



InterRidge

Steering Committee Meeting Report 2011

**Hangzhou, China,
13-14 October 2011**

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Co-Chair, Jon Copley
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Also in attendance :

Changbin Wu (COMRA, China)
Chunhui Tao (SIOSOA)
Zhu Yongling (SIOSOA)

Absent Steering Committee Members:

Jon Copley (Co-Chair, 2010)
Colin Devey (Germany, 2001)
Nicole Dubilier (Germany, 2004)
Pedro Ferreira (Portugal, 2009)
Dan Fornari (USA, 2009)
Richard Hobbs (UK, 2011)
Hide Kumagai (Japan, 2009)
Rolf Pedersen (Norway, 2001)
Kamesh Raju (India, 2005)

Table of Contents

1 Welcome and introduction 9

2 Accept 2010 meeting report, accept 2011 meeting agenda, and confirm Steering Committee Members 9

3 InterRidge Office 9

 3.a Coordinator – Update 9

 3.a.i. Website and email lists 10

 3.a.ii. Member Database 10

 3.a.iii. Cruise and Vents Databases 10

 3.b InterRidge Education and Outreach – Update 10

 3.b.i. InterRidge Student and Postdoctoral Fellowship Programme 11

 3.b.ii. Cruise travel bursaries 11

 3.b.iii. Vent survey and letters to ISA 11

 3.c Review of 2010 meeting Action List 12

4 National updates 15

 4.a Principal Members 15

 4.b Associate and Corresponding Members 25

 4.c Status of potential membership upgrades / additions 33

5 GRID-Arendal liaison: proposal of a UNEP-IR Atlas: Deep sea chemosynthetic ecosystems facing human impacts 34

6 Current working groups – Updates 35

 6.a Hydrothermal energy transfer: its impact on the Ocean Carbon Cycles 35

 6.b Long-Range Ridge Exploration 39

 6.c Mantle Imaging 39

 6.d Seafloor Mineralization 40

 6.e Vent Ecology 42

 6.f Discussion of Working Groups and new WG proposals 44

7 National Data Portals 46

8 Status of IR vents database and ChEss database 46

9 Chinese and Russian applications for exploration licences and related issues 47

10 Workshop and Meeting reports 48

 10.a Geological carbon capture & storage in mafic and ultramafic rocks 48

 10.b Circum-Antarctic Ridges 39

11 Workshops and meetings proposed for later this year and 2012 49

12 InterRidge Finances 50

 12.a InterRidge Budget 2011 50

 12.b Status of payment of billed nations 50

13 Terms of Reference: Funding criteria for IR-sponsored meetings 50

14 Next InterRidge Office 51

15 StCOM meeting location and date 51

16 Meeting Adjourns 51

Appendices

APPENDIX I InterRidge Chairs and Coordinators; Steering Committee Members; National Correspondents	Appendices pg. 43
APPENDIX II Briefing notes on GRID Arendal’s proposal for Atlas of Chemosynthetic ecosystems	Appendices pg. 46
APPENDIX III Proposals for new IR Working Groups:	
Proposal for IR Working Group: “Southern Mid-Atlantic Ridge Targeted Exploration” (SMART)	Appendices pg.v50
Proposal for IR Working Group: Intra-oceanic Arc and Backarc Systems	Appendices pg.v52
Proposal for IR Working Group: Oceanic Detachment Faults	Appendices pg.v55
APPENDIX IV InterRidge Budget for 2011	Appendices pg. 58
APPENDIX V Terms of Reference	Appendices pg. 59

InterRidge 2011 Steering Committee Report

Meeting Agenda Day 1, Thursday 13th October, 2011; 9:00AM – 5:30PM

1	9:00	Welcome and introduction	B. Murton
2	9:15	Accept 2010 meeting report, accept 2011 meeting agenda, and confirm Steering Committee Members; AOB to be added	B. Murton
3 A	9:30	InterRidge Office Coordinator's report	D. Milton
B	9.45	Education and Outreach: <ul style="list-style-type: none"> • InterRidge Fellowship and Postdoctoral Fellowship Programme • Cruise bursaries 	D. Milton
C	10:00	Review of 2010 meeting Action List	B. Murton
10:30 GROUP PHOTO AND COFFEE BREAK			
4 A	10:50	National updates Principal members	China – J.Chen / J. Li France – J. Dymont Germany – B. Murton Japan – M. Sunamura UK – B. Murton USA – C. German
B		Associate and corresponding members	India – B. Murton Korea – S-H Park Norway – B. Murton
C		Update on Portuguese membership Status of potential membership upgrades / additions	B. Murton
13:00 LUNCH			
5	14:00-15:00	GRID-Arendal liaison: proposal of a UNEP-IR Atlas: Deep sea chemosynthetic ecosystems facing human impacts	Y. Beaudoin (via Skype)
6 A	15:00	Working groups – updates: Hydrothermal energy and ocean carbon cycles	N. Le Bris / C. German
B		Long-range Exploration	C. German
C		Mantle Imaging	N. Seama
D		Seafloor Mineralisation	B. Murton
E		Vent Ecology	B. Murton
15:45 COFFEE BREAK			
6F	16:00 – 17:30	Discussion of Working Groups and new WG proposals	B. Murton
19:30 End of Day 1; DINNER			

Meeting Agenda Day 2, Friday 14th October, 9:00AM – 3:00PM

7	9:00	National data portals	C. German
8	9.30	Status of IR vents database and ChEss database	B. Murton
9	9:45	Chinese and Russian applications for exploration licences and related issues: Chinese presentation Russian presentation	Jin Jiancai (COMRA) G. Cherkashov
10:30 COFFEE BREAK			
9 Cont.	11:00	Environmental Impact Assessment at vent sites Discussion	S. Smith (Nautilus Minerals) B. Murton
12.30 LUNCH			
10	13:30	Workshop and Meetings	B. Murton
11	14:00	Workshops and Meetings proposed for later this year and 2012	B. Murton
12	14:15	InterRidge finances: IR Budget 2011 Status of billed nations	D. Milton B. Murton
13	14:45	Terms of Reference: Funding criteria for IR-sponsored meetings	B. Murton
14	15:00	Next InterRidge Office 2013-15	B. Murton
15	15.15	Next Steering Committee meeting location and date Action List for 2011	B. Murton
16	15:30	Meeting adjourns	B. Murton

1 Welcome and introduction

The agenda of the 2011 Steering Committee meeting was circulated electronically to all Steering Committee members, Working Group Chairs and guests prior to the meeting. Our meeting in 2011 was hosted by IR-China in Hangzhou. The meeting began with Zhu Yongling (SIOSOA) welcoming the IR StComm to Hangzhou. Bramley Murton welcomed members and guests to the meeting and thanked our Chinese hosts for their hospitality.

Apologies were received from: Jon Copley, Colin Devey, Nicole Dubilier, Pedro Ferreira, Dan Fornari, Richard Hobbs, Hide Kumagai and Kamesh Raju. Jiabiao Li will be joining the meeting on 14th October.

2 Accept 2010 meeting report, accept 2011 meeting agenda, and confirm Steering Committee Members

The 2010 Steering Committee Meeting Report, finalised in February 2011 and available on the IR website at: <http://www.interridge.org/stcom/reports> was accepted. At the 2011 Meeting, we welcomed Georgy Cherkashov (Institute of Mineral Resources of the Ocean, St Petersburg University), Samantha Smith (Nautilus Minerals), Jin Jiancai (COMRA), Xiqui Han (Second Institute of Oceanography), Chris German (WHOI) and Nobi Seama (Kobe University) - Working Group Chairs who also acted as alternates for Dan Fornari and Hide Kumagai respectively. Yannick Beaudoin (GRID-Arendal) participated via Skype for Agenda item 5.

The StComm members were confirmed, with Richard Hobbs as the new UK member.

ACTION

BM asked CG to discuss with DF the nomination of a second designated USA member.

3 InterRidge Office

3.a Coordinator – Update

Coordinator Presentation

Debbie Milton, InterRidge Coordinator, highlighted the activities below.

Major activities for the Coordinator since the 2010 StComm meeting included:

- Last quarter of 2010: produced annual IR Newsletter; attended AGU
- First quarter of 2011: development and promotion of cruise travel bursaries and outreach via website; mailing lists; vent survey for ISA
- Second quarter of 2011: Evaluation and selection of 2011 InterRidge and InterRidge/ISA Student/Post-doc Fellowships; commissioning of translation materials; website development
- Third quarter of 2011: Coordination of two IR-sponsored meetings: Ocean Mantle Dynamics and Circum-Antarctic Ridges; database management; wikipedia
- Expected 4th quarter of 2011: Annual IR Newsletter; StComm meeting; Third Decadal Plan meeting

Other activities for the Coordinator since the 2010 StComm meeting included:

- invoices to member nations, payments to IR-sponsored meetings and award winners;
- bi-weekly e-newsletters;

- education and outreach activities below.

3.a.i. Website and email lists

The website has been upgraded to the Drupal 6.0 version, allowing a greater functionality. Daily activities at the IR office include posting events, news, and jobs to the website. Since 1st Jan 2011, 20 emails have been posted with IR bi-weekly news to the interridge-mail emailing list. As of September 2011, there were 1209 members on this list. Most were also registered online in the IR Member Database. In addition, the IR bi-weekly news e-mails are transmitted to the InterRidge-Japan e-mail list. With regards to the interridge-classifieds emailing list, as of September 2011 there were 192 members on this list.

3.a.ii. Member Database

As of September 2011, the Member Database contained 1618 registered members from 63 different countries. Work on this mailing list showed over 900 email addresses were undeliverable and have been deleted. However, whilst the actual mailing list has been edited the website members list has not (to the same degree), as it has not been possible to distinguish who has moved institution as opposed to those who have left the field of oceanography.

3.a.iii. Cruise and Vents Databases

Since January 2010, Debbie has added 30 cruises to the IR cruise database (<http://www.interridge.org/IRcruise>), bringing the overall total to 653 cruises (from 1976 - 2014). Although anyone can add a cruise to the database without a password (<http://www.interridge.org/node/add/cruise>), no one has entered his/her own cruise into the database yet.

The InterRidge Global Hydrothermal Vents Database is available at: <http://www.interridge.org/irvents/>. Stace Beaulieu has continued to update it this year and Version 2.1 was completed in September 2011 and is comprehensive through the end of 2009 for active submarine hydrothermal vent fields.

80 of the vent fields in Version 2.0 were edited with additional information.

35 vent fields were added to the database. 14 of these were discovered in 2010 or 2011.

1 vent field was deleted from the database since it turned out to be equivalent to an existing listing.

Thus, the total number of listings in the Version 2.1 is 588 (34 more than Version 2.0).

532 of these listings are confirmed or inferred active. 56 of these listings are inactive (please note: the database is not comprehensive for inactive vent fields).

Stace Beaulieu has confirmed that she will finish her work after version 2.1 is published. BM suggested that the database could continue to be updated by people submitting their data via a wiki.

3.b InterRidge Education and Outreach – Update

Major accomplishments in Education and Outreach in the past year included:

- Awarding 5 Fellowships in June 2011: two supported by InterRidge and three by the ISA Endowment Fund. This means that all original funding from the ISA has been committed and there is currently a proposal with the ISA for \$45000 to fund 3 IR/ISA Fellowships for 2012-14.

Other E & O activities for the Coordinator in the past year included:

- The major outreach areas of the website – cruise travel bursaries, student fellowships, code of conduct, WG mission statements have been translated into Chinese, French, German, Japanese, Korean and Spanish.

- Establishing a presence on Wikipedia

3.b.i. InterRidge Student and Postdoctoral Fellowship Programme

The grant that IR received in 2008 from the International Seabed Authority (ISA) Endowment Fund for \$30,000 USD to be awarded as \$5,000 fellowships (2 per year for 3 years, 2009-2011) has been successfully distributed. The remaining three ISA Fellowships were awarded to:

- Girish Beedessee - a PhD student at the Mauritius Oceanography Institute, who will travel to JAMSTEC, Japan to work with Ken Takai.
- Srinivas Rao - a PhD student at the National Institute of Oceanography, India who will continue the collaboration between National institute of Oceanography, India and PMEL, Oregon, working with Ed Baker.
- Sabyasachi Sautya - a Phd student also at the National Institute of Oceanography, India will use his Fellowship to study under Daniel Jones at NOC Southampton, UK.

