



InterRidge Program Plan Addendum 1996

(April, 1997)

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1.0 InterRidge Update Summary 1996

1.1 Membership

InterRidge Membership continues to expand. The InterRidge Chair and Steering Committee welcomed Germany and Norway as upgrading members. Germany upgraded to Principal Membership in 1996. Norway upgraded to Associate Membership and announced their anticipated participation through 1998. The number of Corresponding Members has also grown with the addition of Denmark. Australia announced that it hoped to become an Associate Member in 1997.

The tally of InterRidge Member Nations for 1996 stands at 6 Principal Members (France, Germany, Japan, Spain, UK, USA), 2 Associate Members (Norway, Portugal) and 11 Corresponding Members (Australia, Canada, Denmark, Iceland, India, Italy, Korea, Mexico, Russia, Sweden, Switzerland).

1.2 InterRidge Phase 2 Projects and Recent Progress

Global Studies:

- **Global Digital Atlas:** The establishment of a global multibeam bathymetric database by linking distributed databases via the World Wide Web. Chair: P. Blondel.
- **SWIR (Southwest Indian Ridge):** Co-ordinated reconnaissance mapping and sampling of a complete super-segment, the Southwest Indian Ridge from the Bouvet Triple Junction to the Rodrigues Triple Junction, including integrated Ocean Drilling experiments. Chair: C. Mével.
- **Arctic Oceans:** Co-ordination of planning efforts for mapping and sampling of the Arctic Ridges. Chair: R. Rihm.

Meso-Scale Studies:

- **4-D Architecture of the Oceanic Lithosphere:** An integrated study of a fast spreading segment (Hess Deep) in parallel with an integrated study of a slow spreading segment on the Mid-Atlantic Ridge, both including important components of scientific drilling. Chair: L.M. Parson.
- **Quantitative Fluxes Experiment:** Segment-scale experiment to measure integrated magmatic, thermal, chemical and biological fluxes at the Mid-Atlantic Ridge. Chair: TBA.
- **Back-Arc Basin Database:** Petrological database of Back-Arc Basins on the World Wide Web. Chair: K. Tamaki.

Active Processes:

- **Event Detection and Response:** Detection of transient ridge-crest seismic, volcanic and hydrothermal events, and logistical responses to them through a strategy of international collaboration. Chair: K.L. Von Damm.
- **Biological Studies at the Ridge Crest:** Promotion of integration of biological studies into ridge crest geosciences and advancement of this rapidly expanding field. Chairs: L.S. Mullineaux and D. Desbruyères.

4-D Architecture of the Oceanic Lithosphere

A meeting of the 4-D Architecture of the Oceanic Lithosphere Project working group was convened by L.M. Parson in parallel with the ODP-IR-IAVCEI Workshop in North Falmouth. Since ocean drilling will play an important role in the 4-D Architecture Project, it was deemed particularly relevant to schedule this working group meeting so that the results could be presented to the more general ODP-IR-IAVCEI community in attendance. During the meeting, the working group carried out an assessment of progress towards the goals identified at the Boston 1994 4-D Architecture Workshop.

Biological Studies at the Ridge Crest

Work on the Hydrothermal Vent Fauna Identification Manual, edited by D. Desbruyères and M. Segonzac of IFREMER, is reaching completion. A 1997 publication date is anticipated for the colour volume containing descriptions, line drawings and photographs of over 200 species.

1.3 WWW

Information continues to be added to the InterRidge World Wide Web pages. The InterRidge home page (currently still on a server at the University of Durham: <http://www.dur.ac.uk/~dgl0zz1/>, but soon to be moved to a server on the Jussieu campus in Paris) provides links to the InterRidge Researcher Electronic Directory, information concerning InterRidge program structure, an events calendar, workshop announcements, reports, proceedings and various national and international programme home pages.

1.4 Piggy-back Projects

Offers of ship time aboard the Russian vessels *RV Professor Logatchev* (three month cruise to the Mid-Atlantic Ridge in 1996) and *RV Akademik Alexandr Karpinsky* (120 day cruise to the Southern Ocean in Spring 1997) were announced through the InterRidge Piggy-back Project service.

R.E. Thomson (Pacific Geoscience Centre, Institute of Ocean Sciences, Canada) asked for help with the deployment of satellite-tracked ALACE floats to study the deep flow structure downstream of a hydrothermal venting source. There were also other enquiries from investigators currently developing instrumentation. These proposals held promise for future piggy-back projects but were not yet at the implementation stage.

