. As a general rule, the allocated zones correspond to sites with a sharp decrease in the instantaneous spreading rate.

The joint analysis of the results of geophysical modelling and geological data enables us to conclude that the allocated zones specify the discrete character of the MAR-spreading. During delays in spreading rate there is a decrease in the supply of basaltic lava to the rift valley floor and serpentinized protrusions are formed in the rift valley. Hydrothermal alteration of the upper mantle derived ultrabasic rocks took place as a result of contact with ocean water. Increased magnetization is probably connected with this process at the expense of formation of magnetite in serpentinites and a decrease in the integrated density associated with hydration of peridotite during serpentinization of the of the upper mantle.

Acknowledgements

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International Ridge-Crest Research: **Mid-Atlantic Ridge:**

A Structural and Geochemical Study of the Western Volcanic Zone, Iceland : Preliminary Results

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Introduction

Iceland was constructed over the past 16 Ma by basaltic to silicic volcanism occurring at the Mid-Atlantic Ridge, and is topographically elevated because of the thickened crust and volcanic material produced in association with the Iceland hot spot (Wolfe *et al*., 1997). Southwestern and south Iceland, as well as the northern Reykjanes Ridge (Fig. 1), consist of a complicated rift system composed of two overlapping spreading centres, the Western and Eastern Volcanic Zones. These volcanic zones are connected by a nascent transform fault, the South Iceland Seismic Zone (Einarsson, 1991). The Western Volcanic Zone is the older of the two rift zones having been active for the past 7 Ma. The Eastern Volcanic Zone in south Iceland, whose southern-most extension is the island of Surtsey, is suggested to be a propagating rift from central Iceland (Saemundsson, 1986).

The Reykjanes Ridge is directly connected to the Western Volcanic Zone. It is a slow spreading ridge which exhibits some of the characteristics of faster spreading ridges such as the absence of a deep rift valley and the presence of an axial ridge (Sempere *et al*., 1990). Its axis is 36 degrees oblique to the spreading ridge and is flanked by sub-parallel normal faults. The features of the ridge are best explained by the propagation of successive pulses of convecting hotspot material southward along the axis (Vogt and Johnson, 1975). The northern extent of the Reykjanes Ridge (63.00° - 63.80° N; Fig. 1) is a narrow belt of a series of en échelon ridges, superimposed on an elevated plateau (Johnson and Jakobsson, 1985).

The Western Volcanic Zone of Iceland can be divided into two structural segments, a southwestern part, the Reykjanes Peninsula (63.80° - 64.19° N), and a northeastern part (64.19° - 65.22° N). The Reykjanes Peninsula forms the transition between the Reykjanes Ridge and the active volcanic zones of Iceland and is characterized by a rather low topographic relief. Many investigators have sug-

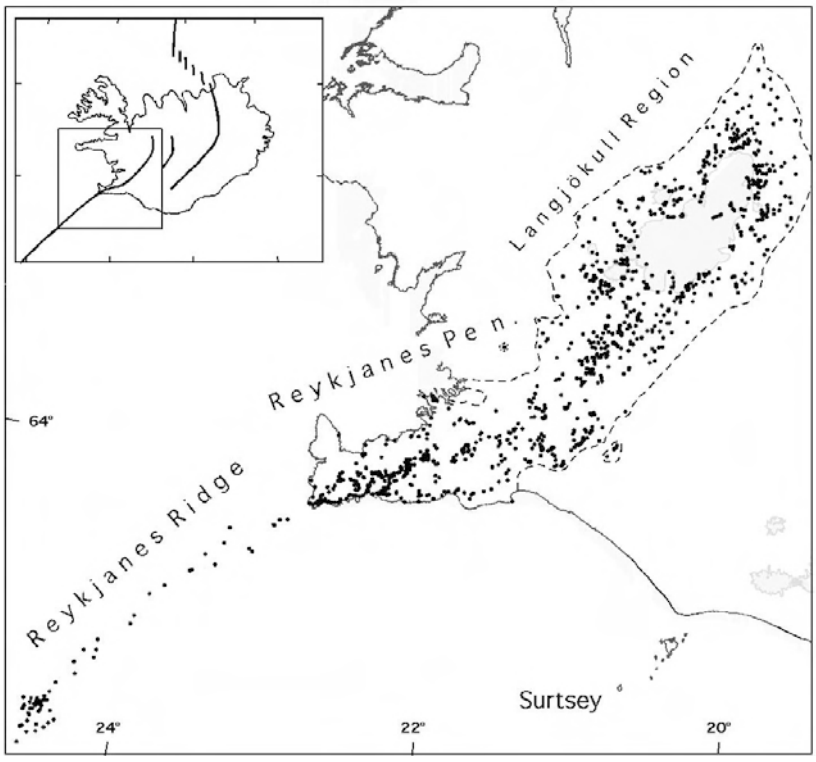

Figure 1. The Western Volcanic Zone of Iceland (within stipled area) and the northernmost Reykjanes Ridge, with location of sampling sites. The Western Volcanic Zone is divided into the Reykjanes Peninsula and the Langjökull Region. The insert map shows the axis of active (tholeiitic) rift zones in the Iceland area.

International Ridge-Crest Research: **Mid-Atlantic Ridge:** Jakobsson *et al.,* continued....

gested that the volcanic zone of the Reykjanes Peninsula as well as the elongate, constructional ridges observed on the Icelandic insular shelf are the surficial manifestations of the oblique spreading centre.

The northeastern part of the Western Volcanic Zone (64.19° - 65.22° N) in Iceland (Jóhannesson and Saemundsson, 1998), herein called the Langjökull Region, has a considerably higher relief than the Reykjanes Peninsula, and has an axis which is 30 degrees oblique to the spreading ridge. The Langjökull Region is cut by several shallow grabens, the most prominent one being in the southwestern part, and which appears to be part of the Thingvellir graben. The region has not received much attention from volcanologists and geochemists and it is among the least known parts of the volcanic zones of Iceland (Schilling *et al*., 1978; Sigurdsson *et al*., 1978; Hardarson and Fitton, 1997). Volcanic activity during Holocene has not been vigorous and it has been suggested that the Langjökull Region represents a dying rift zone, or that it is at a low in volcanic production (Saemundsson, 1986), being supplanted by the younger propagating Eastern Rift Zone.

The overall geochemistry of the Western Volcanic Zone of Iceland and the Reykjanes Ridge has been dealt with by many researches, notably J.-G. Schilling and his coworkers (Schilling *et al*., 1983). It was the focus of our work, however, to determine in detail the volcanic structure and geochemistry of the Langjökull Region, and especially to compare it to the Reykjanes Peninsula and the northernmost part of the Reykjanes Ridge (Fig. 1).

Collection of data

Volcanic formations from the Brunhes magnetic epoch (< 0.78 Ma) of the Langjökull Region (Jóhannesson and Saemundsson, 1998) and to some extent of the Reykjanes Peninsula, were mapped in the scale of 1:50 000 during the summers of 1994 to 1999. Aerial photographs of the whole region in the approximate scale of 1:36 000 were investigated prior to and after the field work. Samples were obtained from all exposed Recent eruption units and nearly all subaerial or subglacial Upper Pleistocene basaltic units which could be identified during the reconnaissance mapping (Fig.1). Intermediate units were not sampled to the same extent and the silicic rocks are subject to a special survey by K. Jónasson at the Icelandic Institute of Natural History (Jónasson, 2000).

An eruptive unit is defined as extrusives and shallow intrusions which apparently have formed in one volcanic eruption. The volume and relative age of each unit is determined, as is the morphology of the eruption site. In the absence of absolute dating, an attempt is made to divide the sub- and intraglacial volcanoes into three age groups, based on the degree of erosion. Several of the units were studied in detail and 12 eruption units were sampled extensively. Special care was taken to investigate if the many tuyas and large hyaloclastite ridges are monogenetic or not. A relatively large part of the Langjökull Region is covered by the Langjökull icecap (Fig. 1) and it is therefore fortunate that the subglacial bedrock topography has recently been investigated by radio echo soundings by Helgi Björnsson and his group at the University of Iceland, and the preliminary unpublished results made available to us (Björnsson, pers. comm., 1999).

Rock samples from the Reykjanes Peninsula, mainly collected in 1972 - 1977 and 1980-1985 by the first author, are also used in the present study. Rock dredges from the crest of the northernmost part of the Reykjanes Ridge, collected by the USNS Lynch in 1971 and 1973, and by the R/V Hafthor in 1975 (Johnson and Jakobsson, 1985), and the R/V Bjarni

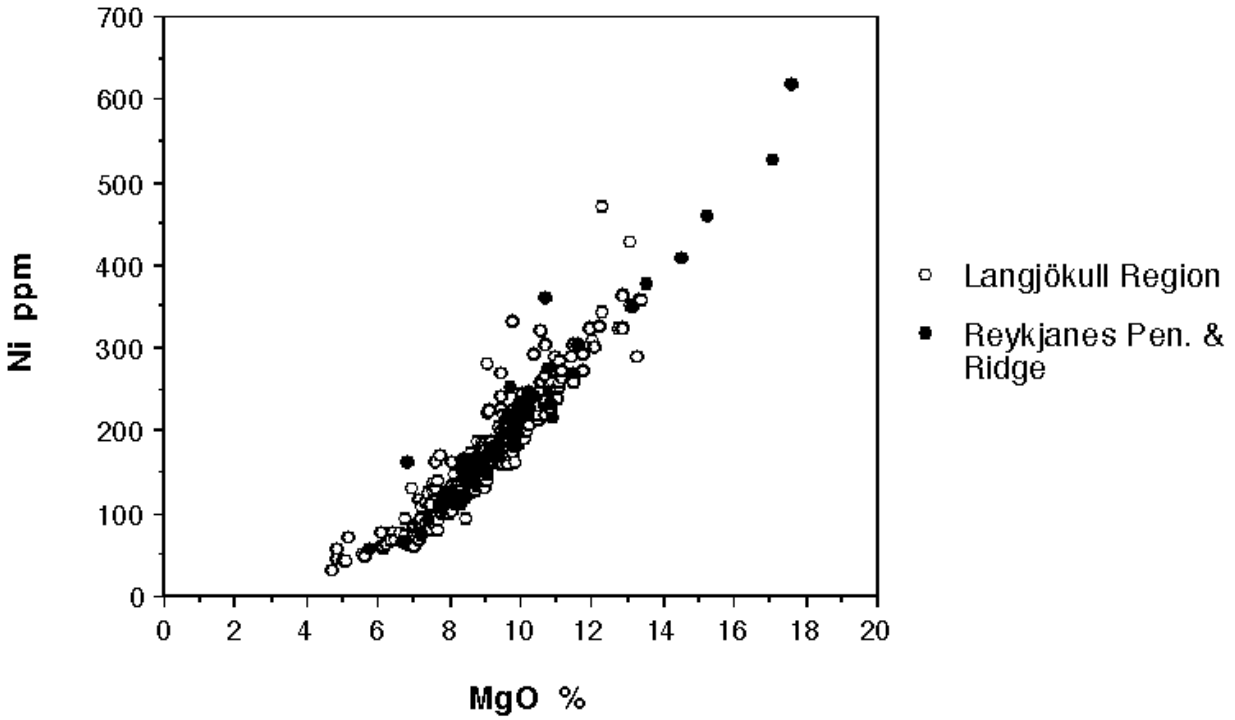

Figure 2. Plot of Ni versus MgO (wt.%) for basaltic rocks from the Langjökull Region and the Reykjanes Peninsula. Each point represents one chemical analysis of an eruption unit, as in the following plots.