Two InterRidge Fellowships were awarded for the first time in 2011. The successful applicants were:

- Donato Giovannelli - a PhD student at the University of Naples Federico II, Italy who has arranged to work at Costantino Vetriani's laboratories at Rutgers University, USA.
- Eoghan Reeves - a Postdoctoral Fellow at the MARUM Center for Marine Environmental Sciences, University of Bremen, Germany will be working in collaboration with Drs. Chris German and John 'Chip' Breier at the Woods Hole Oceanographic Institution, USA.

Advertisement this year included the InterRidge e-mailing list, members list and through the IR website. Debbie sent an announcement to the following societies and organizations: AGU, Asia Oceania Geosciences Society, Brazilian Geophysical Society, CenSeam, ChEss, European Geosciences Union, Indian Geophysical Union, InterRidge, IODP, Ridge 2000, SCOR, Society of Exploration Geophysicists, South African Geophysical Association. Debbie also emailed directly all InterRidge members in developing and emerging economy countries. Also available this year was a mailing list from Elaine Baker, who runs the University of the Seas programme.

3.b.ii. Cruise travel bursaries

As with all new ventures, the uptake of cruise travel bursaries was below capacity. B. Murton wrote to all known P.I.s in 2011, to raise awareness of these opportunities. We awarded 3 bursaries:

Applicant	Host Scientist	Cruise location and date
Melis Cevatoglu, Turkey	Julie Perrot, France	MoMAR, June 2011
Adam Schaen, USA	Wolfgang Bach, Germany	Manus Basin, June 2011
Adrien Bronner, France	Jo Whittaker, Australia	Perth Abyssal Plain, Nov 2011

3.b.iii. Vent survey and letters to ISA

In February 2011, as a result of a request from ISA, IR sent the results of a survey of the InterRidge community concerning those vents that people wished to see protected to the LTC. This information was considered during the granting of exploration licences for polymetallic sulphides in July 2011 to China and Russia.

DISCUSSION

BM noted the healthy state of IR activities – the Newsletter articles show the breadth of IR work, fellowship awards have increased, cruise bursaries are providing more mobility and IR is playing an important part in energizing early-career scientists.

NB - targeted emails to PhD students would help knowledge of IR funding.

JC - frequent emails are needed to remind people of the availability of funds, especially as cruise bursaries are available all year.

NS - IR should inform ship schedulers of the cruise bursary scheme.

CG – IR could be a co-author of the vents database, to be published in G-cubed journal.

JD – agreed that an IR product would be better for French IR membership, rather than work by individual members.

ACTION

DM Request lists of PhD students from national correspondents.
Continue to advertise bursaries widely, including ship schedulers.
Pursue ways to update the vents database.

CG Agreed to include IR as a co-author of the vents database.

3.c Review of 2010 meeting Action List

List from 2010 StComm report:

InterRidge 2011 Steering Committee Report			
Item	Issue	Action	Who and when
2	DF requested discussion of access to national databases and Ridge2000 data portal.	Place in Agenda after 5G (this was not discussed at 2010 meeting) Add links to website <i>On current agenda, Item 7</i>	Debbie – Dec 2010. Completed.
3A	DF – does IR have distribution lists to Governments? CD – SCOR WG proposal for research cruise info. To integrate metadata on all cruises (Germany not supporting this) www.scor-int.org	IR Office requires details from StComm members of national agencies to pass on IR adopted protocols - <i>No response</i> CD can give feedback in 3 weeks: <i>The proposal went no further</i>	Debbie –Dec 2010 Colin Devey – Oct 2010 Completed
3B1	DF – wants ning to be available to StComm for it to be able to make suggestions	Ning to be circulated to StComm <i>BM – JC is working on this.</i>	Jon Copley Oct 2010
3B2	Cruise bursaries – overlap with University of the Sea	Meet with Elaine Baker in London 20 Sept; contact EB Develop on line, simple, multilingual proforma Organise subgroup of reviewers within StComm	Debbie and Bram Sept 2010. Completed Debbie. Completed Debbie - <i>no need as yet</i>
3C1	USA 2 nd member of StComm	R2K Comm to nominate someone, pref. with biological background <i>Response from DF - no funding for 2nd person.</i> <i>At 2011 meeting, CG was asked to discuss with DF the second nominated USA member.</i>	Dan Fornari Oct 2010 Completed
3C2	Wikipedia	DM to pursue. AC may have help at ISA	Debbie Feb 2011. Completed
4A1	Germany update Air France data	Request BEA for seafloor data, to be made available to MGDS at Lamont JD and DF to be kept update. <i>No advance on this.</i> <i>At 2011 meeting, JD – ultimately all data will be available for science. This was a condition of using ABYSS for the work.</i>	Colin Devey Nov 2010
4A2	Japan update Can benefits of IR be articulated against future severe funding cuts	HK to give IR list of outputs needed to help justify JAMSTEC subscription (DM to prompt this)	Hide Kumagai & Bram Dec 2010. Completed
4A3	USA update Outreach Do other countries link to R2K? IR members need well-articulated statement of IR contribution to international	IR to link to R2K site and FLEXE/GLOBE Debbie to ask National correspondents <i>No response.</i> IR to consider a form of lecture series? <i>At 2011 meeting, CG suggested videoing lectures and putting on website and YouTube. Need to find funding.</i> IR to produce and circulate - also to policy makers. <i>Available on request, dependent on</i>	Debbie – Oct 2010. Completed Debbie – Dec 2010. Completed. Bram - decided against. Bram – Dec 2010. Completed.

InterRidge 2011 Steering Committee Report

4C	Discussion on paid membership Potential member - Mexico NZ	IR Office to develop contacts – try to identify key people Ireland, Canada <i>Ireland became new Corresponding member, 2011</i> France to identify and pursue? <i>New correspondent – Alfredo Aguilón Robles agreed to be Mexican Correspondent.</i> De Ronde and Wysoczanski – contact re. membership level <i>No funds available for increase in membership.</i>	Bram – July 2011. Completed. Debbie to ask JD/CH – Dec Completed. Debbie/Bram – Dec 2010. Completed.
5A1	LRE WG	Needs to develop some proposals <i>See Appendix III p.50 (new proposal)</i>	Colin Devey – completed Sept 2011
5A2	Mantle Imaging WG Possible IRTI	IR can offer letter of support <i>Workshop 2-6 October 2011</i>	Bram – Completed.
5C	DES WG Future of IODP Formal end of WG	Need to build linkages between major programmes. Can IR engage key scientists? Bram+Dan Fornari to make urgent case IR Office to write to Chair	Bram+Dan Fornari - Sept 2010. Bram - Oct 2010. Completed.
5G1	New WG proposal on Ocean Detachments by Escartin	Reply to Escartin to be sent round StComm before sending to Escartin Renewed proposal tabled at this meeting <i>See Appendix III p. 54 (new proposal)</i>	Debbie – Sept 2010
5G2	Seafloor Mineralisation WG CD wants Sven Petersen to be a member.	Ask M Tivey his opinion: <i>Outcome: Petersen is included.</i>	Debbie – Oct 2010.
6	IODP liaison New Science Plan	Contact WG Chairs for response Outline steps that could be taken Support letters from IR later in process (IR to serve as a conduit to HC Larsen) Cc HCL in all correspondence between IR members	Bram – same as 5C
7B	Vents list Is there a database of current activities? Where are instruments, for what purpose?	JC to send this round to meet GOBI deadline in October; urgent – to make spreadsheet available with criteria in a form which can be emailed to community. Submit list Jan/Feb 2011 Liaise with AC at ISA if they can do this. AC to send IR website URLs	Jon – Sept 2010. Completed Debbie – March 2011. Completed.
8	UNEP/GRID-Arendal Outreach	Develop 2 yr strategy of outreach with GRID-Arendal Make video available: <i>Bram submitted Cayman Trough video</i>	Item 5 on agenda Bram – completed May 2011.

InterRidge 2011 Steering Committee Report

9	Hydrothermal energy WG	Give WG feedback of discussion about supplementing SCOR budget <i>WG has not requested any money for 2011 meeting.</i>	Debbie – Oct 2010. Completed.
10	Mascarene proposed meeting	Ask WG chairs if they will support it through attendance by some of their groups Write to JD for more defined outcomes <i>Conference postponed until 2012 and will be dedicated to Kensaki Tamaki</i>	Debbie - Completed Bram - Completed
11	Budget Student awards	Make corrections 2011 summary included in this report Portugal becomes Corresp member by default Contact USA about actual expenditure 2008+9 (requested by HK) <i>Jian Lin wrote: More detailed figures are unavailable</i> Advertise in advance to convenors; \$500 Two awards given at EGU Prizes offered for Mantle Imaging and Toulouse workshops	Debbie – Sept 2010. Completed Bram – Sept 2011. Completed. Debbie – Jan 2011 completed. Debbie – ongoing.
12		Send HK Newsletters	Debbie – Sept 2010. Completed

ACTION

BM Send IR statements to China, France and Korea (Item 4A3).

4 National updates

As of September 2011, the total IR regional/national membership is 32, with the addition of Ireland as a new Corresponding Member. Portugal has defaulted to a Corresponding member after non-payment for 4 years.

DISCUSSION

CG – other funding streams might be possible within Portugal.

ACTION

BM Contact Ricardo Santos using EBSAs as an approach and explore the Azores connection, including Governor of the Azores.

4.a Principal Members

China

*Y. John Chen and Jiabiao Li
Powerpoint presentation*

2011 has been another fruitful year of mid-ocean ridge research in China. Several important areas of progress are as follows:

1. Chinese scientists on board R/V *Dayang Yihao* have completed 7 consecutive ridge cruises and have collected evidence for active hydrothermal vents on the East Pacific Rise, Southern Mid-Atlantic Ridge and the Southwest Indian Ridge. For the first time, the Chinese ROV *Ocean Dragon II* was employed during the survey for hydrothermal vents in the Southern

Mid-Atlantic Ridge. The Chinese Deep-tow Side-scan Sonar system (DTA 6000) was also deployed to obtain detailed seafloor topography and side-scan images of the targeted ridge segment.

2. Five test dives were successfully completed to a depth of 5,188 m by the Chinese manned submersible “*Dragon 7000m*” (Figure 1) during a test cruise to the East Pacific in July 2011. Chinese divers performed a series of tasks during these dives, including collecting sediments and rock samples on the seafloor using the mechanical arms. This event was broadcast live on Chinese national TV and generated great public interest in deep-sea research and science. It was another success in public outreach for the Chinese scientific community in recent years, after sending the first Chinese astronaut into space.

3. The Chinese National Natural Science Foundation granted a new 8-year program “South China Sea Deep”, with a total of 150 Million RMB (about US \$24 M), to conduct scientific research on marine, geological, oceanographic and biological processes of the South China Sea. This is the second such major program for the earth sciences in China, following the “North China Craton” program which started in 2008.

4. The 2nd International Ocean Sciences Summer School and PhD Student Forum, focusing on multidisciplinary research of geobiochemical interactions in the ocean and at the seafloor, was held at Xiamen University on 1-7 July, 2011. The summer school admitted 150 formal and 50 audit students, most of them graduate students in all fields of ocean sciences, including marine biology/microbiology, geology/geophysics/geochemistry, ocean chemistry, physical oceanography and ocean engineering. The summer school featured 16 science lectures from the international science community, including ocean ridge researchers Jian Lin, Anna-Louise Reysenbach and Rick Colwell. The lectures and discussion focused on six science themes: (1) Understanding the ocean within the Earth system; (2) The deep sphere: Seafloor and sub-seafloor as a deep and “black” geological and ecological system; (3) Seafloor-ocean interactions: Energy, chemical and biological; (4) Meso-pelagic system: The largest unknown ocean; (5) Upper ocean and air-sea interactions: Their roles in climate change; and (6) Progress towards a holistic view of the Earth as an integrated system of spheres and between geological and biological processes. The summer school also featured a PhD student forum, poster sessions and outreach science education in two local high schools.

JC spoke of the attempts to collaborate with UK and others for OBS. Due to the uncertain future of ODP programme, the Chinese are looking to buy 1-2 Legs for drilling on SWIR.

DISCUSSION

BM asked if travel bursaries could apply to the many cruises.

ZY is the contact for this. However, a problem is that PIs are not announced until 1-2 months prior to the cruise.

ACTION

DM to liaise with ZY re. bursaries.

France

Jérôme Dymont,

Written report

Year 2010 was an excellent year for mid-ocean ridge research in France, with nine cruises in all oceans. Year 2011 was not so good in term of cruise numbers, with only four cruises, although compensated by the success of the MoMAR observatory demonstrator, which marks a major turn for the French community.