1.5 InterRidge Office Transfer

A bid to serve as InterRidge Chair and host the InterRidge Office for the 1997 - 1999 term was received from M. Cannat of the Laboratoire de Pétrologie, Université Pierre et Marie Curie, Paris, France. Following circulation and discussion of the bid amongst the Steering Committee Members, M. Cannat attended the 1996 InterRidge Steering Committee Meeting, where her bid was accepted.

1.6 Recent InterRidge Workshops

4-D Architecture of the Oceanic Lithosphere

A Meeting of the 4-D Architecture of the Oceanic Lithosphere Project Working Group was held in conjunction with, and results were presented in plenary session of, the ODP-InterRidge-IAVCEI Workshop "Oceanic Lithosphere & Scientific Drilling into the 21st Century".

ODP-InterRidge-IAVCEI Workshop

The Oceanic Lithosphere & Scientific Drilling into the 21st Century Workshop, convened by H.J.B. Dick and C. Mével, set out to define a unified drilling programme for mid-ocean ridges (MORs) and large igneous provinces (LIPs) in the next century. Five working groups drew up programmes for LIPs, Fast (hot) MORs, Slow (cold) MORs, Active Processes and Observatories, and Back-arc Spreading Centres. The Workshop is recommending a number of new ODP Working Groups to participate in ODP's proposal panel structure, and InterRidge was charged with nominating members for several of these (in some cases working with other interested programmes such as MARGINS).

FARA-InterRidge Mid-Atlantic Ridge Symposium

The results of the joint French-US FARA Program was summarised, and future research objectives formulated, at an international symposium held in Iceland from 17th - 21st June 1996. The meeting, sponsored by French and US science agencies to mark the end of the programme, was convened by C.H. Langmuir and H.D. Needham under the auspices of InterRidge.

1.7 Activity in the InterRidge Office

The major portion of the first half of 1996 was spent in preparation of the ODP-InterRidge-IAVCEI and FARA-InterRidge Symposia and their associated abstract volumes. Both symposia were well attended and on-site co-ordination was handled by the InterRidge Co-Ordinator. Publication of the Spring/Summer and Fall/Winter issues of InterRidge News went on as usual. The InterRidge Office also participated in editing the text of the InterRidge Hydrothermal Vent Fauna Identification Manual, compiled under the direction of the Biological Studies Project Working Group. The Office continues to reply to numerous e-mail inquiries from the international ridge crest research community on a daily basis. Information and documentation is also provided to various media projects and programmes not directly related to ridge crest research. The on-going effort to develop InterRidge membership continues to be a prime concern. In addition, a great deal of effort has gone into updating and maintaining the InterRidge World Wide Web pages, especially the Ridge-Crest

Researcher Directories and the Calendar of Meetings and Events, and the mailing list, which now contains nearly 2100 entries, and doubling the number of addresses on the e-mailing list. The Office has also taken steps to make the forthcoming transfer as smooth as possible.

2.0 InterRidge Structure December 1996

2.1 The Steering Committee:

R.C. Searle	(UK; Chair)	C. Mével	(France; <i>ad hoc</i>)
P. Blondel	(UK; <i>ad hoc</i>)	J.M.A. Miranda	(Portugal)
M. Canals	(Spain)	L.S. Mullineaux	(USA; <i>ad hoc</i>)
D.M. Christie	(USA)	L.M. Parson	(UK; <i>ad hoc</i>)
J.-J. Dañoibeitia	(Spain)	R. Rihm	(Germany)
D. Desbruyères	(France; <i>ad hoc</i>)	E. Sundvor	(Norway)
J. Francheteau	(France)	K. Tamaki	(Japan)
C.R. German	(UK)	T. Urabe	(Japan)
P.M. Herzig	(Germany)	K.L. Von Damm	(USA)

2.2 InterRidge Member Nations:

At the end of 1996 InterRidge membership was as follows. Each member nation is listed with its National Correspondent(s) and national ridge research programme where they exist.

Principal Members:

France - Dorsales - J. Francheteau
 Germany - DeRidge - R. Rihm
 Japan - InterRidge Japan - H. Fujimoto, T. Urabe
 Spain - M. Canals, J.-J. Dañoibeitia
 UK - BRIDGE - R.C. Searle
 USA - RIDGE - K.L. Von Damm

Corresponding Members:

Australia - T.J. Falloon
 Canada - CanRidge - S.K. Juniper, K.M. Gillis
 Denmark - J.R. Hopper
 Iceland - K. Grönvold
 India - D. Gopala Rao
 Italy - TBA
 Korea - S.-M. Lee
 Mexico - J.E. Aguayo-Camargo
 Russia - A.V. Sobolev
 Sweden - N.G. Holm
 Switzerland - G. Früh-Green