Saemundsson in 1990 and R/V Arni Fridriksson in 1991 (Walker, 1992; Walker and Jakobsson, 1994), were also used for comparison. Rock samples from the volcanic islands of Eldey and Geirfugladrangur on the Reykjanes Ridge were collected in 1979 and 1982. The total amount of suitable rock samples from the three regions (the Langjökull Region, the Reykjanes Peninsula and the Reykjanes Ridge) available for the present study, is now 1157. The samples are stored in the collections of the Icelandic Institute of Natural History in Reykjavik.

New major element and trace element analyses of 438 samples were obtained by XRF at the Geochemical Laboratories of McGill University, Montreal. These were mainly from basaltic eruption units from the Langjokull Region and to a lesser degree from the Reykjanes Peninsula and the Reykjanes Ridge. Care has been taken to ensure an even distribution in space and time. The rock samples are generally very fresh, as demonstrated by the Fe_2O_3/FeO ratio, which averaged 0.22. The LOI value was generally below 0.1 %.

In addition 132 chemical analyses of basaltic rocks from the Reykjanes Peninsula and the Reykjanes Ridge from three published papers (Jakobsson *et al*., 1978; Johnson and Jakobsson, 1985; Levi *et al*., 1990) and three university dissertations (Hardardóttir, 1983; Walker, 1992 and Sigurdsson, 1994), as well as unpublished XRF analyses acquired by Dr. C. L. Walker at the University of Leeds (Walker and Jakobsson, 1994), are incorporated in the data base. The older chemical data compared very well with the new analytical data set and appeared to be of similar quality.

Structure

The eruption units of the Western Volcanic Zone can be divided morphologically into subaerial pahoehoe lava shields and aa lavas (Jakobsson *et al*., 1978), and sub- or intraglacial tuyas (table mountains) and hyaloclastite ridges (Chapman *et al*., 2000). The main part of each lava shield and tuya appears to have erupted from one crater, whereas the fissure lavas and the sub- or intraglacial ridges clearly erupted from fissures. However, it seems likely that the shields and the tuyas, in the beginning, erupted from fissures, albeit short, since the volcanic zones are dominated by extensional tectonics.

The volcanism in the Langjökull Region appears to have been characterized by relatively large eruptions for a considerable time period, at least during the three last glaciations and interglacials. The volcanic activity appears to have been similar during this period with relatively few but voluminous eruptions and it is therefore probably not correct to label it as a dying rift zone. Preliminary results indicate that a comparatively large part

International Ridge-Crest Research: **Mid-Atlantic Ridge:** Jakobsson *et al.,* continued....

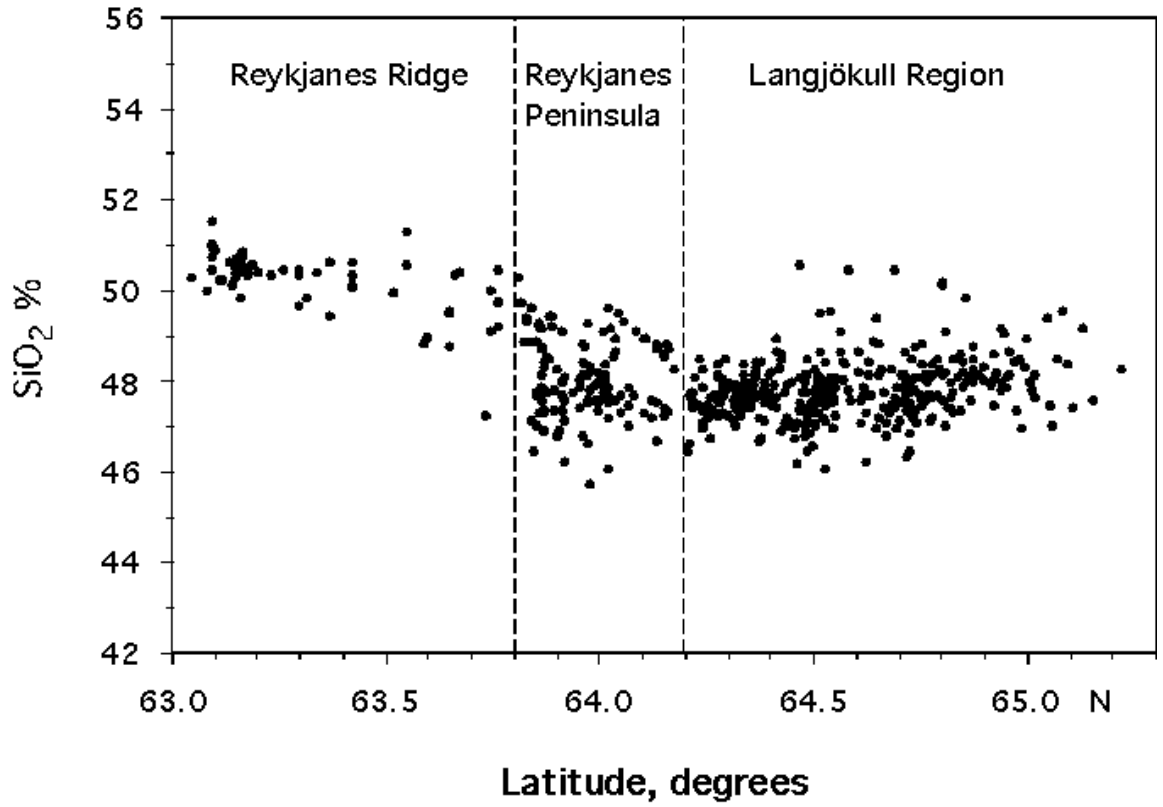

Figure 3. Plot of SiO_2 (wt.%) versus latitude for basaltic rocks from the Reykjanes Ridge, Reykjanes Peninsula and the Langjökull Region.

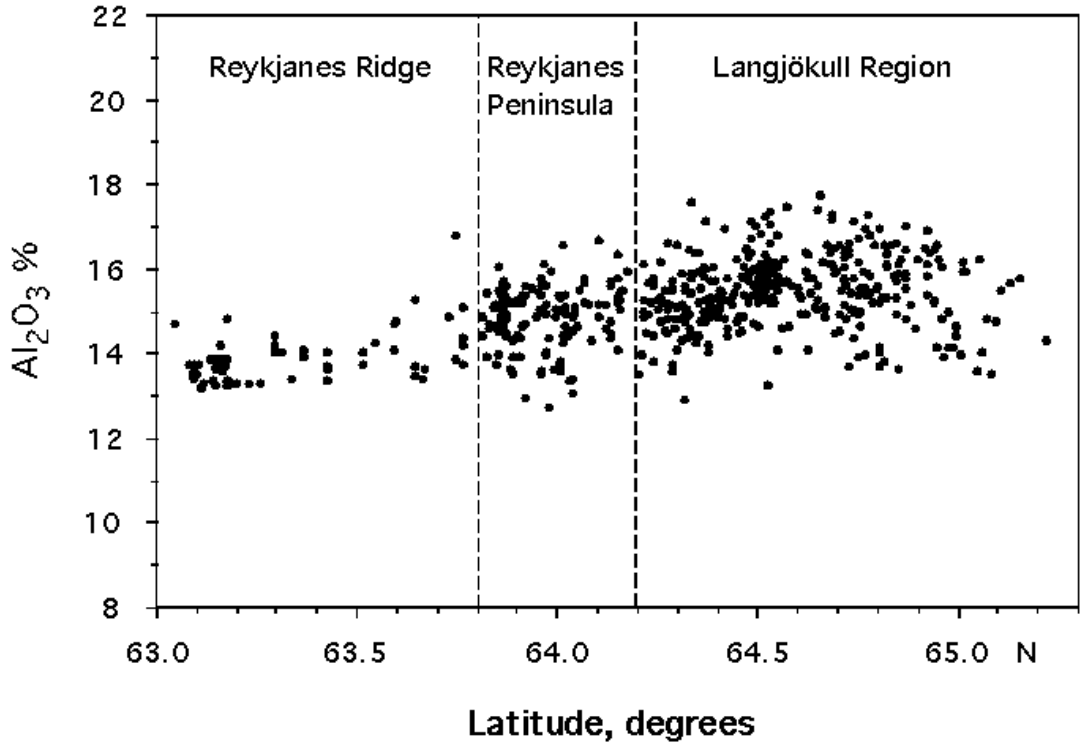

Figure 4. Plot of Al_2O_3 (wt.%) versus latitude for basaltic rocks from the Reykjanes Ridge, Reykjanes Peninsula and the Langjökull Region.

of the 374 identified units have a volume above 2 km^3, and units smaller than 0.5 km^3 appear relatively rarely. The largest eruption unit is the tuya Eiríksjökull with a volume of about 50 km3 and it is therefore the largest eruption unit so far identified in Iceland. The Reykjanes Peninsula, on the other hand, is characterized by numerous smaller eruptions, only rarely does the volume exceed 2 km^3, the largest being about 7 km^3 (Jónsson, 1978; Jakobsson *et al*., 1978).