Cruises MoMARSAT and BIOBAZ took place in June and July 2011 on R/V *Pourquoi Pas?* The purpose of the MoMARSAT experiment (P.I. M. Cannat, J. Blandin, P.M. Sarradin) was to recover and reinstall the MoMAR observatory demonstrator for an additional year on the Lucky Strike hydrothermal site. The observatory includes two SEAMON (Sea Monitoring Node, IFREMER) nodes, dedicated to geophysics and ecology, respectively. The geophysical node, SEAMON West, is made of a cabled deep-sea seismometer (IPGP) and a pressure gauge. The ecological node, SEAMON East, is made of a TEMPO module (IFREMER) – including a video system, a CHEMINI chemical analyzer and temperature probes - and a Fe²⁺ chemical analyzer (NOC). A BOREL buoy (IFREMER) connects the observatory to the world by satellite link for real-time observations. Experiment BIOBAZ (P.I. F. Lallier), "integrated BIOlogy of Bathymodiolus AZoricus", involved the collection of hydrothermal mussels for further experimentation ashore, as the initial step of a pluri-annual project.

Also related to the MoMAR project, cruise HydrobsMoMAR (P.I. Julie Perrot), in June-July 2011 on R/V *Le Suroit*, recovered and re-moored the hydrophone network in the SOFAR channel, which has been monitoring the seismicity of the Azores area almost continuously for the last decade.

After a successful initial experiment in 2009, project Oha-Sis-Bio (P.I. Jean-Yves Royer) has moored another hydrophone network in the southern Indian Ocean, onboard the R/V *Marion Dufresne* voyages during the austral summer 2010-2011. These hydrophones will record the seismicity of the three Indian ridges as well as the presence of marine mammals.

Last but not least, a cruise devoted to the mineral exploration of the French EEZ around Wallis and Futuna Islands in the SW Pacific, and supported by industry, is planned for the end of 2011 onboard R/V *L'Atalante*.

For the sake of efficiency, the four government organizations in charge of parts of the French oceanographic fleet have decided to join efforts and create a unique structure to schedule the fleet and coordinate its evolution. This structure, known as UMS FOF (for "Unité Mixte de Service Flotte Océanographique Française"), was launched in March 2011. At present, there is no information available on cruise schedules for 2012.

DISCUSSION

BM asked if data is on the MoMAR website.

JD – data is available but not on website, which is being managed by J Escartin.

JD also explained that mineral exploration cruises are different to science. JC said that China created a special fund to rent commercial vehicles for pure science cruises. COMRA decides the others.

JD – no ridge programme in France for the past 10 years. Current funding is from CNRS. Maria Marcia will be advisor of CNRS Director for Earth Sciences, in charge of Marine Geosciences, starting next year, in JD's role.

ACTION

JD to send cruise information when available to IR Office.

JD to inform IR Office when MoMAR data is available on website.

Germany

Colin Devey

Written report led by B. Murton

Despite the fact that the German Science Foundation-coordinated ridge research program SPP1144 ended late in 2009 (or perhaps as a long-term result of this program and its lasting effects on the community), ridge research is alive and well in Germany. In 2011 German scientists will have carried out three cruises to ridge-related targets.

The first was in January and February, when scientists from IFM-GEOMAR in Kiel, together with colleagues from the King Abdulaziz University in Jeddah, Saudi Arabia, made the first cruises in the "Jeddah Transect" project to study the Deeps of the Red Sea rift. Because of the unique brines which fill these rifts, scientists not normally involved in mid-ocean ridge research also participated. Results of particular note include the highest-resolution maps of the Deeps ever produced, which are allowing tectonic/volcanological models for the origin of the Deeps and their brines to be developed. Some volcanic samples were also collected from the spreading axis.

In June and July, an international group of scientists led by Wolfgang Bach from the University of Bremen aboard R/V "Sonne" visited the Manus Basin to study the hydrothermal vents, their precipitates, their fluids and their life. Using the Bremen "Quest" ROV the team collected rock, fluid and biological samples and carried out in situ experiments and measurements using, among others, an in situ mass spectrometer.

And finally in November, researchers from IFM-GEOMAR, together with colleagues from the University of Hawaii, will be studying the volcanology and hydrothermal activity of the Northeast Lau Basin spreading axis aboard the R/V *Kilo Moana*, in a joint project with Nautilus Minerals. This represents the first industry-academia joint project for German spreading axis researchers and will no doubt be an informative experience for all concerned. The German scientists are hoping to collect a wealth of bathymetric data over the spreading axis from their deep-diving AUV "ABYSS" and so learn more about tectonic and volcanological processes in a back-arc spreading centre.

DISCUSSION

GC – Sven Petersen wishes to start a new segment-scale programme (recommended from LRE workshop).

CG – history of earth science shows discoveries always funded by commerce.

JD – there must be a clear separation between commerce and science, but the former cannot be ignored. Scientists must explain to policymakers what can/cannot be done.

BM – IR has the role of best practice, and informs decision-makers, leading to legislation and sustainability.

CG – ISA makes laws. IR can advise ISA and give best advice. IR input is needed.

NB – IR's Code of Conduct has been used. Commerce needs more information from IR on ecosystem function plus other fundamental research to enable better management, respond to policy and constraints.

Japan

Kyoko Okino

Powerpoint presentation by M. Sunamura

First we wish to thank you for the message of sympathy from the IR chair following the tsunami disaster on 11 March. InterRidge-Japan members also personally received many sincere mails from IR friends. I would like to take this opportunity to express our thanks. We are deeply shocked by the catastrophic damage caused by the M9 quake and the following tsunami at the northern Pacific coast of our country. After six months, more than 4000 people are still missing and the situation of the nuclear power plant is unpredictable. We are deeply aware that we are fragile and our knowledge

is very limited. The impact on our daily life and research activity is immeasurable, but we try to continue efforts to promote ridge-related studies in Japan and to expand our community.

Domestic and International Meetings

An InterRidge-Japan symposium was held on 4-5 November 2010, at the Atmosphere and Ocean Research Institute, University of Tokyo. About sixty scientists participated in the symposium, sharing recent research activities. The second day was dedicated to the international session 'Frontier studies on hydrothermal activities' under the collaboration with a Japan-New Zealand workshop on marine resources. We also had a business meeting on 26 May 2011, at the Japan Geoscience Union Meeting, where we shared information on budget, cruise, workshops and international affairs, and discussed the InterRidge-Japan annual activity plan. We agreed that the annual contribution to InterRidge will be shared by the TAIGA project and JAMSTEC. We also planned to host the international workshop on 'Ocean Mantle Dynamics: From Spreading Center to Subduction Zones' led by the IR Mantle Imaging WG, 4-6 October 2011.

Ongoing Project "TAIGA" and related cruises in FY2010

The interdisciplinary research project TAIGA, Trans-crustal Advection and In-situ biogeochemical processes of Global sub-seafloor Aquifer, was launched in 2008. The project is funded by MEXT (Ministry of Education, Culture, Sports Science and Technology) from FY2008 to FY2012. We received a high evaluation in a mid-term external review in 2010 and the project is now approaching its final phase.

As we described in the last IR News, we focus on subseafloor fluid advection, which carries huge heat and chemical fluxes from the interior of the earth and supports the growth of biosphere (beneath and on the seafloor). Three integrated study sites have been selected: the southern Mariana Trough as TAIGA of sulfur, the Indian Triple Junction as TAIGA of hydrogen, and the Okinawa Trough as TAIGA of methane. In the southern Mariana Trough, the submersible dive survey was designed using the detailed seafloor mapping by AUV *Urashima*. A new hydrothermal vent was discovered at an off-axis seamount, where the AUV near-bottom survey predicted possible hydrothermal activity. The deep crust/upper mantle imaging using OBSs and OBEMs was also conducted in the same area. In the Okinawa Trough as TAIGA of methane, the *Chikyu* deep drilling (Exp. 331 <http://www.jamstec.go.jp/chikyu/eng/Expedition/okinawa/exp331.html>) was successful and a large extent of sub-seafloor hydrothermal fluid flow was confirmed, giving a key to understanding the Kuroko-type mineralization. We have also had several cruises to investigate the geological/geochemical/microbiological environments before and after drilling. In the Indian Triple Junction area, previous studies showed the exposure of lower crust/mantle rocks in the area, which may be a key to understanding the hydrogen-rich Kairei hydrothermal field. R/V *Hakuho-maru* visited the Indian Ocean Triple Junction with AUV *r2D4* in November 2010, and integrated AUV surveys, rock dredging, water and plankton sampling in hydrothermal plumes were done. More than fifty scientists joined the project, and many seagoing studies are planned, mainly in the integrated study sites. Further information can be checked at the project web site (<http://www-gbs.eps.s.u-tokyo.ac.jp/~taiga/en/index.html>).

International collaboration in the Lau Basin

Under the US-Japan collaboration, a cruise using R/V *Roger Revelle* was done in the Lau Basin to deploy OBS, OBM and OBEMs (PI D. Wiens, Japanese Scientist: N. Seama). These instruments were successfully recovered using R/V *Kilo Moana* in 2010.

Enhanced interest in seafloor resources

Besides the rehabilitation from the serious earthquake-related disaster, seafloor resources e.g. gas-hydrates, massive sulfides and REEs, attracted great interest in Japan. JAMSTEC launched a project-oriented research division, Submarine Resources Research Project, in April 2011. Coinciding with this, JAMSTEC also plans to build a set of AUV and ROV to promote such research.

Cruises in FY2011

In reaction to the M9 earthquake in March, the operation schedule of our research ships was forced to change drastically. A substantial amount of ship time was devoted to monitoring radioactive levels offshore from Fukushima in the first couple of months, and many urgent studies including aftershock surveys by OBSs, sea-bottom crustal movement, surface environmental change etc. were carried out and are continuing. In this context, the scheduled R/V *Yokosuka* cruise in the Indian Triple Junction was cancelled this year. Fortunately, the cruises in the Okinawa Trough area will be conducted according to the initial plan. The BMS (Benthic Multi-coring System) drillings were conducted during the *Hakurei-Mar* No.2 cruise in May (PI T. Urabe). Six cruises with ROV *Hyper Dophine* were planned in the Iheya, Izena and Tarama hydrothermal areas from August to September. The integrated survey of plume detection and near-bottom mapping will be conducted in the Dai-Yon-Yonaguni hydrothermal site using AUV *Urashima* in December. Along the Izu-Bonin backarc rift, the R/V *Hakuho-maru* cruise revealed its rift structure and hydrothermal systems.

As I informed the IR mailing list, Dr. Kensaku Tamaki, Professor at Tokyo University and former InterRidge Chair, passed away suddenly on April 6 at the age of 62 during his stay in New York. He led the Japanese ridge community for many years and it is still hard to realize his sudden passing. His career with some photos and the message to IR colleagues from his wife can be seen at memorial web site: <http://ofgs.aori.u-tokyo.ac.jp/~okino/TamakiMemorial/>

InterRidge-Japan web site (in Japanese): <http://ofgs.ori.u-tokyo.ac.jp/~intridgej/>

DISCUSSION

BM – is the AUV lost?

NS – It is on the CIR at 2-3000m depth, but is no longer in communication.

After lunch, Dr Changbin Wu joined the meeting. He leads the management of COMRA's planning programme.

UK

Richard Hobbs

Written report, led by B. Murton

My interest in being the new UK correspondent for InterRidge stems from my research having an underlying theme of using remotely sensed data to understand the subsurface. In particular, how well one can quantify the uncertainty in the model given the observed data and the risky topic of how well does the model actually represent the real subsurface. My recent research has focused on using seismic data to map thermohaline structure in the oceans, and the development of joint inversion with Bayesian based uncertainty analysis for combinations of seismic tomography, magnetotelluric and gravity data.

So why the sudden interest in ridges? Many years ago I was the director of the British Institutions Reflection Profiling Syndicate (BIRPS) and, together with colleagues from the US, we acquired the first 3D seismic survey of the overlapping spreading centre at 9°N on the East Pacific Rise (a.k.a. ARAD survey). About 6 years ago I met up with Vincent Tong (UCL), a student who worked on the ARAD data at Cambridge and, together with Christine Pierce (Durham), hit upon the idea of looking in detail at the early evolution of the ocean crust and the role of hydrothermal fluids using a joint geophysical approach. Since then the project has grown, with additional input from contacts in oceanography (Miguel Morales Maqueda and David Smeed (NOC), Christopher Ballentine (Manchester)) into an inter-disciplinary project - OSCAR - that will examine the role of fluids in ocean crust formation and their subsequent discharge and heating of the abyssal ocean.