Associate Members:

Norway - E. Sundvor
 Portugal - J.M.A. Miranda

2.3 Phase 2 Projects:

Theme/Working Group - Leader/Rapporteur

Global Studies

- SWIR Project - C. Mével
- Global Digital Atlas - P. Blondel
- Arctic Ridges - R. Rihm

Meso-Scale Studies

- 4-D Architecture of the Oceanic Lithosphere - L.M. Parson
- Quantification of Fluxes - TBA
- Back-Arc Basins - K. Tamaki

Active Processes

- Biological Studies - D. Desbruyères & L.S. Mullineaux
- Event Detection and Response - K.L. Von Damm

2.4 Liaison with other Projects and Organisations:

Ocean Drilling Program (ODP): C. Mével

- Lithosphere Panel: R. Rihm, P.R. Castillo
- Tectonics panel: J. Lin

SCOR: M.C. Sinha

3.0 InterRidge Mailing List at 3rd December 1996

Country	Mailing List		E-mail Addresses		Country's %age with E- mail Address
	Number	%age of Total	Number	%age of total	
1. Argentina	1	0.05			
2. Australia	22	1.06	21	1.30	95.45
3. Belgium	6	0.29	3	0.19	50.00
4. Brazil	2	0.10			
5. Canada	64	3.07	55	3.41	85.94
6. Chile	2	0.10	1	0.06	50.00
7. China	2	0.10	1	0.06	50.00
8. Czech Republic	1	0.05	1	0.06	100.00
9. Denmark	4	0.19	4	0.25	100.00
10. Ecuador	1	0.05			
11. Fiji	1	0.05			
12. France	214	10.27	174	10.79	80.93
13. French Polynesia	1	0.05			
14. Germany	130	6.24	82	5.08	63.08
15. Greece	2	0.10			
16. Iceland	14	0.67	10	0.62	71.43
17. India	11	0.53	8	0.50	72.73
18. Iran	1	0.05			
19. Ireland	8	0.38	8	0.50	100.00
20. Israel	2	0.10	1	0.06	50.00
21. Italy	7	0.34	5	0.31	71.43
22. Japan	152	7.30	93	5.77	61.18
23. Korea	8	0.38	5	0.31	62.50
24. Mexico	5	0.24	2	0.12	40.00
25. Netherlands	16	0.77	7	0.43	43.75
26. New Caledonia	1	0.05	1	0.06	100.00
27. New Zealand	5	0.24	5	0.31	100.00
28. Norway	11	0.53	8	0.50	72.73
29. Philippines	1	0.05			
30. Portugal	15	0.72	13	0.81	86.67
31. Puerto Rico	2	0.10	1	0.06	50.00
32. Russia	54	2.59	30	1.86	55.56
33. Slovenia	1	0.05	1	0.06	100.00
34. South Africa	4	0.19	4	0.25	100.00
35. Spain	23	1.10	11	0.68	47.83
36. Sweden	8	0.38	6	0.37	75.00
37. Switzerland	8	0.38	4	0.25	50.00
38. Taiwan	1	0.05	1	0.06	100.00
39. Turkey	1	0.05			
40. UK	202	9.70	179	11.10	88.61
41. USA	1067	51.22	868	53.81	81.35
42. Venezuela	2	0.10			
Total	2083		1613		77.44

4.0 InterRidge Publications 1996

- Meso-Scale Studies Workshop Report: Quantification of Fluxes at Mid-Ocean Ridges: Design/ Planning for the Segment Scale Box Experiment, pp. 20, March 1996.
- Active Processes Workshop Report: Biological Studies at the Mid-Ocean Ridge Crest, pp. 25, August 1996.
- Active Processes Workshop Report: Event Detection and Response & A Ridge Crest Observatory, pp. 61, December 1996.
- Steering Committee Meeting 1995 Report, pp. 22, February 1996.
- Steering Committee Meeting 1996 Report, pp. 17, December 1996.
- InterRidge Program Plan Addendum 1995, pp. 14, September 1996.
- InterRidge News*, vol. 5, no. 1, pp. 52, 1996.
- InterRidge News*, vol. 5, no. 2, pp. 68, 1996.