The Reykjanes Peninsula, as most other parts of the volcanic zones in Iceland, is characterized by structural units called volcanic systems, formerly called volcanic fissure swarms (Jakobsson *et al*., 1978). These volcanic systems are arranged subparallel or in an en échelon fashion within the volcanic zones. Volcanic production is generally highest in the central part of each system. One volcanic system, Hengill, at the junction of the Reykjanes Peninsula and the Langjökull Region, has developed a central volcano (volcanic centre) with an associated geothermal system and intermediate to silicic volcanism (Hardardóttir, 1983; Walker, 1992). To the east of Hengill is the extinct Pleistocene central volcano Hveragerdi (Walker, 1992). It has been suggested (Johnson and Jakobsson, 1985) that the crest of the Reykjanes Ridge on the insular shelf between 63.00° and 63.80° N, is made up of eight volcanic systems, similar to those on the western Reykjanes Peninsula. The elevation of the central part of a volcanic system is analogous to the elevated central portion of Mid-Atlantic ridge segments as reported by Macdonald (1986).

The presence of distinct volcanic systems is more difficult to pinpoint in the Langjökull Region than in most other parts of the volcanic zones in Iceland. There appear to be two active volcanic systems with diffuse boundaries, the Prestahnúkur volcanic system at the western edge of the Langjökull ice sheet, and the Hveravellir volcanic system at the eastern edge of the ice sheet. A nascent (?) central volcano is situated in the southern end of the Prestahnúkur system and a well-developed central volcano, Hveravellir, has been developed at the centre of the Hveravellir system. Field work indicates that there may be a few other extinct volcanic systems in the region, which have not developed central volcanoes.

Geochemistry

The geochemical survey shows that only rocks belonging to the tholeiitic series were produced in the Langjökull Region during the Brunhes magnetic epoch, as on the Reykjanes Peninsula and the Reykjanes Ridge. No traces of alkalic or transitional alkalic rocks have been found as in the Eastern Volcanic Zone (Jakobsson, 1980).

The basalts (> 4.5 wt.% MgO) of the Langjökull Region fall into two main groups, olivine tholeiites and tholeiites. A majority of the eruption units are olivine tholeiites, with about 8.5 to 11 wt.% MgO (Fig. 2). The most primitive olivine tholeiites carry ubiquitous chromian spinel and forsteritic olivine, although they appear not to be true picrites, as found on the Reykjanes Peninsula and the northernmost Reykjanes Ridge (Johnson and Jakobsson, 1985). Intermediate eruption units, mainly basaltic icelandites, are very rare outside the central volcanoes, and silicic rocks are only found in the cores of the central volcanoes of the Langjökull Region and the Reykjanes Peninsula.

The field relations and petrographic data are in the process of being integrated with the geochemical data. Chemical analyses of rocks where petrographic and field relations indicate a cumulation of olivine or plagioclase macrophenocrysts, have been omitted during this process. The chemical analyses which have been utilized are therefore considered to represent liquid compositions. It is evident that many of the basaltic eruption units, notably the larger ones, show systematic variations in major element and trace element content, in some cases of the same nature as those found in tuyas by Moore and Calk (1991).

The overall major and trace element chemistry of the Langjökull Region is similar to that of the Reykjanes Peninsula (Jakobsson *et al*., 1978; Gee *et al*., 1998), but more distant from the basalts of the Reykjanes Ridge (Schilling *et al*., 1983). The basalts of the Langjökull Region have generally lower Si, and higher Ti, P, Nb, Zr, Sr, Rb and Ba than the Reykjanes Ridge rocks, as can be detected in the data of Schilling *et al*. (1983).

General systematic distribution patterns along the Mid Atlantic Ridge between 63.00° N and 65.22° N are indicated by the present data set. Examples will be given here with regard to SiO_2 and Al_2O_3. Figure 3 shows the variation of SiO2 content versus latitude of the investigated basaltic rocks, and figure 4, the Al_2O_3 content versus latitude. A striking discontinuity is apparent in the SiO_2, where the Reykjanes Peninsula appears to act as a transition zone between the Langjökull Region and the Reykjanes Ridge. Other major elements, as FeO-total, also appear to separate the basaltic rocks into two suites which overlap in the Peninsula. The average content of Al_2O_3 (Fig. 4) appears on the other hand to rise constantly throughout these segments

International Ridge-Crest Research: **Mid-Atlantic Ridge:** Jakobsson *et al.,* continued....

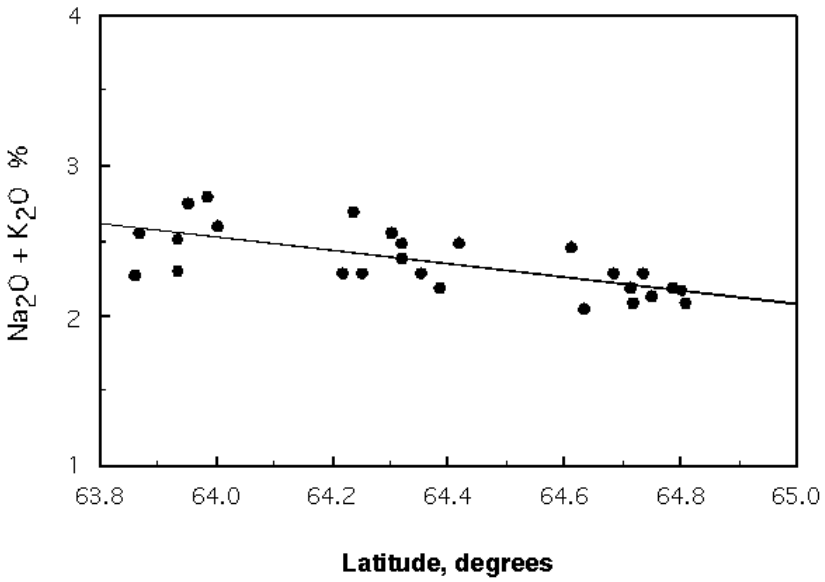

Figure 5. Plot of Na_2O plus K_2O (wt.%), at fixed MgO content (7.5 wt.%), of volcanic glass from tuyas and hyaloclastite ridges on the Reykjanes Peninsula and the Langjökull Region.

of the Mid Atlantic Ridge towards the centre of the Icelandic mantle plume. The MgO content shows a similar trend.

Some systematic trends in glass analyses from tuyas and hyaloclastite ridges are apparent within the Western Volcanic Zone when groups of samples from each volcanic centre are compared at a constant level of differentiation as fixed by MgO content (7.5 wt. %). At fixed MgO content the glasses show a northern increase in SiO_2 and CaO and a decrease in P_2O_5, K_2O, TiO_2, Na_2O and FeO, in that order of degree of correlation (Fig. 5). These are generally the same trends as seen in the whole rock chemistry in these two regions.

Analyses of the sulfur content of volcanic glass gives some indication of the confining pressure at the time of eruption (Moore and Calk, 1991). Lava that erupted beneath an overburden of ice or water and was quenched rapidly, will retain more of its original sulfur content as compared to lava that is erupted subaerially. Many tuyas contain glass with high sulfur content toward the bottom, and these volcanic centres apparently underwent little degassing in their early stages, but the tuyas all become more extensively degassed toward the top as they emerged above the ice. Some tuyas are remarkably degassed during their entire history as based on samples collected on their flanks. Two large tuyas that are remarkably degassed even to the bottom are Eiriksjökull and Hlödufell.

Acknowledgements

The first author was ably assisted in the field, by Thráinn Fridriksson, B.S., Hallgrímur D. Indridason, B.S., and Thorbjörn Rúnarsson, B.S., during the summers of 1994 to 1999. Dr. C. L. Walker contributed in 1994, then at the University of Leeds, United Kingdom, with major and trace element chemical analyses of rocks from the Reykjanes Ridge and the Hveragerdi area, for which we are grateful. Dr. Helgi Björnsson, at the Science Institute, University of Iceland, is thanked for making available preliminary results of the bedrock topography of the Langjökull icecap. This project was supported by grants from the Icelandic National Science Fund, the U. S. Naval Oceanographic Office and the Office of Naval Research, Washington, USA.

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MOMAR Project

The objective of the MOMAR project is to promote international cooperation to establish long-term multidisciplinary MOnitoring on the Mid-Atlantic Ridge, with a special emphasis in the Azores region. MOMAR will combine long-term monitoring of biological and physico-chemical activity at hydrothermal vents, with broader scale monitoring of tectonic, volcanic and hydrothermal processes at the ridge axis.

MOMAR workshop report:
October, 1998, 100 Pages
To obtain a copy contact the InterRidge Office

MOMAR webpage:
http://triton.ori.u-tokyo.ac.jp/~intridge/momar/index.html

International Ridge-Crest Research: **Archaean Park Project:**

The Archaean Park Project:
"Interactions Between Subsurface -Vent Biosphere and the Geo-Environment"

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Introduction

A major ridge-related research project, funded by Special Coordination Fund of the Science & Technology Agency (STA), Japan, starts in April 2000. The project entitled "Archaean Park; International research project on interaction between sub-vent biosphere and geo-environment" is a five year project (2000 – 2004) with mid-term re-evaluation due in 2002. The project will inherit the human and scientific resources of the "Ridge Flux Project" (1993-1998) and will expand the horizon of the research towards sub-vent biosphere. About 15 main research organizations will be involved in the research together with several others which may temporarily participate in the project.

Purpose of the Research

The convection of hydrothermal fluid within the oceanic crust gives rise to various sub-surface environments near hydrothermal vents. The deeper portion of the system is likely to be hot and strongly-reducing due to hydrogen, methane and hydrogen sulfide gases dissolved in the fluid. Such environmental conditions are analogous to the site of origin and early evolution of life during the Archaean age. Since most of Domain *Bacteria* and Domain *Archaea* near the root of the Universal Tree are hyper-thermophilic, we named our proposal as "The Archaean Park Project". The research conducted under the umbrella of the Archaean Park project may lead us to discover organisms analogous to *"Our Common Ancestor",* which may have evolved in similar environments. This type of habitat also presents and opportunity to explore the temperature limit for the survival of micro-organisms. We can access such subsurface environments, within the earth's crust, at shallow depths from the sea floor in hydrothermal vent areas.