The target is the Costa-Rica Ridge in the Panama Basin. The principal reasons for the choice were: the ODP hole 504B that will provide 'ground-truth' of the evolution of layer 2 from the ridge to borehole, based on high-resolution geophysics which, requiring profiles of only ~200 km from the ocean ridge, is practical; and the shape of the Panama Basin, bounded on the north-west and south by ~2000 m high ridges formed by the Galapagos hot-spot, and to the north-east and east by Central and South America. There is a known source of cold water in-flow along the Ecuador Trench and the only way out is through mixing and uplift caused by thermal heating which, we hypothesise, is largely driven by hydrothermal circulation.

The Irish-led VENTuRE scientific expedition aboard the national research vessel R/V *Celtic Explorer* (CE11009) has discovered a previously uncharted field of hydrothermal vents along the Mid-Atlantic Ridge, the first to be explored north of the Azores. The mission, led by Andy Wheeler of University College, Cork (UCC), together with Bramley Murton and Darryl Green from the National Oceanography Centre and Jon Copley and Verity Nye from the University of Southampton, UK, and scientists from NUI Galway and the Geological Survey of Ireland, discovered the vent site at a depth of 3,000 m using the Remotely Operated Vehicle (ROV) *Holland 1*. The expedition was supported by the Marine Institute, Ireland and the National Geographic Society, who filmed the work for inclusion in an upcoming National Geographic Channel series, '*Alien Deep*', premiering globally in 2012. A paper on the Moytirra vent field is in the International Research section of this volume.

In November-December, Jon Copley is planning to dive with an ROV on the vent field on the SW Indian Ridge that was discovered by a Chinese research cruise in 2007 (cruise JC67 and will follow Alex Rogers' cruise (JC66)) studying SWIR seamounts. This will be the third vent field on an ultraslow-spreading ridge to be sampled for biological investigations, after Mohn's Ridge and the Mid-Cayman Spreading Centre. The fauna photographed by the *ABE* AUV during the 2007 cruise suggest possible similarities to the assemblages that a UK Consortium has found on the East Scotia Ridge, and samples will be collected to determine the taxonomy and molecular phylogenetics of SWIR vent fauna for the first time.

The NERC-Funded UK-GEOTRACES Consortium is investigating the fluxes of micronutrient metals such as iron and zinc to the highly productive region of the South Atlantic around 40°S. This is a region where life flourishes in the surface ocean, but where the source of the required micronutrients is uncertain. In the deep ocean at this latitude, waters are flowing northward to provide micronutrients to the productive equatorial Atlantic, and southward to the micronutrient-starved Southern Ocean. So understanding micronutrient fluxes at 40°S has implications on a much wider scale. Micronutrient fluxes to the South Atlantic may come from dust, rivers, sediments, or the Mid-Atlantic Ridge (MAR). As part of a research cruise in January 2012 on board the RRS *James Cook* (JC68 - PI Gideon Henderson), consortium

members will seek to assess the relative importance of these fluxes. This will involve extensive water-column and sediment sampling over the MAR. In the water, the combination of multiple chemical tracers, together with measurements of the micronutrients themselves, will constrain the fluxes of metals such as iron from on- and off-axis venting to the oceans in particulate and dissolved phases. This work will indicate the role of the South Atlantic MAR in influencing ecosystems and the carbon cycle over a wide swathe of the Atlantic.

The *James Clark Ross* cruise (JR275) forms part of the British Antarctic Survey (BAS) core EvolHist work package which will be a joint cruise with the JR259 leg and the Halley Research Station relief, sailing from Stanley, Falkland Islands (51°42'S 57° 51'W) to the Filchner Trough area (~72°00'S, ~35°00'W) and back. While the target research area for JR275 is the Filchner Trough, the marine geophysical cruise JR259 is targeting sites in the South Scotia Ridge (SSR) and southern South Sandwich Islands (SSI). During JR259 (PI Philip Leat) will survey very poorly known parts of the Scotia Sea using an EM122 multibeam echosounder and sea floor sampling. Target areas will be segments of the West Scotia Ridge spreading center which stopped spreading at 6 Ma but which erupted post-spreading alkaline lavas at 300 ka, the South Scotia Ridge, a transform plate boundary between Weddell Sea and Scotia Sea oceanic plates, and active seamounts of the southern South Sandwich arc and associated East Scotia Ridge back-arc spreading centre.

USA

Dan Fornari, Ridge 2000 Chair, WHOI

Powerpoint presentation, led by C. German

The Ridge 2000 Program in the US formally ended at the start of FY2011. While dedicated funding for R2K science ended in late 2010, NSF program managers have indicated that R2K scientific goals remain a priority and the ~\$4 million in targeted R2K funding originally slated to continue through 2011 would be reprogrammed into the overall NSF OCE research funds. Field and laboratory programs with MOR foci would be considered for any site along the global MOR, not just the R2K Integrated Study Sites (ISS). Important research efforts are still required to complete analysis of recently collected R2K data, and complete, report, integrate and synthesize results from R2K activities. All of these efforts will help to ensure optimal scientific utilization of the large quantity of R2K data archived in the MGDS R2K Data Portal1 and other applicable data repositories.

The primary goal of the Ridge 2000 Program (R2K) has been to achieve an integrated, holistic understanding of global mid-ocean ridge (MOR) processes. This ongoing work is building on the substantive body of knowledge that has been derived from past and current R2K field, laboratory and modeling efforts. In addition, R2K research and engineering has played a formative role shaping current Ocean Observatories Initiative (OOI) science and technology programs and related focused research programs like the Center for Dark Energy Biosphere Investigations (C-DEBI).

The community workshop, held in fall 2010 in Portland, OR, stimulated R2K investigators and other researchers to share and integrate data across disciplinary and geographic boundaries. Researchers who participated in the 2010 meeting working groups are collaborating on data comparisons including topical and ISS geographic syntheses and modeling of MOR processes to provide new insights on how spreading centers operate at all levels. These studies will lead to publications in peer-reviewed journals that will serve as part of the intellectual legacy of R2K. In addition, a special issue of *Oceanography Magazine*, focused on R2K research results will be published in March 2012. Manuscripts are currently

being received by the co-editors of the special issue (S. Beaulieu, D. Fornari, J. Holden, L. Mullineaux and M. Tolstoy) and are being sent out for review prior to compilation and layout of the special issue.

Achieving outstanding R2K programmatic goals requires data sharing among investigators across disciplinary boundaries and collaborative efforts to find causal linkages and to develop cross-disciplinary models to better understand underlying processes. The MGDS R2K Data Portal has made such data sharing far more efficient and easier for PIs and students. Many R2K PIs have made substantial progress in publishing the results of field studies and making those data sets available for comparative studies across geographic and process-oriented boundaries (e.g. at Integrated Studies Sites (ISS) and elsewhere). All environmental metadata and field data from R2K-funded cruises are archived and discoverable through the R2K Data Portal¹. Over the past 12 months, a large volume of new derived data has also been submitted.

¹The R2K data portal is administered by the Data Management Office (DMO), part of the Marine Geophysical Data System (MGDS) at Lamont-Doherty Earth Observatory (LDEO). See: <http://www.marine-geo.org/portals/ridge2000/>
<http://www.marine-geo.org/portals/ridge2000/docs.php#data>

Ridge 2000 Program Priorities

The highest priorities for post-Ridge 2000 Program activities are to capitalize on new insights gleaned from recently collected data through additional field and laboratory studies, modeling efforts to describe MOR processes in quantitative or conceptual models, and synergistic, multidisciplinary studies that compare geological, biological or geochemical aspects of MORs between and within ISS and other oceanic spreading centers. Research that will help fulfill R2K Program objectives includes:

- Research that synthesizes existing datasets within and across ISSs to achieve greater understanding of how all or parts of oceanic spreading centers operate. This includes all relevant ISS, TCS (Time Critical Studies), in addition to well-constrained data sets from other sites.
- Integrating different observations into conceptual, semi-quantitative, and/or quantitative models to help understand the forcing functions of ridge crest phenomena and their responses to changing conditions and perturbations.
- Collecting missing critical data that will inform how all or parts of oceanic spreading centers operate and/or are essential to developing or proving various models or ideas.
- Continued discovery of important multidisciplinary processes related to oceanic spreading centers. The TCS component of R2K is especially well suited to facilitating this type of discovery activity.

Ridge2000 related US cruises

Although there will be no umbrella organization in the U.S. to coordinate MOR research in 2012, several other programs are ongoing and include field studies at ridges. First, the National Science Foundation's Ocean Observatories Initiative (OOI) is establishing a Regional Scale Node (RSN) at Axial Volcano on the Juan de Fuca Ridge. An RSN network of observatories, including cabled arrays of sensors on the seafloor and up into the water column, will span the Juan de Fuca plate. An OOI cruise with R/V *Thompson* (Aug. 20 - Sept. 1, 2011), led by John Delaney and Deb Kelley of University of Washington, streamed live HD video from ROV *ROPOS* dives to Axial Volcano:

<http://www.interactiveoceans.washington.edu/visions11>.

Just prior to the OOI cruise, an eruption was discovered at Axial Volcano and investigated by two expeditions: on R/V *Atlantis* with ROV *Jason II* led by Bill Chadwick, and on R/V *Western Flyer* with ROV *Doc Ricketts* led by David

Clague. The last eruption at Axial Volcano occurred in 1998. Chadwick and Scott Nooner had been monitoring Axial Volcano for more than a decade, and in 2006 published a paper in the *Journal of Volcanology and Geothermal Research* in which they forecast its eruption before the year 2014. Other Legs of the MBARI 2011 Pacific Northwest Expedition visited North Cleft, Coaxial Seamount and the Endeavour segment of the Juan de Fuca Ridge (<http://www.mbari.org/expeditions/Northern11/index.htm>). The Ridge 2000 ISS at Main Endeavour Field is a cabled observatory in the NEPTUNE Canada program.

The Center for Dark Energy Biosphere Investigations (C-DEBI) Program

(<http://www.darkenergybiosphere.org/research/schedule.html>) is also funding cruises to MORs. C-DEBI is an NSF-funded Science and Technology Center on the deep biosphere, with the mission to explore life beneath the seafloor and make transformative discoveries that advance science, benefit society, and inspire people of all ages and origins. Cruise AT18-07 led by Keir Becker on R/V *Atlantis*, 26 June-14 July 2011, was a direct follow-on to IODP Expedition 327, when seafloor observatories (CORKS) were placed on the eastern flank of the Juan de Fuca Ridge. This cruise had a number of education and public outreach components, including the “Adopt a Microbe” project (<https://sites.google.com/site/adoptamicrobe3/>). IODP Expedition 336, North Pond - Mid-Atlantic Ridge Microbiology, is scheduled for 17 Sept-20 Nov 2011, with co-chief scientists Katrina Edwards (U.S.) and Wolfgang Bach (Germany): http://iodp.tamu.edu/scienceops/expeditions/midatlantic_ridge_microbio.html).

Other funding agencies have sponsored U.S. ridge research, including NOAA Ocean Exploration, which featured two expeditions on the NOAA Ship *Okeanos Explorer* in 2011: Leg 2 of the GALREX 2011 expedition to the Galapagos Rift, 8-28 July 2011 (<http://oceanexplorer.noaa.gov/okeanos/explorations/ex1103/welcome.html>), and an expedition to the Mid-Cayman Rise, 2-14 August 2011 (<http://oceanexplorer.noaa.gov/okeanos/explorations/ex1104/welcome.html>). The Mid-Cayman Rise research was conducted in partnership with U.K. scientists, both on-shore and at sea, and also benefited from recent cruises and data provided from France and Japan. Other sponsors of the Mid-Cayman Rise studies included NASA ASTEP (Astrobiology Science and Technology for Exploring Planets).

Additional information on Ridge 2000 related cruises can be found at: <http://www.ridge2000.org/science/index.php>. The UNOLS Office also maintains current and past catalogs of scheduled research cruises for US investigators in all branches of the ocean sciences. http://strs.unols.org/public/Search/diu_all_schedules.aspx?ship_id=0&year=2011.