5.0 InterRidge Meetings and Workshops 1996

Meso-Scale Studies:

4-D Architecture of the Oceanic Lithosphere Working Group Meeting
North Falmouth, MA, USA, 26th May 1996

Administrative Meetings:

Steering Committee Meeting
Estoril, Portugal, 25th & 26th September 1996

Symposia:

ODP-InterRidge-IAVCEI Scientific Drilling into the 21st Century
North Falmouth, MA, USA, 26th - 28th May 1996

FARA-InterRidge Mid-Atlantic Ridge Symposium
Reykjavik, Iceland, 19th - 22nd June 1996

Meeting and Workshop Summaries

5.1 Meso-Scale Studies:

5.1.1 4-D Architecture of the Oceanic Lithosphere: Working Group Meeting

North Falmouth, MA, USA, 26th May 1996

Convenor: L.M. Parson

In the course of the workshops held so far, it was recognised that this project would be made up of two types of experiments: Those that did not require international collaboration (Type 1) and those that did (Type 2). Only 2 components of the 4-D Architecture of the Oceanic Lithosphere project require international collaboration: Drilling and seismic experiments. The membership of the 4-D Architecture working group has been somewhat fluid resulting in a haphazard approach to this project.

The following fundamental questions arose from the workshops held in 1993 and 1994:

1. What is the 3-D magmatic plumbing system of a spreading segment?
2. What is the 3-D hydrothermal system of a spreading segment?
3. How is the extension accommodated in 3-D by brittle/ductile/magmatic/mechanic and what controls the geometry?
4. How is mantle upwelling coupled to lithospheric accretion and deformation?
5. What are the fundamental causes of segmentation? What controls temporal variability in spreading segments?

The experiments were also split into fast- and slow-spreading ridge experiments. It was decided that the fast-spreading experiments required sampling of the deeper levels of the oceanic crust so that a tectonic window into the crust would be necessary. For this reason Hess Deep was selected as the experiment site.

For slow-spreading ridge environments, a number of generic, non-site-specific experiments were described and a short list of 4 sites selected based on the history of work at these sites. These experiments include detailed characterisation of axial and off-axis geology, with use of a drill ship (type 2 experiment), geodetic strain measurements, and an integrated along axis and off axis seismic

reflection and refraction survey and tomography experiment, with long-term monitoring of seismic activity (type 2). The point was made that these experiments should be carried out at a site where the general bathymetric, gravity, magnetic and geological framework is well characterised, over the length of 2 to 3 segments along axis, and up to at least 10 Ma-old lithosphere. The following list of data that are currently available for the 4 prospective sites was drawn up:

	MARK	TAG	29°N	35°N
Geophysical mapping > 10 Ma	x	x	x	
Deep-towed or Submersible Survey/Seafloor Experiment	x	x	x	x
3-D Seismics	x	x	x	x
Rock Sampling (by dredging, submersible or drilling)	x	x		x

The MARK area was recognised as being the site that had the best characterised axial and off-axis seafloor geology. The 35°N site is the only one with segment scale along-axis and off-axis seismic reflection and refraction data. It was considered counterproductive for InterRidge to go any further toward selecting a site at this point. As for the seismic part of the project, it was noted that even a 30% success of the MELT project would prompt funding for long term seismic monitoring.

The point was made that it would be very useful to have a geologic map of the segment at which the seismic experiments would be carried out. Knowledge, of the material through which the seismic waves travel, helps to prepare the ground for a seismic experiment. For the time being most is known about the MARK area. InterRidge could make a compilation of the most recent work by soliciting data from PIs carrying out work. From this a geologic map could be made.

5.2 Symposia:

5.2.1 ODP-InterRidge-IAVCEI Ocean Lithosphere & Scientific Drilling into the 21st Century

North Falmouth, MA, USA, 26th - 28th May 1996

Convenors: H.J.B. Dick and C. Mével

InterRidge has a long standing interest in collaborating with ODP as closely as possible. Drilling has always been seen as a vital tool for ridge research. This workshop grew out of some work done by H.J.B. Dick who originally set up a group called DOCUM which focused on ocean drilling in the USA. R.C. Searle addressed P-COM about a year ago during which the idea of ridge crest drilling was informally discussed. This idea was formalised in this workshop.

Five thematic working groups were set up at the meeting: Fast-spreading Ridges, Slow-spreading Ridges, Active Ridge Processes, Large Igneous Provinces and The Arc Environment. There weren't many people involved in arc environments present at the meeting and it was thought that a further workshop to target those people might be held.

The main conclusions came from the first 4 working groups. LIPs are not closely linked to ridge processes so InterRidge is principally concerned with the results of the first three groups. Each working group identified first-order scientific questions and the objectives needed to answer them.