The upper part of the circulation system within the crust will become oxidizing due to invasion of oxygenated seawater. Supply of free oxygen to the metabolic cycle of micro-organisms such as sulfur-oxidizing and methane-oxidizing bacteria will greatly enhance their growth rate. Therefore, exploration of the oxidation/reduction front is essential to estimate the total biomass which is supported by chemo-synthesis based mostly on endogenic energy and material from the solid earth. We noticed through long-term seafloor monitoring at southern East Pacific Rise (EPR) that the ocean tides act as a pump to move fluid back and forth, and consequently modify the redox front into a wide zone within the oceanic crust. This hypothesis will be tested by monitoring of the sea floor.

It is worthy to point out that the nature and life span of the Sub-Surface Biosphere is controlled by fluctuation of geologic phenomena such as tides, evolution of magma, and regional stress field. This is because the supply of nutrients, temperature variation, and other environmental changes to the biosphere are a function of such fluctuations. Therefore, the oceanic crust and embodied Sub-Vent Biosphere are interrelated and the synergy between micro-biology and geo-sciences are vital to understanding the system.

Research Plan

The major experimental set up will involve a tethered submarine drilling system such as DBMS (Deep-sea Boring Machine System; Japan) or PROD (Portable Remotely Operated Drill; Australia) for direct sampling of micro-organisms, rocks and fluids from vent sites. Several methods to evaluate the contamination of surface

bacteria will be applied during sampling. The drilled holes will be used for various long-term measurements and *in situ* monitoring. Extensive geophysical, geological and geochemical surveys will be conducted to map and monitor the drill site to delineate the lateral extent and the structure of the biosphere, as described in some detail below. The effect of tides on temperature, fluid flow, and permeability will be evaluated through seafloor monitoring. The dispersion of hydrothermal plumes will be monitored to know the influence of biomass ejected into the ocean.

The target sites for the Archaean Park project exist, both in the eastern and western Pacific basins. This is because the generation, evolution, and dispersion of the Sub-Vent Biosphere will be best described if we compare the long-lived mid-ocean ridge system in eastern Pacific with the isolated cases of sporadic volcanic edifice in the west.

We have two candidate sites in western Pacific; Myojin Knoll caldera (D=1400m, Tmax=278°C) and Suiyo Seamount (D=1370m, Tmax=311°C) both in Izu-Bonin Arc. We also believe that the best site in eastern Pacific could be the Axial Seamount Caldera (D=1590m, Tmax=330°C), in Juan de Fuca Ridge, because of its active magmatism, furnished data sets, proven Sub-Vent biosphere, and good access to the site. Observatory team through UJNR framework, UK DEOS Observatory, and others including LExEn program of NSF. We will start with development of sampling techniques and testing them at subaerial geothermal site(s) where we may expect sub-surface microbes. We are planning to drill shallow hole(s) into geothermal areas as an analogy of seafloor systems.

Four Sub-Themes

There are four sub-themes in the Archaean Park Project:

1) Physical processes of hydrothermal circulation systems: High-resolution mapping, imaging, and long-term monitoring of the entire hydrothermal system, mainly by geophysical methods.
2) Observation of the chemical environment of the Sub-Vent biosphere: Analyses of entire constituents of the fluid and monitoring of long-term and tidal variations in sub-seafloor and plume environments.
3) Microbiology and molecular ecology in Sub-Vent Biosphere: Development of microbial sampling and treatment techniques, exploration and measurement for molecular diversity and ecology of microbial communities.
4) Interaction between microbial and geological processes: Identification of bio-geo-interaction using micro-analytical techniques in hydrothermal systems which have existed throughout the history of the Earth.

Following is a tentative list of individual themes and researchers. Please note that some of the themes may be postponed or cancelled due to various reasons.

1. Physical processes of hydrothermal circulation system (sub-leader: N. Seama; Chiba Univ.)

Structure and extent of hydrothermal circulation systems

- Controlled-source electro-magnetic survey (N. Seama; Chiba Univ.)
- Small-aperture hydrophone array measurements (A. Nishizawa; HDJ)
- High-resolution side-scan sonar survey (Tokuyama; ORI, Uni. Tokyo)
- Shinkai 2000 submersible observation and mapping

Monitoring of time-dependent variation in physical parameters

- Dense heat-flow and temperature measurements (M. Kinoshita; Tokai Univ.)
- Flow measurement with Medusa at drill holes (A. Tanaka; GSJ)
- Flow measurement with heat-pulse method at recharge zone (M. Taniguchi; Nara Univ. of Ed.)
- Numerical modelling of phase-separated system (S. Yoshida, Nagoya Univ.)

2. Observations of the chemical environment of the Sub-Vent Biosphere (sub-leader: J. Ishibashi; Kyushu Univ.)

Lateral variation in chemistry of low-temperature diffuse flows

- Time/space variation in sulfur isotopes on Osmo-sampler fluid (J. Ishibashi; Kyushu Univ.)
- Development of gas-tight fluid sampler and isotopic analyses line (T. Gamo; Hokkaido Univ.)

Chemical sensing and monitoring of hydrothermal plumes

- *In-situ* use of chemical analysers and sensors to monitor plumes (K. Shitashima; CRIEPI)
- Determination of isotopic fractionation of microbial reactions (U. Tsunogai; Hokkaido Univ.)
- Modelling of hydrothermal plumes and propagation of biomass (K. Okamura; Nagoya Univ.)

Sea-floor monitoring station for chemical parameters

- Vent-cap monitoring station for oxidation potential and particle size (K. Nakamura; GSJ)
- Potentio-stat measurement of chemical species in fluid (K. Nakamura; GSJ)

International Ridge-Crest Research: **Archaean Park Project:** Urabe *et al.* continuted...

3. Microbiology and molecular ecology in the Sub-Vent biosphere (sub-leader: A. Maruyama; NIBH)

Development of microbial sampling and treatment techniques

- QA/QC of contamination check for microbial sampling (T. Naganuma; Hiroshima Univ.)

Molecular diversity and ecology of microbial communities

- Molecular diversity, population analysis and correlation between microbiological and geological variations (A. Maruyama, S. Hanada, H. Yagi; NIBH)
- Tidal pumping and shift in the redox front in the Sub-Vent biosphere (T. Naganuma; Hiroshima Univ.)
- Physiology and ecology of gas-utilizing microbes in hydrothermal plumes (K. Nanba; Univ. Tokyo)
- Population and viability of microbes at cellular levels (K. Kato; Shinsyu Univ.)
- Microbial methane oxidation processes (M. Utsumi; Univ. Tsukuba)

In-situ measurement of microbial ecosystem

- *In situ* measurement of microbial population and diversity (T. Naganuma; Hiroshima, Fujii; U. Tokyo)
- *In situ* incubation of sub-vent microbes at the seafloor (T. Kuwahara; U. Tsukuba)
- *In situ* measurement of microbial population and activities (A. Maruyama; NIBH)

Bio-/ gene-resources from sub-vent biosphere

- Special incubator for hyperthermophiles and discovery of primitive life (A. Yamagishi; Tokyo-Pharmaceutical Univ.)
- Hunting of unknown microbes: molecular/cellular detection, isolation, incubation and taxonomy (S. Hanada, A. Maruyama; NIBH)
- Molecular specification and incubation of sulfur reducing microbes (M. Fukui; Tokyo-Metropolitan Univ.)
- Direct gene sequencing and functional prospecting (Y. Kawarabayashi; NIBH)
- Direct protein sequencing and functional prospecting (T. Kurusu; Univ. Ibaraki)
- Viral particle detection and functional prospecting (H. Chiura; Intern. Christ. Univ.)

4. Interaction between microbial and geological processes (sub-leader: K. Marumo; GSJ)

Traces of microbial activity recorded in minerals and fluids

- Micro-analyses of sulfur isotopes, fractionation of sulfide minerals (T. Kakegawa; Tohoku Univ.)
- New sampling technique of microorganisms using fluid inclusion (T. Sawaki; GSJ)
- Isotopic analyses on organic materials of microbial origin (H. Naraoka; Tokyo-Metropol. Univ.)

Bio-mineralization in sub-vent biosphere

- Microorganism/mineral interaction (T. Murakami; Univ. of Tokyo)
- Trace element and isotopic fractionation between cells and minerals (K. Marumo; GSJ)

Stability and synthesis of organic matter in water-rock reactions

- Composition of amino-acids in hydrothermal fluids (H. Kawahata; GSJ)
- Synthesis of amino-acid on the surface of sulfides (T. Kakegawa; Tohoku Univ.)