R2K Distinguished Lecture Series (DLS) Speakers

The Ridge 2000 Distinguished Lecture Series ended in 2010-2011. By all measures it was a very successful outreach program that brought the excitement of a diverse cross section of mid-ocean ridge research and technology to students at many small US colleges and universities. DLS program information and past speakers and venues are available at: http://www.ridge2000.org/dls/speaker_list.php

Ridge 2000 Education & Outreach Activities (E. Goehring, Penn. State Univ.)

No new Education & Outreach Activities took place in CY2011 as there was no funding in the R2K budget to support these activities. Past activities and materials are summarized at the following websites.

- <http://flexe.psu.edu> (FLEXE project overview, including access to curriculum and login to FLEXE system).
- http://flexe.psu.edu/forum_archive (archived versions of FLEXE Forums, so that information may be accessible until a live version/format is made available through GLOBE).

- <http://classic.globe.gov/projects/flexe> (original FLEXE project page on GLOBE site will be moved to new GLOBE site when it is available).

DISCUSSION

- CG - Ridge 2000 data must be instantly available, data from other programmes must be available within 2 years.
- C-Debi, run by K. Edwards. Is connected to Deep Carbon Project, Sloan Foundation, including mantle carbon and deep biosphere. A possible link with the new WG proposal on Detachments?
 - GEOTRACES – in 2013, there will be a cruise from Peru – EPR 20°S He plume – 150°W. Studies will be on biogeochemical/hydrothermal plumes. Strong Fe signals are significant with axis, so links are trying to be made.
 - Third Decadal Plan – does SCOR have to authorise this?

ACTION

DM to liaise with SCOR re. Third Decadal plan authorization.

4.b Associate and Corresponding Members

India

Kamesh Raju

Written report, led by B. Murton

The Indian Ridge program completed the first deep-sea AUV cruise over the Central Indian Ridge in 2010. The cruise was onboard R/V *Sagar Nidhi*, owned by the Ministry of Earth Sciences and operated by the National Institute of Ocean Technology (NIOT), Chennai, India. The AUV *ABYSS*, hired from IFM- GEOMAR, was deployed over the slow-spreading Central Indian Ridge. We surveyed a 40-mile segment between 10°10'S to 10°50'S. Shipboard multibeam, CTD and MAPR surveys were conducted prior to the deployment of the AUV. The dive locations were selected based on the shipboard multibeam and CTD-MAPR data. AUV dives consisting of two mapping missions and one dive of photography were successfully completed. High resolution bathymetry with 200 KHz Reson multibeam system, temperature, turbidity and Eh data were collected. Based on the CTD-MAPR-AUV investigations, we located a zone of high turbidity and anomalous Eh in the region. We found that the CTD-MAPR-AUV is a powerful combination for the exploration of hydrothermal vents. We have plans to further explore this segment during future expeditions to the Central Indian Ridge. Excellent cooperation with the *ABYSS* team of IFM-GEOMAR, led by Dr. Nico Augustine, resulted in acquiring high quality data during this cruise. Thanks are due to Prof. Colin Devey and Dr. Klas Lackschewitz for their efficient pre- and post-cruise coordination. This is one fine example of cooperation among the members of the InterRidge community. Scientists, technicians and students from CSIR-National Institute of Oceanography (CSIR-NIO), Goa, the CSIR-National Geophysical Research Institute (CSIR-NGRI), Hyderabad, National Institute of Ocean Technology (NIOT), Chennai participated in this cruise. The project is funded by the Ministry of Earth Sciences, Government of India, New Delhi.

Korea

Sung-Hyun Park

Powerpoint presentation

KOPRI Cruise (KOPRI Leg.1)

From 28 Feb - 15 March 2011, the Korea Polar Research Institute (KOPRI) conducted a short survey of two segments at 160°E (KR1) and 152.5°E (KR2) of the Australian-Antarctic Ridge (AAR; Figure 1) using the icebreaker *Araon* (P.I. Sung-Hyun Park). This was an historic cruise because AAR is the largest unexplored expanse of the global mid-ocean ridge system. In very rough sea conditions, we obtained a multi-beam map and 16 rock core samples from the two segments. Also, we found strong signals of hydrothermal venting using MAPR (Miniature Automatic Plume Recorder) profiles from the ridge at both segments. As well as nine Korean scientists, international participants (Charles Langmuir, Harvard University and Jian Lin, Woods Hole Oceanographic Institution) also joined the cruise. Below are some brief results of the cruise.

Geomorphology

The spreading rate of the AAR is intermediate and its axial depth is relatively shallow (~2100 m). The axial morphology varies from an axial high (west) to a well-developed rift valley (east) in the KR1 segment, suggesting magma supply has varied on short spatial scales. Magma supply at the western end of the KR1 segment is excessively high and its morphology looks like a plateau. The western end abuts a transform fault with a strike towards the Balleny Islands, providing a possible source of excess magma supply and shallow axial depth. KR2 is deeper than KR1 and can be divided into two segments by an offset. East of this offset is a rift valley, while the western segment has an axial high. A small seamount is located in the north of the western segment. Magma supply has also varied in this segment, but it is lower than KR1.

Rock samples

We obtained fresh glasses from 16 rock cores. Recoveries of rock cores were from 2-50 g. Nine rock cores showed over 20 g of recoveries. Glasses show diverse petrographic characteristics from aphyric to phyrlic and from vesicular to massive. MgO contents are mostly between 6~7 wt. %. Fe-Ti basalt and dacite were found at the western end of the KR1 segment where magma supply appears most robust. Most samples from KR1 are slightly enriched except one sample from the western end, but the eastern segment is slightly depleted. KR2 samples are more primitive than KR1. All samples from the eastern segment of KR2 (rift valley) are depleted. On the other hand, two of the three samples from the western segment (axial high) are enriched. Enriched samples may be influenced by the seamount in the north of the segment.

Hydrothermal Vents

We attached MAPR into the wire for rock cores, so we also obtained 16 MAPR profiles from the two segments. In the KR1, it appears that hydrothermal vents are mainly distributed in the central part of the segment. Four MAPR profiles from the central part of KR1 have a strong turbidity anomaly. Among them, one profile shows double peaks with the strongest turbidity anomaly. It appears that hydrothermal activities are very strong in the area. However, any profiles do not show a significant change in oxidation-reduction potential, so vent sources are not very close from the sampling locations. To confine the vent locations more precisely, more MAPR profiles should be obtained. In the KR2 segment, hydrothermal vent signals were mainly found in the western part of the segment. Three MAPR profiles of this part show significant turbidity anomalies up to 300 m thick near the bottom, with the westernmost profile showing a significant change in oxidation-reduction potential. The source of hydrothermal vents may be located in the west of this site and probably very close. It is worth noting that vent signals were not found in the excessive magma supply area, but in the intermediate magma supply area.

Next Cruise

In December 2011, we will revisit the KR1 and KR2 to obtain more rock core samples, MAPR profiles and multi-beam data (KOPRidge Leg. 2). We can confine the hydrothermal vent locations after this cruise. KOPRI is now making long term plans to survey the AAR including AUV and ROV.

KORDI (Korea Ocean Research and Development Institute) cruises

KORDI conducted two ROV cruises on the Tonga Arc using *Araon*, the first cruise being from 24 Mar- 8 April 2011. The second cruise was from 9-25 April 2011. The main purpose of the cruises was to find proper mining sites. During the cruises, they observed hydrothermal vent biology using ROV and obtained rock and sediments.

New Zealand

Malcolm Clark, Richard Wysoczanski, and Matthew Leybourne

Research voyage

Hydrothermal vent research in the Kermadec Arc continued over the past year. The New Zealand R/V *Tangaroa* spent most of March in the southern Kermadec Arc, surveying volcanoes under a collaborative GNS-NIWA-WHOI research project supported through the New Zealand government Oceans2020 programme. The research is directed at improving understanding of the mineralisation processes associated with the formation of seafloor massive sulphides, which are of increasing interest to mining companies. The geological and geophysical objectives were complemented with biological studies to address the association of faunal communities with the benthic habitat, and their vulnerability to human impact. The survey was both international and multidisciplinary, and deployed a wide array of equipment from the vessel: the WHOI autonomous underwater vehicle *Sentry*, TowCam (a towed seafloor camera system), CTDs, *Tangaroa*'s new EM302 multibeam system, magnetometer and gravimeter sensors, and direct sampling using rock dredges and epibenthic sleds.

The survey focused on three core seamounts: Rumble II West, Clark, and Healy, as well as Rumble III, which was a secondary objective. Opportunistic sampling was carried out on Cotton and Lillie, as little data were available from any previous sampling on these features (Figure 1).

From 58 epibenthic sled tows, a total of almost 3700 invertebrate and fish specimens were catalogued during the survey, comprising taxa from 13 phyla. Many groups were infrequently caught, but sponges, anemones, crabs, crinoids, corals, brittle stars, hydroids and polychaetes were found on most seamounts. Ophiuroids were the most numerous, with over 500 individuals recorded from the sled catches. The catch from Lillie seamount was one of the most diverse and abundant, whereas lower or about equal numbers were recorded in sled tows on Healy, Rumble III and Rumble II West. The specimens collected during the voyage are currently being examined by taxonomists, and it will be some time before formal identifications are completed.

There were marked differences between faunal groups on the various seamounts (Figure 1). Relative abundance was highest at Lillie (numbers of individuals standardised to a tow length of 1 n. mile) where anemones, polychaetes and ophiuroids were abundant. Faunal numbers were also high at Clark seamount, but there the main taxa were more evenly distributed: ophiuroids, corals, bivalves, gastropods and decapods (mainly shrimps, squat lobsters and hermit crabs).

Hydrozoans were common on Rumble III as well as on Cotton, whereas ophiuroids were the most abundant fauna on Rumble II West and Healy. Overall numbers of animals were relatively low on these last three seamounts.

Japan - New Zealand Workshop on Seafloor Resources

In November 2010, a workshop was held in Tokyo between New Zealand and Japanese scientists to discuss the future direction of SMS research in Japan and New Zealand. The workshop was held at the University of Tokyo on 1-2 November 2010, and was followed by a two-day field excursion. The fieldtrip was to Misasa mine and surrounding area. This region hosts SMS deposits now exposed on land, and it gave us all a chance to see first hand the type of deposits that we explore on the seafloor.

There were 10 New Zealand participants (including two students) from NIWA, GNS and Victoria University of Wellington. Funding for the New Zealand participants was from the Royal Society of New Zealand. The Japan Society for the Promotion of Science funded the conference and fieldtrip in Japan.

Norway

Rolf Pedersen

Researchers from the Centre for Geobiology (CGB) at the University of Bergen continue to undertake most of the ongoing ridge research activity in Norway. During summer 2011, several CGB research teams returned to the Arctic ridges. This year the focus was on the Mohns Ridge near the volcanic island of Jan Mayen. The team, which also included researchers from University of Washington, ETH Zürich and University of Girona, returned for more detailed sampling of the two hydrothermal fields discovered in 2005. An overriding focus for this summer's cruise activity was to use the natural CO₂ leakage from these relatively shallow hydrothermal fields to test gas sampling and sensors, and in particular the use of acoustic methodologies to detect and quantify seafloor CO₂ leakages. Such methodologies are also relevant for CGB's participation in CO₂-related projects such as the collaborative EU project, ECO₂ that focuses on the safety of subseafloor CO₂ storage and monitoring strategies.

The teams continued to use and develop AUV procedures for detailed imaging of the seafloor, using a combination of multibeam echo sounder and side scan sonar systems, as well as photo mosaicing. This year we particularly tested the use of synthetic aperture sonar (HISAS) mounted on a Kongsberg Maritime HUGIN AUV (see Figure 1). As with previous cruises, CGB researchers continued to be active in sampling and characterization activity that is relevant for bioprospecting.

Philippines

Graciano P Yumul, Jr. and Dr. C.B. Dimalanta

Dr. Yumul has submitted a paper by way of reporting on work done in the Philippines in 2011. Please see: "*Oceanic and continental margin terranes at the Sundaland-Philippine Sea Plate collision boundary: Preserved evidence on northwestern Mindoro, Philippines*" in the International Research section of IR News 2011.

Russia

Sergei Silantyev

Russian ridge cruises in spring-autumn 2011 included: R/V *Professor Logachev* (Polar Marine Geological Expedition - PMGE, Ministry of Natural Resources) at the Mid-Atlantic Ridge (MAR) between 12°-20°N, in an area claimed for the prospecting of polymetallic sulfides by the Russian Federation at the 17th Session of the International Seabed Authority (11-22 July 2011, Kingston, Jamaica). Multidisciplinary explorations in the Northern Atlantic and Western Arctic region were continued by R/V *Akademik Nikolai Strakhov* (Geological Institute, RAS).