- One of these was total penetration of the crust from the top of the extrusive basalt layer into the mantle for both fast- and slow-spreading ridges. A variety of reasons were presented for this: Limited resolution of geophysical methods, interest in the way the crust is built up, the way melt is delivered from the mantle into the crust, how well does the layered seismic/ophiolite model correspond with real oceanic crust generated at a mid-ocean ridge.
- The techniques of offset drilling and drilling tectonic windows at both fast- and slow-spreading ridges were emphasised in order to look at lateral variability and extend the knowledge gained from single deep holes.
- It was recognised that the deep holes would require new technology and consideration was given to planning into the next century. A planning programme was generated to the year 2003 and onwards.

The plans for drilling match very closely those which were generated at the InterRidge 4-D Architecture of the Oceanic Lithosphere Workshop held in Boston. It is probably through implementing this type of plan and by writing drilling proposals and getting them funded that we will implement much of the 4-D Architecture project plan.

The slow-spreading targets selected were the 15°N area where there are large outcrops of serpentinized peridotite, and the generic site for the InterRidge 4-D Architecture experiment (see Section 5.1.1). The 15°N target was identified because it is thought to provide the best opportunity to carry out the mantle study objectives of the 4-D experiment. While this is separated geographically from the main 4-D Architecture experiment it therefore remains thematically similar. It calls for an array of 5 - 6 relatively shallow holes to be drilled in order to investigate the upper mantle and lower crust. The drilling plan for the 4-D experiment generic site involves two transects of holes perpendicular to the ridge trend. About three holes would be drilled from very young crust to 10 Ma crust at a segment centre where there's a well developed mantle Bouguer anomaly low and presumably thick magmatic crust. Another three holes would be drilled at a segment end where there's a mantle Bouguer anomaly high and presumably thin magmatic crust. This drilling project would start with the existing capability of the *JOIDES Resolution* with shallow holes. As drilling technology advances, a pair of those holes would be chosen, one at the segment centre and the other at the segment end, to deepen for full crustal penetration. This would be coupled with arrays of offset drilling holes around the two deep holes.

The drilling targets for fast-spreading crust were initially off-axis in mid-plate at the H2O site half way between Hawaii and the western US coast. There is a submarine cable at this site. The precise location would be decided by the people who write the drilling proposal. If drilling is successful at this site, the hole would be maintained and a deep crustal section would be drilled during the next decade or so. If this site was not successful, the focus would move to medium-spread crust at the Costa Rica Ridge. A hole would be drilled very quickly, without sampling, down to the depth reached at hole 504B and then deepened down to the Moho. Alongside that, offset drilling would be carried out at Hess Deep as discussed in the 4-D Architecture project plan.

The Active Processes working group gave highest priority to drilling at the ridge axis. They propose drilling and instrumenting 5 holes in conjunction with a ridge axis observatory. The ideal configuration would be 4 holes to ~500 m depth and 1 hole to ~2 km depth. These holes would be logged and CORKed and instrumented in order to determine the physico-chemical state of the crust in the region of an active volcano-hydrothermal system and monitor the fluid and geochemical evolution of the system over decade timescales. Other critical environments for Phase 3 drilling include the flank of the Juan de Fuca Ridge, mid-plate volcanoes and convergent margin hydrothermal systems.

The main recommendation to ODP was that working groups should be set up to take the ideas issuing from this workshop forwards. ODP is in the process of structural reorganisation. What has been P-COM over the past few years will divide into an Operations Committee and a Science Committee (SCICOM). SCICOM will continue to send out proposals for peer review, but it will also set up working groups called Project Planning Groups which will report to it. They will be pro-active in developing drilling proposals. It will still be possible for individuals to develop proposals for submission to SCICOM. However, ODP is encouraging proposals to be submitted via the Project Planning Groups which will be set up in conjunction with thematic programmes like InterRidge.

The workshop recommended that 4 Project Planning Groups be set up: Ridges (both fast- and slow-spreading), Large Igneous Provinces, Active Processes and Biology. The Biology Planning Group was inspired by the recent discovery of biological activity deep in the crust and the general thought was that this was an opportunity to be seized. One of the recommendations was, as a matter of urgency, to set up a proper microbiological laboratory on the *JOIDES Resolution*.

InterRidge was tasked with recommending membership of the Ridges (and with MARGINS, the LIPs) Project Planning Groups. InterRidge would not be the sole organisation having input, but a large part of the recommendations was expected to come from InterRidge. It was also recognised that, since a Biological Studies Working Group already exists within InterRidge, that group of people might assist ODP in composing a suitable ODP Biology Project Planning Group. SCICOM was due to meet in February 1997 when they would formally set up or invite nominations for these working groups.