Summary

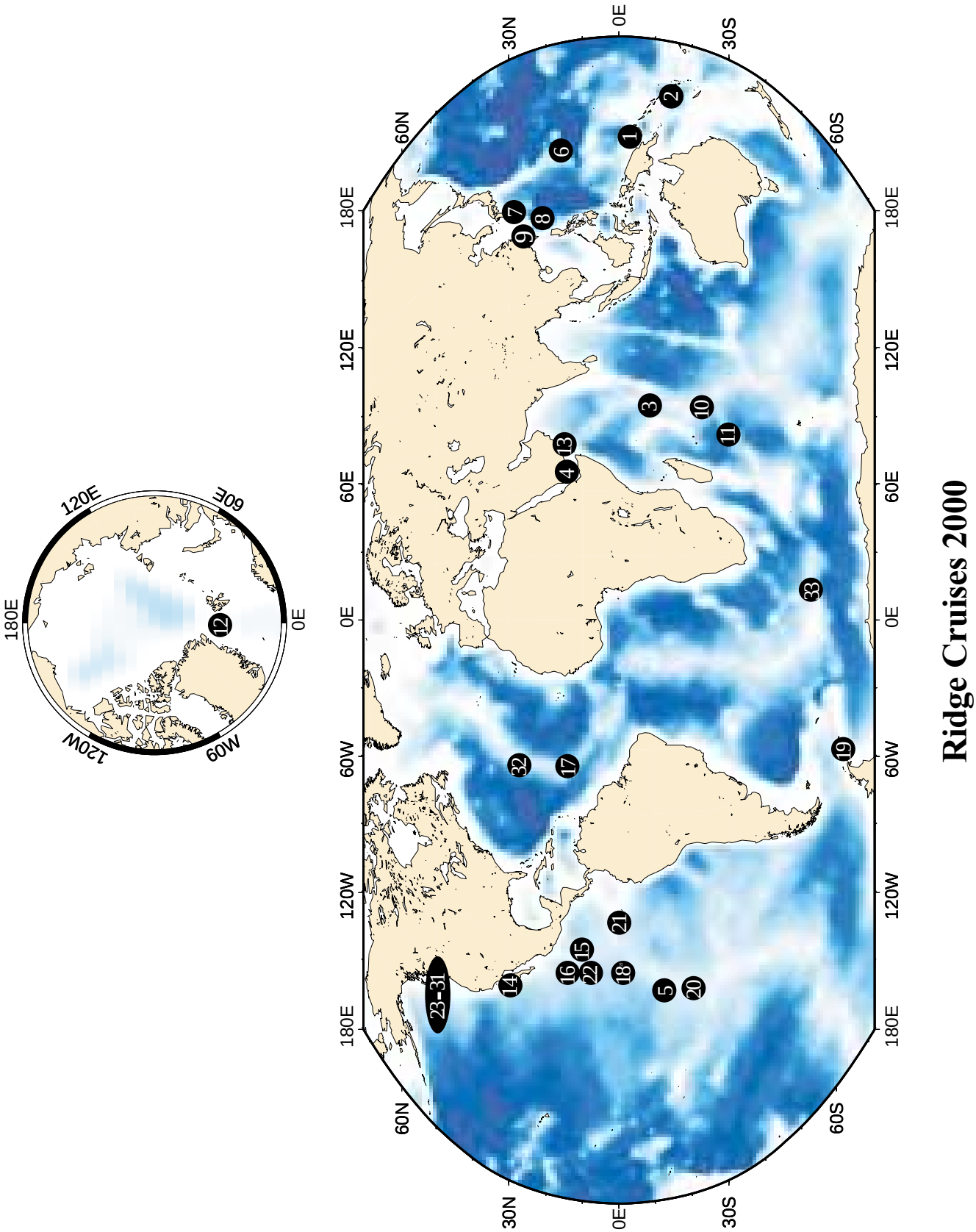
This article is a brief summary of the research plan of the Archaean Park Project. It is still flexible and will evolve over time as we proceed with the research. So, we welcome inputs from ridge-related researchers of various disciplines. The latest research plan can be found on our home page (http://www.gsj.go.jp/~marumo/). Currently, the home page is in Japanese only but the English version is under construction.

Editor's Note

The articles appearing in *InterRidge News* are intended to disseminate as quickly as possible preliminary results on recent mid-ocean ridge and back arc ocean cruises. Articles are **not** peer-reviewed and should not be cited as peer reviewed articles. The InterRidge office does edit the articles and strives to correct any grievous errors however all responsibility for scientific accuracy rests with the authors. Comments on articles that have appeared in *InterRidge News* are always welcome.

Agnieszka Adamczewska
InterRidge News Editor

World Ridge Cruise Map, 2000



Map No.	Country	PI	Institution	Cruise ID/Location	Research Objectives	Ship	Dates
1	Australia	Dekker, Binns	CSIRO	Basin, Bismark Sea, Papua New Guinea	Microbe collection for minerals bioprocessing; trials of bottom-tow, instruments for exploration and minearl resource assessment; searching for new hydrothermal sites	Franklin	14 Apr - 4 May '00
2	Australia	McInnes	CSIRO	New Ireland and Solomon and Forearc Basins	Investigation of hydrothermically active submarine arc volcanoes	Franklin	May 5-24 '00
3	France	Dyment, Hemond	IUEM - UBO	GIMNAUT: Central Indian Ocean	Intercalibration of magnetic and radiometric dating of young basalt, Magnetic structure and properties	L'Atalante, Nautile	27 May - 21 Jun '00
4	France	Leroy, Gente	IUEM - UBO	ENCENS-SHEBA: Gulf of Aden, East Sheba Ridge	Multi-narrow beam mapping and MCS seismics	Marion Dufresne	Jun 3 '00 - Jul 17'00
5	Germany	Devey, Villinger	U Bremen	EXCOII Leg 1 and 2, EPR at ca. 13 S	Geophysics (mapping, simple seismics and heat flow) and rock, sediment, and pore water sampling on the EXCO corridor from 0-8 Ma	Sonne	Dec. 29 '99 Jan. 27 '00; Jan. 28 - Feb 29' 00
6	Japan	Gamo	ORI	Mariana Trough	Search of active hydrothermal area and geological observation of the lower crust outcrops by using ROV Kaiko	Kairei ROV Kaiko	May 6 '00 - Jun 11'00
7	Japan	Kato	JAMSTEC	Southern Okinawa Trough	Seabottom observation and sampling by submersible Shinkai 2000	Natsushima Shinkai 2000	May 10 '00 - May 20 '00
8	Japan	Hashimoto	JAMSTEC	Southern Okinawa Trough	Biological observation and sampling by submersible Shinkai 2000	Natsushima Shinkai 2000	May 21 '00 - Jun 3 '00
9	Japan	Matsumoto	JAMSTEC	Southern Okinawa Trough	Seabottom observation and sampling by submersible Shinkai 6500	Yokosuka Shinkai 6500	Jul 21 '00 - Aug 15 '00

10	Japan	Hashimoto	JAMSTEC	Rodriguez Triple Junction	Biology and geochemistry of hydrothermal areas	Kairei, ROV Kaiko	Aug. 11 - Sep. 3 '00
11	Japan	Kikawa	JAMSTEC	SW Indian Ridge	Surveying outcrops of lower oceanic crust	Kairei, ROV Kaiko	5 -29 Sep.
12	Japan-Russia	Tamaki, Cherkashov	ORI, VNIIOkeangeologia	Knipovich Ridge	Deep-tow mapping, sampling, CTD, OBS	R/V Logachev	Sep 1 - Sep 25 (Tentative dates)
13	Japan	Fujimoto Tamaki	Tohoku University	Gulf of Aden	Seabeam, sampling, CTD, OBM, Geology, geophysics, geochemistry, paleoclimate	R/V Hakuho-maru	4 Dec '00 - 12 Jan '01
14	USA	Cary, Luther, Reysenbach	U. Delaware, Rutgers	EXTREME 2000, Guaymas Basin LEXEN	Microbiology centered on diffuse flow chimney environments	Atlantis, Alvin	Jan. 12-23 '00
15	USA	Cochran, Fornari	Lamont-Doherty	9 deg 35'-38'N EPR	Conduct near bottom geophysical data collection on closely spaced E-W lines using near bottom continuous gravity, maggie and EM2000 mb	Atlantis, Alvin	Jan 27 - Feb. 9 '00
16	USA	Webb, Evans	SIO, WHOI	9 deg 50'N EPR	Hydrothermal Structure: A Magnetometric Resistivity Survey	Melville	Feb. 17 - Mar. 11 '00
17	USA	Smith	WHOI	Mid-Atlantic Ridge	Recover North Atlantic Hydrophone Acoustic Array	Knorr	Feb. 23- Mar. 20 '00
18	USA	Fornari	WHOI	AHA cruise (Autonomous Hydrophone Array), East Pacific Rise, 20 deg N-26 deg S	Carry out near-bottom investigations using Seabeam, DSL-120 sonar, Argo-II, dredging, rock coring, and CTDs over 4 -5 areas suspected of having recent volcanic eruptions based on NOAA Autonomous Hydrophone Array	Melville	Mar 24 - May 10 '00

Map No.	Country	PI	Institution	Cruise ID/Location	Research Objectives	Ship	Dates
19	USA	Christeson, Dalziel, Nakamura	UTIG	Bransfield Strait, Antarctica	Ocean Bottom Seismograph refraction profiling for crustal structure in Bransfield Strait, West Antarctica	N.B. Palmer	April '00
20	USA	Lutz	Rutgers	EPR		Atlantis, Alvin	April 9-27, 2000
21	USA	Sinton, Detrick	U. Hawai, WHOI	Galapagos	Ocean bottom Seismograph refraction profiling, multi-channel seismics and petrological dredging of the Galapagos spreading center to study its interactions with the Galapagos hotspot	Ewing	April 2- May 21, '00
22	USA	Manahan, Cary, Felbeck	USC, Delaware, SIO	9 deg N EPR	Dispersal mechanisms and reproductive strategies of vent crabs; Recover live Alvinalla pompejana and perform physiological experiments on board ship using a recently developed pressurized and heated collection device.	Atlantis, Alvin	May 2 -28 2000
23	USA	Delaney	UW	Juan de Fuca		Atlantis, Alvin, JASON	Jun 10 - Jul. 11 '00
24	USA	Trehu	OSU	Juan de Fuca	MCS and OBS	Thompson, JASON	Jun 23 - Jul 7 '00
25	USA	Plumley, Van Dover, Seewald	U. Alaska, William & Mary, WHOI	Juan de Fuca	Search for photosynthetic bacteria at vents using a variety of methods to test the hypothesis that ambient light at vents ma support geothermally driven photosynthesis or photo-assisted energy transfer, including pigment extractions and analysis, characterization of fluorescence spectra of microbial cells associated with hydrothermal substrates and fluids, as well as molecular and culture techniques.	Atlantis, Alvin	Jul 16 - 28 2000

26	USA	McDuff	UW	Juan de Fuca	Heat Flux	Thompson, ABE	Jul 10-28 2000
27	USA	Carson, Kastner	Lehigh, SIO	Juan de Fuca		Atlantis, Alvin	Aug. 2-11 2000
28	USA	Fisher	UCSC	Juan de Fuca	SCS & Heat Flow	Thompson, JASON	Aug. 21 - Sep. 20 '00
29	USA	Delaney	UW	Juan de Fuca		Atlantis, Alvin, JASON	Jun. 10 - Jul. 11 '00
30	USA	Levin	SIO, NOAA	Juan de Fuca, Methane Seep		Thompson, JASON	Sep. 23 - Oct. 1 '00
31	USA	Rona	Rutgers	Juan de Fuca	Acoustic imaging of hydrothermal flow regimes (buoyant plumes and diffuse flow) in coordination with in-situ flux	Thompson, JASON	Oct 2-10 2000
32	USA	Blackman	SIO	Mid-Atlantic Ridge - 30 deg N	Use submersible, sonar & video mapping, deep-tow gravity profiles and oriented samples to determine the structure and evolution of the oceanic core complex on the inside corner of the RTI	Atlantis, Alvin, Argo-II, DSL-120	Nov 10- Dec. 15 '00
33	USA	Dick, Lin	WHOI	Western part of the South West Indian Ridge	Rock dredging and geophysical survey of an oblique section and adjacent segments of the SWIR	Knorr	Dec. 8 '00 - Jan. 21 2001

National News....