The biennial workshop of Russian-Ridge was held in Moscow on 1-2 June 2011 at the Institute of Ore Deposits, Petrography, Mineralogy and Geochemistry of Russian Academy of Sciences. The topic of this workshop was “Main Results in Russian Study of the Mid-Oceanic Ridge Processes in First Decade of XXI”. Scientists from different Russian scientific centres participated and presented results obtained during the first decade of the new century. We would like to highlight the following:

Big hydrothermal cluster including ore deposits have been discovered during 2000-2011 in the MAR rift valley between 12°58'N and 14°45'N (Ashadze (12°58'N), Semenov (13°31'N) and to the north of this region (Krasnov (16°38'N), Peterburgskoye (19°52' N) and Zenit-Victory (20°08' N)).

Many Russian scientific centres participated in these expeditions, and onshore investigations.

Big dataset on petrology and geochemistry of different rocks, composed of oceanic core complex widespread at MAR axial part between 13°-15°N, was obtained and published (with IFREMER and IPGP-CNRS UMR, France).

1,2,3,4,5

Collections of plutonic rocks were made during cruises 22 and 26 of the R/V *Professor Logachev*, Cruise 41 of the R/V *Akademik Mstislav Keldysh*, and the Russian-French expedition *Serpentine* aboard the R/V *Pourquoi pas?*. The data obtained suggest that the oceanic core complexes of the Ashadze and Logachev hydrothermal fields were formed via the same scenario in the two MAR regions. On the other hand, the analysis of petrologic and geochemical characteristics of the rocks indicated that the oceanic core complexes of the MAR axial zone between 12°58' and 14°45'N show a pronounced petrologic and geochemical heterogeneity manifested in variations in the degree of depletion of mantle residues and the Nd isotopic compositions of the rocks of the gabbro-peridotite association. The trondhjemites of the Ashadze hydrothermal field can be considered as partial melting products of gabbroids under the influence of hydrothermal fluid. It was supposed that the presence of trondhjemites in the MAR oceanic core complexes could be used as a marker for the highest temperature deep-rooted hydrothermal systems. Perhaps, the region of the MAR axial zone, in which petrologically and geochemically contrasting oceanic core complexes are spatially superimposed, served as sites for the development of large hydrothermal clusters with a considerable ore-forming potential.

For the first time the oceanic core complex from MAR-Sierra Leone RTI (5°-6°N) was sampled and studied.^{2,3}

A big sample collection representing all rock types composed of MAR axial zone between 5°-6°N has been studied. These samples were collected during the 10th cruise of R/V *Academic Ioffe* and the 22nd cruise of R/V *Professor Logachev*. The MAR region near its intersection with Sierra Leone FZ is a typical example of oceanic core complex with wide development of extension structures, including various faults and fragmented rift valleys. The area is characterised by extensive outcrops of altered mantle peridotites and gabbroic rocks; fresh basaltic pillow lavas play a subordinate role

here. The majority of the studied plutonic rocks form the main trend of regular change in the compositions, from troctolites through olivine gabbros, gabbros and gabbro-norites to diorites. It was proposed that the formation sequence of the oceanic crust in MAR between 5°-6°N was realized at three major episodes: (1) Formation of two types of plutonic rocks: primitive gabbro derived from MORB-parental melts, and Fe-Ti-gabbro related to siliceous Fe-Ti oxide series; and 2) The recent eruptions of fresh pillow lavas MORB-type with chilled glassy margins.

The U-Pb dating of Zr from oceanic plagiogranites and associated gabbroic rocks from two MAR oceanic core complexes (12°58'N and 5-7°N) were carried out.^{1,2,3,5}

In recent decades, progress in the application of methods of isotope geology for dating the rocks of oceanic basement was related to the study of behavior of U-Pb system in zircon extracted from gabbroids and associated oceanic plagiogranites. The isotopic study of zircons from gabbros of the axial MAR zone at 5°-6°N (Markov deep) using laser ablation showed that all samples of gabbro-norites dredged in this area from the same dredging site contain zircons with very young ages, up to 1-2 Ma. The U and Pb isotope composition of zircon from the same collection was previously analysed using a SHRIMP ion microprobe. Based on this study, two zircon generations were distinguished in these rocks: young zircons and very old with ages up to 3170 Ma. The U-Pb dating and Lu-Hf isotope analysis of zircon grains extracted from trondhjemites and host gabbros in the oceanic core complex of the Ashadze hydrothermal field (MAR, 12°58'N) demonstrated that zircons both from trondhjemites and gabbros are dated at close to 1 Ma. It should be especially emphasised that zircons from trondhjemites of the Ashadze field are similar to those extracted from associated gabbros in terms of trace element distribution. Available data on the age of zircon from felsic rocks and associated gabbros indicate that the best statistically justified U-Pb age determinations are ages of MAR plagiogranites within the range of 0.76-1.95 Ma. This age obviously marks the oceanic plagiogranites as being related to the late magmatic stage of the evolution of the oceanic core complexes of MAR. The proportions of felsic rocks that compose the oceanic core complexes make it possible to believe that oceanic plagiogranites were formed at the final stages of their magmatic evolution. Therefore, the same age data on zircons indicate that exhumation of the oceanic core complexes of MAR began no earlier than this time.

New data on chemistry and mineralogy of the ore edifices from different Atlantic hydrothermal fields were obtained.^{2,5,6}

Research of fluid inclusions in minerals from samples, selected during the 32nd cruise of R/V *Professor Logatchev* at the Semyenov-4 and Semyenov-5 hydrothermal fields (13°31'N) in the Central Atlantic was carried out. Physicochemical parameters of hydrothermal ore-forming processes have been defined by means of the analysis of fluid inclusions in barite from sulfide ore samples and in anhydrite from samples of ore edifices (hydrothermal field Semenov-5). A comparison of results of this study, with data available from a near located hydrothermal field, has shown that clear differences of temperature and salinity of fluid exist in fluid inclusions from sulfides composed of ore edifices widespread in the hydrothermal cluster at MAR between 13° and 15°N.

The high-precision MC-ICP-MS method of Pb-isotope analysis has been applied to the study of sulfides from four hydrothermal fields in MAR between 12°58'-16°38'N: Ashadze, Semenov, Logachev, and Krasnov. The Pb-isotope characteristics of studied sulfides permit participation of two mantle sources of Pb (DMM and HIMU) in their formation, the first being prevalent. Obtained results demonstrate also that sulfides from examined hydrothermal fields are similar to MORB by their Pb-isotope composition.^{2,5}

The study of metallic-ferrous and ore-bearing sediments located within northwestern (active) and eastern (non-active) hydrothermal fields of the Semenov ore deposit was the first for data on lithology and biostratigraphy of sediment cores sampled in the Semenov field.^{1,3,5,7}

Geodynamic model of serpentinite-hosted hydrothermal systems was proposed on the basis of numerical modeling as well as empirical data.¹

Kinetic and thermodynamic simulation of the interaction of seawater and its metamorphosed derivatives with peridotites and gabbros in the slow-spreading ridges have been used for reconstruction of phase transformations and matter balance in serpentinite-hosted hydrothermal systems. Simulations were carried out on a simplified vertical crustal section of a slow-spreading ridge of the Hess type that consists only of mantle peridotites (spinel harzburgites). Main results of modeling allow the proposal of the geodynamic model for formation of the Serpentinite Hosted Hydrothermal Systems (SHHS). The simulated mineralogical facies of hydrothermally modified slow-spreading ridge peridotites are in good agreement with the stability fields of secondary minerals in the MSH system. The proposed model suggests that differences in the compositional parameters of hydrothermal vents at the different SHHS are predetermined by the different depths of the corresponding hydrothermal circulation systems. The same modeling was used to reconstruct the geochemical and mineralogical trends of evolution of gabbros during their hydrothermal interaction with marine fluid. The results of simulation offered a new insight into some problems of material balance and ore formation during hydrothermal processes in the slow-spreading ridges.

Modeling of the geodynamic processes in the oceanic spreading center⁸

The main approach in this study was the method of numerical and analogous modeling of processes of oceanic crust accretion and structure-forming in spreading zones. There are three main factors controlling formation of crustal magmatic chambers and zones of focused mantle upwelling in axial zones of mid-oceanic ridges: spreading velocity, mantle temperature, and intensity of magmatic supply. Thickness of crust can possibly indicate the last one. Relationships of these factors can vary significantly in different geodynamical regimes of spreading. Finally, they determine the presence or absence of magmatic chambers and their shape and extent. Experimental thermo-mechanical modeling of accretion processes gives an opportunity to establish qualitative connections between thickness of axial lithosphere and the extent of its heating, with peculiarities of segmentation and structure forming in various spreading regimes. Processes of topography formation in zones of slip and extension were studied by this method. It was concerned also with various processes including formation of transform and non-transform offsets of rifting axis. Colloidal systems composed on the basis of solid and liquid hydrocarbons were applied as experimental materials. Tests were conducted on the experimental complex, including a reservoir with moving wall and a system of internal heating of model material. An electromechanical engine provided movement of the wall with predefined velocity. Experiments replicated different spreading conditions with different velocities and directions of extension, thickness of model lithosphere, width of heating zone and amplitudes of offsets. In this study, the following problems have been considered: formation of axial spreading zones and their stability; formation of transform and non-transform offsets of the rift valley; definition of peculiarities of accretion and off-axial topography of rift valley; and interaction of spreading ridges with hotspots.

New data on geochemistry of hydrothermal vent ecosystems and species diversity of vent communities were obtained.⁴

General patterns of vertical distribution of hydrothermal vent communities were analysed. Two main groups of hot vent communities can be distinguished: «shallow-water» - occurring shallower than 200 m and «deep-water» lying deeper than

200 m. In deep-water communities, symbiotrophic species play an important role in biomass, in shallow-water ones their role is not important. It is suggested that below 4000 m the structure of hot vent communities changes since some vent-obligate taxa do not occur at such great depth.

The distribution of chemical elements in biotic and abiotic ecosystem components at six hydrothermal vent fields at the Mid-Atlantic Ridge (Menez Gwen, Rainbow, Lost City, Broken Spur), the East Pacific Rise (9°50'N) and the Guaymas Basin has been studied. Samples were collected during the 49th and 50th cruises of the Russian R/V *Akademik Mstislav Keldysh* (with *Mir-1* and *Mir-2* submersibles). For the first time, by using a unified approach of collection and chemical analysis, data on the elemental composition of not only the organisms (n=250) but the environment as well (suspended particulate matter, fluids, biotope water) were obtained. The Fe, Mn, Zn, Cu, Co, Ni, Cr, Pb, Cd, Ag, As, Sb, Se and Hg concentrations in the samples were determined by atomic absorption (flame and flameless) spectroscopy (AAS), instrumental neutron activation analysis (INAA), and inductively coupled plasma-atomic emission spectroscopy (ICP-AES).

“Mantle windows” and non-magmatic spreading in the South-East Indian Ocean^{5,7}

This study is based on about 16,500 km of MCS, gravity and magnetic data as well as 40 sonobuoys, which were acquired in the South-Eastern Indian Ocean - on the East Antarctic margin conjugated with Australia (between 102°E and 152°E) during four cruises of Russian R/V *Akademik Karpinsky*. Interpretation of these data combined with data collected previously by USA, Japan, France and Australia (in total about 30,000 km of MCS lines) gives a good basis for understanding the complex crustal structure and tectonic evolution of the studied region. The studied Antarctic margin developed as a result of extreme crustal extension and syn-rift mantle unroofing, culminating in the formation of peridotite/gabbro highs and ridges. The zone of mantle unroofing (transitional crust) has a width of 100-150 km and is well defined by a positive linear gravity anomaly.

¹*Vernadsky Institute of Russian Academy of Sciences;* ²*Institute of Ore Deposits, Petrography, Mineralogy and Geochemistry of Russian Academy of Sciences;* ³*Geological Institute of Russian Academy of Sciences;* ⁴*Shirshov Institute of Oceanology of Russian Academy of Sciences;* ⁵*PMGE, Ship owner of R/V Professor Logachev, Ministry of Natural Resources;* ⁶*Institute of Geology and Mineralogy of the Siberian Branch of Russian Academy of Sciences;* ⁷*VNIIOKeangeologia, Ministry of Natural Resource;* ⁸*Moscow State University*

SOPAC Division of the Secretariat of the Pacific Community

Akuila Tawake

SPC-EU Deep Sea Minerals Project Implementation Update

The discovery of ‘high grade’ Seafloor Massive Sulphide (SMS) deposits and the recent granting of commercial mining leases in Papua New Guinea (PNG) territorial waters have triggered growing interest in marine polymetallic deposits, including manganese nodules and cobalt-rich crust throughout the Pacific Islands region. This has resulted, within a space of five years, either applications for, or granting of, exploration licenses in Fiji, Vanuatu, Solomon Islands, New Zealand, Papua New Guinea, Palau and Federated States of Micronesia, with additional interest being expressed for exploration within the waters of the Cook Islands and Kiribati.

In response to the growing interests in deep sea minerals exploration and mining in recent years within national jurisdiction of the Pacific Islands region, the Secretariat of the Pacific Community (SPC) has proposed a regional approach to addressing the aforementioned issues. This was endorsed by member countries, the Pacific Island Forum Secretariat (PIFS) and the European Union (EU). As a result, the EU has agreed to provide financial support under the 10th European Development Fund to SPC for the implementation of the SPC-EU EDF10 Deep Sea Minerals (DSM) Project.

The overall objective of the project is to expand the economic resource base of Pacific ACP States by developing a viable and sustainable marine minerals industry. The specific purpose is to strengthen the system of governance and capacity of Pacific ACP States in the sustainable management of their deep sea mineral resources through the development and implementation of sound and regionally integrated legal, fiscal and environmental frameworks, improved human and technical capacity and effective monitoring systems.

The DSM Project officially commenced with the signing of the Contribution Agreement between the European Union (EU) and the Secretariat of the Pacific Community (SPC) on 6 August 2010 in the margins of the Pacific Islands Forum Leaders meeting in Port Vila, Vanuatu. Additionally, the inaugural DSM Project regional workshop: “High Level Briefing on the Status of Deep Sea Minerals in the Pacific Islands Region and Planning for a Regionally Integrated Way Forward” was held in Nadi, Fiji, on 6-8 June and was attended by various stakeholders within and outside the region. A total of 97 participants attended the workshop (Figure 1).

The main objectives of the workshop were to present the SPC-EU Deep Sea Minerals (DSM) Project and to provide an opportunity for country representatives to be briefed on various aspects of deep sea minerals. A full report can be viewed at: <http://www.interridge.org/policy>

4.c Status of potential membership upgrades / additions

The revised table of national memberships is posted at:

http://www.interridge.org/files/interridge/IR_member_nations_table_2011a.pdf

- Portugal has tried to raise the issue of InterRidge membership with a newly created “Ministry of the Sea”, but we have not heard from P. Ferreira since mid-September 2011. In light of four years of no payment, it is with regret that it has been decided to re-classify Portugal as a Corresponding member.
- Since the 2009 StCOM meeting, InterRidge has encouraged Hong Kong to work closely with IR China. However, there has been no contact with the IR Office since the last correspondence in April 2010.
- New Zealand is unable to increase their commitment at present.
- Ireland became a Corresponding Member in July 2011, through Dr. Andy Wheeler, Univ. Cork.
- Jerome Dyment recommended Prof. Alfredo Aguillon-Robles as the Mexican Correspondent, who accepted.

DISCUSSION

JD suggested that Australia and Canada should increase their level of membership, as countries should not be Corresponding members for ever. IR has a greater presence in the region through the new WG proposal.

BM pointed out there was no authority to make countries become paying members.

GC asked for a letter of invitation from IR for full membership.

NB suggested Brazil should become paying members – several Brazilians are in the SMART new WG proposal.

ACTION

DM to ask GC for names and addresses for Russian membership, and de Souza.

BM to write letter of invitation for full Russian membership.

5 GRID-Arendal liaison: proposal of a UNEP-IR Atlas: Deep sea chemosynthetic ecosystems facing human impacts

Yannick Beaudoin, Head of Marine Programme, joining the meeting via Skype, powerpoint presentation.

InterRidge has been asked to consider being a partner in producing an “Atlas of deep sea ecosystems facing human impacts”. See Appendix II p. 46 for details.

DISCUSSION

YB - Google Ocean “bubbles” – Offered to develop 12 bubbles for \$10,000

YB outlined two options – **Rapid Response Assessment and the Atlas**. The funding for past models, started with seed money and an explanatory document from GRID. GRID approached two governments who were already investing in the area, and this gave leverage to other groups and companies. It took 4-5 months to get the project underway.

The IR community would need to identify and meet contacts, develop a letter of support to take to agencies such as ISA.

CG - recommended YB contacted INDEEP as it is a more biologically focused group (Maria Baker, Mireille Consalvey).

BM - how effective is the products’ impact?

YB - text from Blue Carbon used in US Senate’s climate bill. Ice and Snow – UNEP best seller for two years in downloads. RRA Congo – led directly to protection policy, now working on enforcement.

BM - how would people find the publication?

YB - embed it on IR site. Launch it at a suitable high profile media/political event. Apps on i-phone and androids. Facebook and Twitter.

JD - asked about the text.

YB - GRID adds value to scientific journal articles by creating a narrative.

NB - Who decides the contributors to the atlas?

YB - GRID brings together a StComm to establish the scope, suggest lead authors for chapter coordination.

OCEANIDS

<http://oceanids.geoiq.grida.no>

YB - IR community produces lots of data, GRID encourages access to data adding value to communities other than scientific ones. GRID can partner with IR to allow more public distribution and is very useful for developing countries.

BM - Do you have control over the data which is posted?

YB - Some – aim is for people to enjoy interacting with data.

UNIVERSITY OF THE SEAS

YB – what is needed is: Development of a project structure with IR

Advance notice of cruises that could host students from developing countries
Funding in the range of \$25000

DISCUSSION

JD - queried the relationship between GRID and UNEP.

CG - outreach is important - GRID might do a better job than IR in sharing data. But is IR the right group for GRID to start with – INDEEP may be better, because expertise for the data product in mind is elsewhere. INDEEP could come back to IR for any geological underpinning. IR needs to identify a needed product and needs to see a business plan and contract.

BM - IR must be clear what issue does it want from GRID.

SS - IR needs to ask: What is the purpose of the product? Who is the audience? What will it cover not already covered? Decision makers want information to do cost benefit analysis. Pictures can create distrust due to missing information or spatial variation. E-books appropriate for developing nations but limited by internet access.

ACTION

DM - contact YB with the outcome that IR does not want to proceed, but to put YB in contact with Maria Baker of INDEEP.

6 Current working groups – Updates

In 2011, there are 5 active IR working groups.

6.a Hydrothermal energy transfer: its impact on the Ocean Carbon Cycles

InterRidge WG jointly with SCOR WG 135
Powerpoint presentation by N. LeBris

Co-Chairs - Nadine Le Bris (IFREMER, France), Christopher R. German (WHOI, USA)

Group Members - Wolfgang Bach (Univ. Bremen, Germany); Loka Bharathi (National Institute of Oceanography, India); Nicole Dubilier (Max Planck Institute Marine Microbiology, Germany); Katrina Edwards (Univ. Southern California, USA); Françoise Gaill (CNRS, Paris, France); Toshi Gamo (Univ. Tokyo, Japan); Peter Girguis (Harvard Univ., USA); Xiqiu Han (Second Institute of Oceanography, SOA, China); Julie Huber (Marine Biological Laboratory, Woods Hole, USA); Louis Legendre (LOV-UPMC, Villefranche, France); George W. Luther III (University of Delaware, USA); William E. Seyfried Jr. (Univ. Minnesota, USA); Stefan Sievert (WHOI, USA); Ken Takai (JAMSTEC, Japan); Andreas Thurnherr (Columbia Univ., USA); Margaret K. Tivey (WHOI, USA).

The WG has welcomed a new associated member, Dr Julia Sanders, from Marine and Freshwater Chemistry, Department of Chemistry, University of Otago, New Zealand. She is a specialist in trace metal speciation in natural aquatic systems and has published several papers on the complexation of metals issued from vents by organic ligands (Sander and Koschinsky, 2011). Beyond providing a very important and complementary scientific expertise, she will add to the international representation of the WG. New Zealand is indeed part of the South Pacific countries that were previously under-represented in our WG.

The annual meeting took place in Hangzhou, China 10-11 October 2011. It was hosted by Xiqiu Han at the 2nd Oceanographic Institute of China. As presented in the WG terms of reference and detailed in our last report, the meeting

was dedicated to drafting two synthesis papers and to setting the plans for the 2012 international workshop. Synthesis will build on existing publications and on-going studies, particularly from WG members, which have developed as a substantial effort in the last 24 months.

In terms of field programs, the group members have been active in a number of new collaborative experiments or explorations for which discussions at the WG level have had significant outcomes. Several projects associating different WG members have been recommended for funding by NSF and are in the process of receiving official approval.

A non-exhaustive list of significant recent or forthcoming cruises:

- 1) Fall 2010. MenezMAR cruise on the Mid Atlantic Ridge. (N. Dubilier, Chief Scientist, W. Bach co project-leader, invited participants: N. Le Bris and P. Girguis). Interdisciplinary geological, chemical and biological studies at the Menez Gwen hydrothermal vent field, Mid-Atlantic Ridge, at 37°50'N. Two of the objectives were particularly related to the WG focus: How does conductive heating of seawater and conductive cooling of hydrothermal fluids affect the composition of diffuse fluids and the vent biota? What are the dominant sources of energy for vent life in the subsurface, surface and hydrothermal plume?
- 2) Summer and January 2011 (C. German): a pair of forthcoming research cruises to the ultra-slow Mid-Cayman Rise with large emphasis on C-org cycling near-seabed and during the buoyant as well as non-buoyant phases of hydrothermal plumes.
- 3) Fall 2011. IODP drilling leg for deep biosphere, North Pond (Mid-Atlantic Ridge flank) (K. Edwards, as co-Chief Scientist and other WG members including W. Bach). Key themes include functions and rates of global biogeochemical processes; the extent of life in the deep biosphere; limits to the existence of life; and evolution and survival in the deep biosphere – all of which are directly relevant to the scope of this WG.
- 4) 2012-2013. GEOTRACES cruise investigating biogeochemical cycling in the South EPR hydrothermal plume (as well as Peru upwelling) has (informally) been approved in the US with C. German as Co-Chief Scientist (alongside Jim Moffett for the Peru Margin component).
- 5) 2012-2013. Indian and Caribbean cruises (K. Takai, with other WG members) particularly focusing on the linkages between geosystem and ecosystem of hydrothermal vent via chemistry.

A substantial number of papers have been published by WG members in 2010 and 2011, including several reviews on specific topics (see below). These works significantly expand our knowledge on 1) the rates and metabolisms fuelling autotrophic and methanotrophic carbon fixation, 2) the distribution and structure of chemosynthetic habitats on and below the seafloor and the diversity and variability of available chemical energy sources, 3) the flow of kinetically stabilized iron that can be exported from vents over long distances, and organic carbon export from vents. In addition, a couple of recent publications on the ocean circulation and dynamics near the crest of the EPR has been published (A. Thurner and co-workers), paving the way to further integration for an assessment of the impact of vent-derived material to the ocean carbon deep ocean budgets. An update of German and Von Damn (2004) overview paper on Hydrothermal Processes for the Treatise on Geochemistry can be mentioned as well as an upcoming publication led by Chris German and Bill Seyfried.

We also acknowledge the support that was provided by InterRidge as part of its fellowship programme to one student (D. Giovannelli) and a post-doc (E. Reeves), who are conducting studies in direct link with our focus. D. Giovannelli will visit

Costantino Vetriani's laboratories at Rutgers University to develop a project entitled: "Analysis of functional gene transcripts in microbial chemosynthetic biofilms from deep-sea hydrothermal vents". The aim of the proposed project is to investigate carbon fixation, respiratory metabolism and quorum sensing mechanisms in chemosynthetic microbial biofilm from deep-sea hydrothermal vents. E. Reeves is a Postdoctoral Fellow at the MARUM Center for Marine Environmental Sciences, University of Bremen, Germany, working with Drs. Wolfgang Bach and Kai-Uwe Hinrichs. His proposal is entitled: "An organic geochemical investigation of sulfur-bearing ligand formation in ascending hydrothermal plume particulate matter". He will be working in collaboration with Drs. Chris German and John 'Chip' Breier at the Woods Hole Oceanographic Institution, USA. They will conduct a hydrothermal plume particle sampling campaign at hydrothermal sites in the Cayman Trough in 2011.