Canada: CanRidge

CanRidge: now a funded programme

Ridge crest research in Canada received a major boost this month with the awarding of a 4 year NSERC Collaborative Research Opportunities grant to a group of 10 university researchers* led by Kim Juniper of the Université du Québec à Montréal. The CanRidge programme focuses on the Juan de Fuca Ridge and is constructed around three primary themes:

1) Biomineralization, bioweathering and the history and continuity of mineral deposition.
2) Controls on faunal and microbial colonization, succession and diversity
3) Landscape scale dynamics: the vent field ecosystem

A fourth theme - the biodiversity of the vent system - will incorporate information from the three studies to model the local and regional scale of diversity patterns observed on Juan de Fuca Ridge. Work within all themes will exploit the unique scientific opportunities presented by the rapidly evolving Axial Volcano vents and the more 'steady state' Endeavour Segment vent fields.

Seafloor sampling and experimental work will use the ROPOS remotely-operated vehicle in collaborative cruises with NOAA and University of Washington investigators. At Endeavour Segment, surface cruises with the Canadian research vessel John P. Tully will carry out sampling and mooring work in hydrothermal plumes, and off-axis coring of hydrothermal sediments. Although preliminary studies will be conducted in July 2000, our first major field season will be in summer 2001 when we are planning cruises to both Axial Volcano and Endeavour Segment.

* Kim Juniper (Université du Québec à Montréal), Anna Metaxas (Dalhousie University), Pierre Legendre (Université de Montréal), Anthony Williams-Jones and Hoyatollah Vali (McGill University), Steve Scott and Grant Ferris (University of Toronto), Vladimir Yurkov (University of Manitoba), Curtis Suttle (University of British Columbia), Verena Tunnicliffe (University of Victoria), Rick Thomson (Department of Fisheries and Oceans Canada and University of Victoria)

NeMO 2000

In June/July 2000 researchers from five Canadian universities (Dalhousie, UQAM, Ottawa, Toronto and Victoria) will participate in a joint cruise with US scientists from the NOAA Vents program, the University of Washington and Western Washington University to Axial Volcano. This cruise marks the third year of the New Millennium Observatory (NeMO) time-series study of hydrothermal and geological processes at this volcanically active point on the Juan de Fuca Ridge. Canadian work will focus on following the evolution of processes set in motion by the January 1998 seafloor eruption, in particular we will be following up on studies of the colonisation of new vents, food web development and biomineralisation (Fe oxide deposition). The cruise will deploy the Canadian ROPOS submersible from the NOAA ship Ronald Brown.

New deep-water winch and cable for ROPOS

A new 5500m fibre optic cable and deep-sea winch will undergo sea trials in April 2000, prior to summer dive operations. The cable was manufactured by Vector Cable of Texas while the winch was designed and built by Lantec of Vancouver, British Columbia. Acquisition of the winch and cable were made possible through financing and grants from the Canadian government Western Diversification Fund, the Canada Foundation for Innovation, and four Canadian universities (Victoria, Toronto, UQAM and New Brunswick).

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Canada's Marine Protected Area at Endeavour vent field
http://www.er.uqam.ca/nobel/oasis

National News....

UK: BRIDGE

The BRIDGE Thematic Programme has now concluded and to celebrate its achievements a Finale was held at the Natural History Museum in London on the 16th November 1999. The delegates were impressed with the talks and displays and the fiery deep mulled wine went down well at the evening reception. The NERC has invested £13 million in a programme which has achieved far more than expected. The programme has drawn together scientists from across the broad scientific community, and focused their enthusiasm in a constructive and effective way building scientific teams engaged in truly multidisciplinary science. Projects funded by the BRIDGE programme have resulted in the development of successful new technology with a wide range of practical and scientific applications. Many of the instruments and techniques developed for working in hostile environments have already found practical uses for industry and the worldwide research community. This has considerable future potential .For example, BRIDGE has developed new instruments that can be used by the oil industry to help visualise the extent of hydrocarbon reservoirs and to assist with the monitoring of drilling operations.

Fifteen expeditions to the deep oceans have been supported, with new instruments purchased for the NERC research fleet and over fifty research projects were supported at universities and NERC institutes. More than 150 scientists have taken part, demonstrating the continuing commitment of NERC to the support of basic sciences. Highlights of the BRIDGE scientific programme were also presented at the Geoscience 2000 conference which was held at the University of Manchester in April. BRIDGE has been an outstanding success and the Fiery Deep magazine has been published to mark some of its achievements. Further copies of this magazine are available on request by contacting:

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National Ridge Project Homepages

InterRidge homepage
http://triton.ori.u-tokyo.ac.jp/~intridge

BRIDGE (UK) homepages
http://www.nerc.ac.uk/es/bridge.htm
http://earth.leeds.ac.uk/~bridge

DeRidge (Germany) homepage
http://www.gpi.uni-kiel.de/~cwd/DeRidge/deridge.html

RIDGE (US) homepage
http://ridge.oce.orst.edu

National News...

Germany:DeRidge

De-Ridge has become much more active in recent months with the start of the preparations for a two-day congress in Bremen (6-7 July 2000) to bring together ridge researchers from both geoscience and biological fields. The convenors (Colin Devey - Bremen, Peter Herzig - Freiberg, Peter Halbach - Berlin, Heiner Villinger - Bremen and Christian Borowski - Hamburg) hope that the congress will encourage more interdisciplinary activities in the German Ridge community and also serve as a platform to place the De-Ridge and German InterRidge funding on a solid basis. A registration form for the congress can be found on the new De-Ridge web page, which has been extensively overhauled by Klas Lackschewitz in recent weeks and is now accessible via the home page of the Bremen "Petrology of the Ocean crust" Group under http://www.ozeankruste.de. We hope that the congress will draw a large attendance and lead to a revitalisation of De-Ridge activities.

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China:

In 1999, a cruise jointly financed by ODP and the Chinese government was undertaken in the South China Sea. The Co-chief scientist was Wang Pingxian from the Tongji University, Shanghai. The aim of the cruise was to further our understanding of the paleo-climate of Southeastern Asian seas by sampling of sedimentary material from the sea floor. Additionally, studies on dredged basement rocks are being planned to investigate the formation and evolution of the South China Basin.

The Chinese Scientists from the Nanjing University and Hangzhou Institute of Oceanic Geology continue to study manganese nodules sampled from the Pacific Ocean in an attempt to determine if the nodules have a biological origin.

A large and important research effort related to ridge processes in China has traditionally involved comparative studies, ivolving petrological, geochemical and geochronological analysis of ophiolites and associated sediments with their modern analogues. A number of co-related projects are currently undertaken on ophiolites in northwestern China. For example, Dr Sun Shu from the Institute of Geology and Geophysics at the Chinese Academy of Sciences, Beijing is leading a research team in an attempt to construct a model for the formation and evolution of back-arc basin systems. These scientists are studying the ophiolites in the north Xianjiang Autonomous Region and they are using the southeastern Asian back-arc basin systems as modern analogues.

To date, only limited resources have been devoted to modern ridge related research. Chinese scientists plan to enhance collaborative projects with their international colleagues, ranging from cruises to carry out ridge related research, to facilities for geochemical analysis.

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National News ...

India: InRidge

One is aware of the advantages of back-scatter studies of the multi-beam eco-sounder data to delineate the finer topographic features of the sea floor. There have been continuous efforts to develop software packages to process the collected multi-beam signatures, easily and efficiently.

Recently two members of the India's ridge research initiative, **InRidge**, (Bishwajit Chakraborty and Vijay N. Kodagali, of the National institute of Oceanography) have developed two very efficient software packages, Probasi and Inbasi, for quantitative interpretation of bottom roughness. The "PROBASI" stands for PROcessing BAckscatter SIgnal, while "INBASI" represents INterpreting BAckscatter SIgnal of the multi-beam angular back-scatter data.

PROBASI is now used in processing 59- beam back-scatter signals [root mean square (rem) eco values] from hydrosweep multi-beam swath system onboard the Indian research vessel ORV Sagar Kanya. The other software, INBASI is developed for the determination roughness parameters. This development also includes determination of similar statistical parameters for subsurface layer information too. In order to use package INBASI, raw echo rms values should go through a processor using PROBASI, suitable to use INBASI package also. These software are currently being used at NIO for the processing of back-scatter data collected from the younger, as well as older crusts in the Indian Ocean.

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USA: RIDGE

The year 2000 is a very busy one for the RIDGE Program. Planning for a new "RIDGE 2000" program will continue through the year with two more workshops planned and associated reports to be written and rewritten. In addition we have a full schedule of meetings to carry out the normal business of the program.

Countdown to the RIDGE 2000 Program

RIDGE 2000 began with a meeting of approximately 130 scientists to discuss the future of the RIDGE Program. The meeting participants endorsed the concept of a new "RIDGE 2000" Program with two closely inter-related components:

Integrated Studies, "from mantle to microbe and beyond." involving vertically integrated, coordinated studies at a small number of pre-selected sites. Exploratory and Time Dependent Studies, encompassing key aspects of ridge science that cannot be undertaken at Integrated Study Sites.

A draft RIDGE 2000 Meeting Report was released on the RIDGE website for public comment in early March . The final report will be available by early May. The report presents a set of recommendations for the initiation of RIDGE 2000 as a successor to the RIDGE Program. Building on the success of the RIDGE 2000 Meeting, the RIDGE Steering Committee will, by the end of 2000, submit to NSF a new "RIDGE 2000 Science Plan" outlining our proposal for the replacement of the RIDGE Program. Community input to the new science plan will be provided by two planning workshops:

Meetings and Workshops

Integrated Studies Planning Workshop: 18-20 May, 2000

"Integrated Studies" are cohesive, integrated multi-disciplinary suites of experiments at a few selected sites. They will be designed to fully characterize the fundamental "type" units of the global system from "mantle to ocean...", as integrated volcanic, tectonic, hydrothermal and biological systems. All aspects of the accreting plate boundary are included, from the dynamics of the underlying mantle, to the physiology of sub seafloor microbe populations, from the formation of melt and magma, to the chemical

National News...

exchange between seafloor hydrothermal systems and the ocean, with the emphasis on coordinated, integrated and interdisciplinary experiments.

Exploratory and Time Dependent Studies Workshop: 5-7 Oct.2000.

Some important facets of multi-disciplinary ridge science cannot be carried out solely in the context of a formal Integrated Study at a pre-selected site. Examples include: exploratory studies in disciplines where global variability is not yet well known; studies addressing lateral or temporal variations and linkages between the vertically integrated study sites; rapid responses to capture data from transient events; investigations of subjects such as biological dispersal capabilities and biogeography that cannot be addressed in the narrow spatial or temporal confines of an integrated study site.

RIDGE Juan de Fuca Results Symposium — November 1999.

More than 80 scientists from the US, Canada, and Japan met in Seattle for 2.5 stimulating days of cross-disciplinary presentations and discussions about the past decade of research on the Juan de Fuca Ridge. By all accounts, the workshop was stimulating and highly successful. The community working in the Northeast Pacific has a long tradition of being interdisciplinary in their efforts, but even long-time researchers in the region claim to have learned a great deal from the meeting. A full meeting report will be published by the RIDGE Office in the near future.

RIDGE Smoker — December 1999.

The RIDGE Program's annual Smoker reception was held during the Fall AGU Meeting at the Brasserie Savoy, San Francisco, California. Thanks to all those who contributed to the success of the RIDGE Smoker! Though we were a bit short on space at the height of the Smoker, it was nice to see so many people in attendance.

2nd MELT Workshop — March 2000

Approximately 50 scientists gathered at Brown University in Providence, Rhode Island for the 'Second RIDGE Workshop on Mantle Flow and Melt Generation Beneath Mid-Ocean Ridges: Constraints From MELT and Other Experiments and Observations'. The chief goal of the meeting was to encourage collaborations between the seismic, EM, and geochemistry communities who collected and interpreted the MELT data and the modelling community who needs to incorporate these and other experimental constraints into their models. This is being written just before the meeting, but a complete workshop report will be available on the RIDGE website after the meeting.

Upcoming RIDGE-sponsored meetings

Application deadlines have passed for all but the last two of these. Further details are available on the RIDGE website

RIDGE 2000 Integrated Studies Planning Workshop, 18-20 May 2000 — DeKalb, Illinois

Physical and Chemical Effects of Mantle Plume – Spreading Ridge Interaction, 26-28 June 2000 — Troutdale, Oregon

The 5th RIDGE Theoretical Institute: The Subsurface Biosphere at Mid-Ocean Ridges 28 July -1 August 2000 — Big Sky, Montana

NORDVULK-RIDGE Iceland Summer School on Plume-Ridge Interactions, 20-30 August 2000 — Myvatn, Iceland

Exploratory Studies Planning Workshop, 5-7 October 2000 — Nashville, Tennessee

In-Situ Sensors Workshop, Fall 2000 — Dates and location TBA

New RIDGE Postdoctoral Fellows

Congratulations to the most recent recipients of RIDGE Postdoctoral Fellowships: Peter Dalla-Betta and Melanie Summit. Peter received his Ph.D. from the Department of Microbiology at Arizona State University in Tempe, Arizona and will be moving to the Department of Geology at ASU to work with John Holloway. Melanie received her Ph.D. from the School of Oceanography at the University of Washington and will be working with Everett Shock at the Department of Earth and Planetary Sciences, Washington University in St. Louis, Missouri.

On-line Databases

Three new databases that may be of interest to ridge scientists are now online:

The RIDGE Petrological Database of the Ocean Floor (PetDB): http://petdb.ldeo.columbia.edu/petdb/

Database of Hydrothermal Vent Specimens: http://www.fieldmuseum.org/collections/invertebrates/vent/

An Online Database for the East Pacific Rise 9°-10°N: http://www.soest.hawaii.edu/hmrg/Mesotech/EPR_Archive.htm

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National News ...

InterRidge - Japan

Japan continues to carry out intensive activities in ridge related research. During 2000, seagoing ridge researches from Japan plan to study the Knipovich Ridge, rift of Gulf of Aden, Rodriguez Triple Junction, Southwest Indian Ridge, Okinawa Trough, and the Mariana Trough. Additionally, the Archean Park program formally started in April, 2000 (see pages 34 - 36 of this issue). Riser drilling ship is under construction by JAMSTEC (Japan Marine Science and Technology Center). The InterRidge Office is now fully operational in Tokyo at the Ocean Research Institute, University of Tokyo. These issues keep Japanese ridge scientists quite busy but with big excitements.

Series of diving cruise at Okinawa Trough

So far, Japanese diving efforts to the Okinawa Trough focused on the northern Okinawa Trough and successfully discovered a huge hydrothermal area at Iheya Ridge. For the coming years Japanese diving efforts in the Okinawa Trough will shift to the Southern Okinawa Trough. Three cruises with Submersible Shinkai 2000 and Shinkai 6500 (http://www.jamstec.go.jp/jamstec-e/ships/index.html) are planned to the southern Okinawa Trough (see Cruise Schedule of this issue). The southern Okinawa Trough is under intensive north-south extension of an island arc crusts with a prominent central rift system. The rate of the opening of the Trough is 4.4 cm/year; measured by GPS geodesy (Kato *et al.,* 1998). Cooperative research with Taiwanese and French scientists is now underway through SEAS (see below). R/V Hakuho-maru of Ocean Research Institute plan to conduct deep tow sidescan sonar survey in 2002 in the rift zone of this area.

SEAS office setup

Marine geologists and geophysicists of Asian counties established SEAS (Science of East Asian Seas) organization to promote coordination of offshore research in the Western Pacific. Currently, Japan, Taiwan, China, Korea, and Philippine are active members of the SEAS organization. SEAS Office is located at Tokai University (http://masahp.or.u-tokai.ac.jp/SEAS/index.html) and managed by Dr. Masataka Kinoshita who is a member of InterRidge Undersea Technology Working Group. As the EEZ territories are rather intricate among the countries of the Western Pacific, it is critical for SEAS to devise workable research plans in this area. In the Western Pacific we have active back-arc basins at the Mariana Trough, the Okinawa Trough, and the Ogasawara (Bonin) rifts so that InterRidge Back-arc Basin Working group is trying to coordinate with SEAS. SEAS and InterRidge Back-arc Basin Working Group plan to host a joint business meeting at WPGM (Western Pacific Geophysics Meeting) at Tokyo from June 27 –30 this year.

Riser drilling ship is under construction

The construction of a deep-sea riser drilling ship will be carried out by JAMSTEC (http://www.jamstec.go.jp/jamstec-e/odinfo/index.html). The basic design was completed in 1999. The construction at the shipyard will start in 2000 and the shipbuilding is due to be completed by 2003. The size of the ship will be 60,000 tons and 210m in length. The initial length of the riser will be 2,500m with the possibility of extension to 4,000m in the future. The riser ship will be operated by IODP (Integrated Ocean Drilling Program, http://www.oceandrilling.org/temp/iodp/ipsc/default.html) to succeed ODP and to promote ocean science with international efforts. The Japanese ridge research groups commit to the riser drilling plan of the oceanic crusts at active ridges and down to the Moho.

R/V Hakuho-maru's three-year plan

Ocean Research Institute, University of Tokyo, announced a three-year cruise plan of the R/V Hakuho-maru (http://www.ori.u-tokyo.ac.jp/ori/3_1he.html) from 2001 to 2003. InterRidge relevant cruises during this term include the Australia-Antarctic Ridge (Jan 2001 - Feb 2002, PI: K. Tamaki), Southern Okinawa Trough (May 2002 - June 2002, PI: K. Tamaki), and the Southern Philippine Sea (Jan 2004 - Feb 2004, PI: T. Ishii). Further details will be announced by InterRidge Japan to InterRidge community on the IR website and future IR news issues.

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Upcoming Meetings and Workshops

Calendar

More details about all of the following meetings can be found via the Meetings Page on the InterRidge web site.
http://triton.ori.u-tokyo.ac.jp/~intridge/info3.html

27-30 March, 2000	**Oceanology International 2000 Penrose Conference: Volcanic rifted margin.** Royal Holloway University of London, Egham Surrey, UK
17-20 April, 2000	**Geoscience 2000** University of Manchester, UK
30 May - 3 June, 2000	**AGU 2000 Spring Meeting** Washington, DC, USA.
16-19 April, 2000	**European Geophysical Society, XXV General Assembly** Nice, France.
23-26 May, 2000	**UT '00: Underwater Technology 2000** Tokyo, Japan.
5-9 June, 2000	**ASLO-2000** Copenhagen, Denmark.
2-3 June 2000	**InterRidge Steering Committee Meeting** Woods Hole, MA, USA
26-28 June, 2000	**RIDGE Plume-Ridge Interaction Workshop** Troutdale, Oregon, USA.
18-22 July, 2000	**IAVCEI** Bali, Indonesia.
July 28 - August 1, 2000	**RIDGE Theoretical Institute: Subsurface Biosphere** Big Sky, Montana, USA.
28 August - 2 September 2000	**The XVIII th (New) International Congress of Zoology** Athens, Greece.
6-17 August 2000	**31st International Geological Congress** Rio de Janeiro, Brazil.
3-8 September, 2000	**Goldschmidt Conference** Oxford, UK.
20-22 September, 2000	**Journees DORSALE 2000** Paris, France.
28-30 September, 2000	**InterRidge workshop on Management of Hydrothermal Vent Ecosystems** Sidney, British Columbia, Canada.
15-19 December 2000	**AGU 2000 Fall Meeting** San Francisco, CA, USA.
12-16 January 2001	**International Conference on the Geology of Oman** Muscat, Sultanate of Oman.
10-15 June, 2001	**10th Water-Rock Interaction Symposium** Sardinia, Italy.
8-13 October, 2001	**Second International Symposium on Deep-Sea Hydrothermal Vent Biology** Brest, France.

Upcoming Meetings and Workshops

International Conference on the Geology of Oman

Sultan Qaboos University, Muscat, Sultanate of Oman
January 12-16, 2001

This conference highlights the last 10 years of geologic research in one of the most fascinating and well exposed outcrop areas of the world. Besides the ophiolites, this conference provides an excellent opportunity to discuss the Southern Tethys, Pangea, the hydrocarbons of the Arabian continent, and the hydrogeology of arid regions. Field excursions will provide insight into the unique geologic features. Some of the field trips will be offered twice, i.e. before and after the conference.

Important Dates:

June 1st, 2000	Deadline for announcing title of presentation
September 1st, 2000	Final registration and payment for conference and excursions
September 1st, 2000	Deadline for abstracts
November 1st, 2000	Notification about talks and posters

Convenors:

Prof. Dr. Tjerk Peters, Bern University, Switzerland, (lina@mpi.unibe.ch)
Dr. Hilal bin Mohammed Al-Azry, Deputy Director General of Minerals, MCI

For further information and on-line registration as well as the pre- and post-conference field excursions visit http://www.geoconfoman.unibe.ch/

31st International Geological Congress

6-17 August 2000, Rio de Janeiro, Brazil

http://www.31igc.org/

Mid-ocean ridge related session:

4-1 Geologic Processes in Mid-Ocean Ridges
Conveners: Volker Hoeck (Austria); Fernando Barriga (Portugal) and Marcos Gorini (Brazil)

Upcoming Meetings and Workshops

2000 Western Pacific Geophysics Meeting

June 27-30, 2000 (Tuesday-Friday) Tokyo, Japan

http://earth.agu.org/meetings/wp00top.html

Mid-ocean ridge related sessions

OS3 Rifting, Volcanism and Hydrothermal Activity in Southwest Pacific Basin (joint with T,V)
Conveners: T. Urabe (Japan) and J-M Auzende (New Caledonia)

OS4 Seafloor hydrothermal systems in Pacific: Comparison between mid-ocean ridge and arc-backarc systems
Conveners: J. Ishibashi and T. Urabe (Japan)

T2 A new challenge for Science of East Asian Seas (SEAS)(joint with OS,S)
Conveners: M. Yamano (Japan), K. Fujioka (Japan) and C-S. Lee (Taiwan)

Physical and Chemical Effects of Mantle Plume - Spreading Ridge Interaction

26-28 June 2000, Edgefield Lodge, Troutdale, Oregon

http://ridge.oce.orst.edu/meetings/PRIworkshop/

Convenors: **David Graham** (Oregon State University), **Garrett Ito** (University of Hawaii), **Y. John Chen** (Oregon State University)

Motivation

Structural and geochemical anomalies related to mantle plumes affect more than 20% of the global mid-ocean ridge system, indicating a fundamental role for mantle plumes in the creation and evolution of oceanic lithosphere.

A number of important problems pertaining to mantle flow, tectonic evolution, crustal accretion and hydrothermal activity are now particularly amenable to investigation, due to the improved resolution of new geophysical and geochemical data sets, and to the increased sophistication of analytical techniques and numerical modeling capabilities. The scientific community is now well equipped to address these questions through new field and laboratory-based studies, and through coordinated efforts among geophysicists, geochemists, and geodynamicists. Due to the complexity of plume-ridge interaction, a substantial gain in our understanding requires us to attack the above problems with integrated, multi-disciplinary investigations that are cost-effective. A RIDGE workshop that aims to facilitate such a coordination is both a timely and necessary first step.

The workshop has three primary purposes:
- provide a forum for discussing recent and ongoing research
- assess our current understanding of mantle plume-spreading ridge systems
- identify the most important outstanding problems and establish a coordinated strategy to address them

Keynote talks and discussion sessions of the workshop will be organized around three inter-linked themes:
- geodynamics and mantle flow
- plate tectonic evolution
- magma genesis, crustal accretion and hydrothermal activity

Upcoming Meetings and Workshops

The XVIIIth (New) International Congress of Zoology

28 August - 2 September 2000, Athens, Greece

Special Symposium B7:
Zoological implications of the discovery of geothermally-driven commmunities
Convener: Françoise Gaill, Université Pierre et Marie Curie, francoise.gaill@snv.jussieu.fr

The discovery of deep-sea vent fauna has revealed one of the most unusual habitats found on earth. Vents are surrounded by a dense community of invertebrates composed mostly of sessile animals that harbor chemoautotrophic bacteria. These commmunities are found around the emerging hot hydrothermal fluid (up to 400ºC) and are dependant on the reduced sulfur compounds as the main energy source for free-living and symbiotic bacteria.

Since the primary food source of the vent community is locally produced in the deep sea, it has been suggested that these communities are largely independant of environmental changes at the surface and not subject to the same evolutionary pressures as other organisms. Even though our knowledge about the zoology of this fauna is increasing, we still do not know what are the life cycles of these animals, what their larvae look like and where they are found. Understanding the dispersal, colonisation and succession of species in vent and cold seep habitats is a great challenge for the future and will shed light about major questions such as the origin of life, evolution of symbiotrophy, diversity of physiological adaptations and molecular phylogeny.

For more details see: http://www.ims.usm.edu/~musweb/icz_xviii/icz_home.html

InterRidge Workshop on management and conservation of hydrothermal vent ecosystems

28 - 30 September, 2000

Institute of Ocean Sciences, Victoria Is, B.C., Canada

Convenors: Paul Dando and Kim Juniper

Workshop Objectives:

1. To discuss the effects of various uses of vent ecosystems - i.e., what damage occurs?
2. To establish the rationale for why it is important to preserve vent ecosystems
3. To identify specific, uniquely sensitive, sites
4. To develop mechanisms for management
5. To draft specific plans for Endeavour, 9°N EPR, Rainbow and Lucky Strike
6. To make recommendations for conservation research (modelling? exploration?)

For most update information, registration information and programme see
http://triton.ori.u-tokyo.ac.jp/~intridge/ventsman.html

Upcoming Meetings and Workshops

American Geophysical Union Fall Meeting

Mid-ocean ridge related sessions

13-17 December 1999, San Francisco, CA, USA

http://www.agu.org/meetings/fm99top.html

- Mid-Atlantic Ridge vs. Indian Ridge-Characterization: Comparison of the slow spreading ridges by submersible dives, surface ship operation and ODP drilling (T11A, T21D)
- Heat Flow and the Thermal Evolution of Oceanic Lithosphere: A Session Honoring Richard P. Von Herzen (T11D, T12A)
- MORB (V11E)
- MORBs, Seamounts, and Ophiolites (V12B)
- Volcanic, Tectonic, and Hydrothermal Activity Along the Southern East Pacific Rise (V11A, V12D)
- Advances in Marine Geosciences: A session in honor of Donald F. Heinrichs (OS21A, OS22C)
- Phase Relations and Element Partitioning on the Mantle Solidus (V21D, V22D)
- Internal Structure and Composition of Fast Spreading Crust Exposed at the Hess Deep Rift (T31B, T32A)
- Arctic Basin Geophysics: New Data, New Theories, and Future Opportunities (T31F, T32B)
- Magmatic, Hydrothermal, and Tectonic Processes of the Kermadec Subduction and Arc - Havre Trough Back-Arc System (V31B, V32E)
- Deep Biospheres: Where and How? (B41C, B42B)
- Mid-Ocean Ridges (T51D, T52F)
- Hot Spots (T51H, T52B)

5th RIDGE Theoretical Institute
The Subsurface Biosphere at Mid-Ocean Ridges

28 July - 1 August 2000

Big Sky Ski & Summer Resort, Big Sky, Montana

http://ridge.oce.orst.edu/meetings/biosphereRTI/

Conveners

Craig Cary (University of Delaware), Ed DeLong (Monterey Bay Aquarium Research Institute)
Deborah Kelley (University of Washington) and William Wilcock (University of Washington)

Subsurface geological and biological processes are inextricably linked at ridges. Not only do volcanoes provide the habitat, energy, and nutrients to support life, but physical and chemical processes within young crust provide fundamental controls on theecology and perhaps diversity of microbial communities. These complexities mandate new approaches to studying life in ridge volcanoes that must emphasize increased interactions between the traditional marine geology and geophysics community and the growing number of microbiologists interested in these systems.

This RIDGE Theoretical Institute will provide participants from a range of backgrounds with a basic understanding of our current state of knowledge concerning these dynamic systems and an opportunity to explore key unresolved questions.

Upcoming Meetings and Workshops

The 2nd International Symposium on Deep-sea Hydrothermal Vent Biology

8-12 October 2001, Brest, France

Background:

Following the success of the previous International Symposium on Deep-sea Hydrothermal Vent biology held in Madeira, Portugal in October 1997, InterRidge is pleased to announce the Second International Symposium on Deep-sea Hydrothermal Vent Biology.

Organisers:

Daniel Desbruyères (France), Verena Tunnicliffe (Canada), InterRidge Office (Japan) in cooperation with "DORSALES" (CNRS - SDV, INSU, IFREMER) France.

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Major topics of the Symposium will be:

- Ecology, microdistribution, temporal evolution, Interactions: between organisms and their habitat,
- Physiology and adaptation,
- Microbiology of symbioses and free-living bacteria,
- Biogeography, evolution, genetics and taxonomy,
- Cold seeps communities
- Shallow water hydrothermal vents

For most recent information see: **http://triton.ori.u-tokyo.ac.jp/~intridge/brestvent.html**

Preliminary registration - 2nd Hydrothermal Vent Symposium

Surname/Family name:	
First name:	
Address:	
Tel: (international)	
Fax: (international)	
E-mail:	
☐ Paper or ☐ Poster (a tentative title or major topic of presentation- optional)	

FAX: + 81 3 5153 6350
OR
Mail (turn overpage) this form to the InterRidge Office,
no later than December 1, 2000.

Send to (address also on the reverse side): InterRidge Office, Ocean Research Institute, University of Tokyo, 1-15-1 Minamidai, Nakano, Tokyo 164-8639, Japan

Upcoming Meetings and Workshops

The 2nd International Symposium on Deep-sea Hydrothermal Vent Biology

8-12 October 2001, Brest, France

Deadlines:

1 December 2000. End of first call for interest to attend.
January 2001. Second announcement, including forms for submission of oral or poster presentations and updated information.
30 April 2001. Deadline for abstracts submission and booking for hotels and excursions.
1 June 2001. Final circular and programme.
1 December 2001. Submission of manuscripts of extended abstracts (to be published in Cahier de Biologie Marine) for review and publication.

For most recent information see: **http://triton.ori.u-tokyo.ac.jp/~intridge/brestvent.html**

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