Publications by WG members (2010-2011)

- Bennett, S.A., Sessions, A.L., Hansman, R.L., Nakamura, K. and Edwards, K.J., 2011. Tracing iron fueled microbial carbon production within the hydrothermal plume at the Loihi Seamount. *Geochimica Cosmochimica Acta* doi:10.1016/j.gca.2011.06.039.
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DISCUSSION

NB reported on the two models developed at the earlier workshop. They can work with different geologies/hydrothermal systems, using inverse modeling.

JD noted the progress of this WG and asked if IR should change the way it develops WGs. IR should consider people working together for a longer time than ~4 years. It should not be assumed that the WG disbands after one international meeting.

BM welcomed the presentation and will pass on the request for \$10,000 for the 2012 meeting to the IR StComm.

ACTION

DM to contact the StComm with financial request for \$10,000.

DM to add discussion point about WGs to Third Decadal Plan agenda.

6.b Long-Range Ridge Exploration

Chair - Colin Devey (Germany)

Group Members (Brazil, China, France, Japan, South Africa, UK, USA) - Chris German, Sidney Mello, Lucia Campos, Anton le Roex, Cindy Van Dover, Gwyn Griffiths, Koichi Nakamura, Hidenori Kumagai, Jiabiao Li, Marcia Maia.

A proposal to form a Working Group to study the Southern Mid-Atlantic Ridge has grown out of the activity of the Long Range Exploration WG. See Appendix III p. 50.

It has been requested that this WG is disbanded.

DISCUSSION

CG explained the context to the development of the new WG proposal “SMART”, arising from the LRE workshop in 2010.

StComm agreed that the WG be disbanded, as a new WG proposal had been tabled.

6.c Mantle Imaging

Chair - Nobukazu Seama (Japan)

Group Members (China, France, USA) - Douglas A. Wiens, Alan D. Chave, Douglas R. Toomey, Pascal Tarits, Wayne C. Crawford, John Chen.

Powerpoint presentation

The Mantle Imaging Working Group was very active in the past year, organising an international workshop on ocean mantle dynamics. This was held in October 2011 at the Atmosphere and Ocean Research Institute, University of Tokyo, Japan. The main question posed at this workshop was: What have and can we derive from crustal and mantle imaging beneath the ocean together with laboratory and numerical studies? Recent high quality seismic surveys with dense OBS (Ocean Bottom Seismograph) arrays reveal variations in the velocity structure of ocean crust, the uppermost mantle, and the Moho transition zone, even if they were formed at a fast-spreading ridge system. Moreover, recent progress in long-term observational technology on the seafloor enables the imaging of regional mantle structure using both seismological and electromagnetic techniques. The resulting velocity and resistivity structures, combined with results from laboratory experiments on mantle rocks and numerical simulations, provide important constraints toward understanding ocean mantle dynamics.

In this meeting, there was a focus on three objectives of crustal and mantle imaging, with an emphasis on mantle dynamics:

- 1) the structure of oceanic lithosphere (including the crust and sub-crust) and asthenosphere
- 2) melt migration beneath the spreading axis to form oceanic crust
- 3) the role of water, especially for subduction and back-arc spreading dynamics.

Each topic is closely inter-related but for each topic, we first reviewed all the available structural images of crustal and mantle structure. Second, recent laboratory experiments on crustal and mantle rocks were presented in order to help interpret the images. Then, petrological and geochemical characteristics of the crust and mantle were used to address variability of crustal formation, and to provide constraints on melt migration and the role of water. Finally, investigations

from numerical simulations are expected to help identify the parameters controlling melt migration, crustal formation, and mantle structure.

(The meeting took place as this report was being produced).

DISCUSSION

NS explained the US group had asked that subduction be included for participation purposes, and GEOPRISMS support meant many Americans were present. It was the first international meeting at AORI, and good for this new institute. 77 people attended from 6 countries. The poster session was introduced by 2-slide oral presentations. Two IR student prizes were awarded to Shusaku Yamazaki and Akiko Takeo, and IR was thanked for its financial support.

BM thought the fieldtrip very valuable, for practical reasons and networking. He expressed the view that convenors should be trusted as to how much time is needed to organize meetings, and that IR StComm should not dictate this.

JD agreed that trust is very important, citing the Mauritius example earlier in 2010. What is the future of this WG?

NS – a discussion is needed with WG members. Collaboration is needed for OBS data.

ACTION

NS to consult WG members.

6.d Seafloor Mineralization

Chair - Maurice Tivey (USA)

Group Members - Fernando Barriga (Portugal), Georgy Cherkashov (Russia), Yves Fouquet (France), Mark Hannington (Canada), Yasuhiro Kato (Japan), Jonguk Kim (Korea), Lisa Levin (USA), Rachel Mills (UK), K. A. Kamesh Raju (India), Xuefa Shi (China), Ingunn Thorseth (Norway), and Cindy Van Dover (USA).

The Seafloor Mineralization Working Group added a new member, Dr. Sven Petersen, from IFM-GEOMAR, Germany, to its membership. Several Working Group members attended the 40th Underwater Mining Institute in Hilo, Hawaii, 14-16 Sept 2011. It was the largest attendance of any UMI meeting in its recent history. In addition to the UMI meeting, a special session on Marine Resources was hosted at the MTS/IEEE Oceans '11 conference in Waikoloa, Hawaii 20-21 Sept 2011 chaired by Steve Scott and John Wiltshire. A list of the abstracts and some relevant papers by Working Group members are listed below in the reference section. A workshop was sponsored by the International Seabed Authority (ISA) in the summer of 2010 in Dinard, France in part as a follow-up to the SMWG recommendation on investigating the impact on hydrothermal ecosystems of undersea mining of polymetallic sulfides. The report was published in 2011 by Working Group Member Cindy Van Dover and others. This Dinard report is available from the ISA website at: <http://www.isa.org.jm/files/documents/EN/Pubs/TS9/index.html>. Cindy Van Dover is also leading a group to develop background information for a workshop proposal on deep-sea habitat restoration: guidelines for management - a high-level look at practices in restoration ecology and applications to deep-sea activities (3 Duke University work-study students are reviewing the restoration practices literature to discover leaders in the field and key concepts. A special session at Ocean Sciences in Salt Lake City (19-24 Feb 2012) is planned on “Deep-Sea Conservation Imperatives in the 21st Century” and will be chaired by Lisa Levin, Cindy Van Dover, Jeff Ardron and Craig Smith.

At the end of 2010, InterRidge was asked by the Legal and Technical Commission of ISA to provide them with a list of hydrothermal vent fields for protection from the recently released “Regulations on Prospecting and Exploration for

Polymetallic Sulphides in the Area” (ISBA/16/C/L.5). InterRidge canvassed the community for feedback and sent a memo to the ISA expressing concern about singling out specific sites and to reinforce the need for clarification on rules for Marine Scientific Research, release of contractor data in a timely way and how biological issues were going to be addressed. In July 2011, the ISA approved licence plans for exploration for polymetallic sulphides in the Area by China Ocean Minerals Resources Research and Development Association (COMRA) submitted 7 May 2010 for work in the Indian Ocean and by the Ministry of Natural Resources and the Environment of the Russian Federation submitted 24 December 2010 for work in the Atlantic Ocean. Licences are expected to be issued before the end of the year.

It has been requested that this WG is disbanded.

Published abstracts, journal articles and reports:

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- Cherkashov, G., 2011. Seafloor massive sulfide deposits discovered at the mid-Atlantic Ridge – Potential target for the ocean mining in the area. Marine Technology Society (MTS), Oceans '11 Conference, September 19-22, Kona, Hawaii, Abstract 110421-017.
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- International Seabed Authority, 2011. Environmental Management of Deep-Sea Chemosynthetic Ecosystems: Justification of and Considerations for a Spatially-Based Approach. Technical Study: No. 9. ISBN: 978-976-95268-9-1.
- Jamieson, J. and Hannington, M., 2011. Size, age and accumulation rates of seafloor massive sulfide deposits. 2011 SME Annual Meeting, Denver, March 2, 2011, Abstract Volume, p. 96.
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- Kim, J., Lee, K.Y. and Kim, J.H., 2011. Metal-bearing molten sulfur collected from a submarine volcano: Implications for vapor transport of metals in seafloor hydrothermal systems. *Geology*, v. 39, no. 4, p. 351-354.
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- Van Dover, C.L., Cherkasov, G., Lodge, M. and Smith, S. (submitted). The Dinard Guidelines: A conservation strategy for chemosynthetic ecosystems. (In Revision: *EOS Transactions, American Geophysical Union*).
- Van Dover, C.L., Smith, C.R., Ardron, J., Dunn, D., Gjerde, K., Levin, L., Smith, S. and the Dinard Workshop Contributors, 2011. Marine Policy, <http://dx.doi.org/10.1016/j.marpol.2011.07.002>.
- Van Dover C.L., 2011. Tighten regulations on deep-sea mining. *Nature* 470: 31-33.

DISCUSSION

(Referring to original email, there was an assumption that StComm would want to disband the WG, rather than a request to do so). ***“I am expecting that you will want to wind up this Working Group at that meeting. That is OK with me but I do think the issue of seafloor mineralization will continue to be an important topic to track by InterRidge.”***

BM - disbanding the WG is premature and unilateral. The topic remains of interest and the WG should be invited to formulate a plan.

JD – topic is very big and therefore difficult without a clear mandate from the StComm. WG should remain until discussion at Third Decadal Plan (TDP) meeting. WG is needed to give advice, watching what is happening.

CG – WG needs to be represented at TDP.

NS – the situation is the same for the Mantle Imaging WG.

ACTION

BM - to ask M. Tivey:

- to consult WG members about the future of the WG.
- to name an alternate for TDP.

6.e Vent Ecology

Co-Chairs: Stephane Hourdez (France) and Yoshihiro Fujiwara

Group Members (Austria, Canada, China, Germany, Japan, Korea, Portugal, Russia, UK, USA) - Maria Baker, Monika Bright, Ana Colaço, Nicole Dubilier, Sergey Galkin, Peter Girguis, Jung-Ho Hyun, Crispin Little, Anna Metaxas, Katsu Fujikura, Xiang Xiao.

Accepted as read – main meeting expected 2013.

This year again, the Vent Ecology WG has mainly been interacting at distance, via the internet, as no major vent-biology meeting has taken place. Activities mainly focused on the establishment of a Sample Transfer Agreement form to facilitate sample use and exchange, as well as the developing interest of mining companies for hydrothermal polymetallic sulfide deposits.

Mining activities and protection of the hydrothermal vent environment

The marked increase in exploration permits for mining companies has raised some concerns in both the scientific community and the general public. A panel discussion was organized last year by the French Academy of Overseas Sciences and IOC-UNESCO on “Exploitable mineral resources (polymetallic nodules, cobalt-rich crusts, hydrothermal polymetallic sulphides) in the abyssal and bathyal domains: options for the conservation and management of the biodiversity of associated ecosystems”. The meeting was held on November 10th, 2010, at UNESCO in Paris, France.

Link to the agenda, background documents and discussion items: http://www.ioc-cd.org/index.php?option=com_oe&task=viewEventRecord&eventID=732

Among these different types of deep-sea mineral resources, hydrothermal deposits will be the first to be exploited. A pilot study of such exploitation is currently underway in Papua New Guinea, where the government granted Nautilus a mining lease in January 2011 (for more details on mineral extraction plans, see the Nautilus Solwara project website:

<http://www.nautilusminerals.com/s/Projects-Solwara.asp>). Studies of the impact of mining activities on biological communities are also currently funded by Nautilus in this area.

Although the legal framework of mineral exploitation and its regulation in EEZs only depends on the country's own legal system, the legal framework for ocean bottom in international waters is the responsibility of the International Seabed Authority (ISA). The UNESCO panel discussion however raised the issue that there is to date, no legal authority dealing with the water column at great depths (i.e. below fishing depths and above the sea-floor). This could be an issue if the mining activity ejects large amounts of particles into the water column.

There were also some concerns of researchers (and not only in Biology) regarding their future work in areas where exploration permits have been granted to contractors for polymetallic sulfides. Adam Cook (ISA) indicated that scientific studies can continue within exploration claim areas as long as it is general marine scientific research rather than commercial exploration for sulfide deposits. Obviously, should there be active mineral exploration there will be safety issues and these may prevent scientific research adjacent to mineral exploration equipment (in the same way that scientific exploration cannot be carried out very close to oil rigs). Conversely, contractors are required to carry out baseline surveys so there may be increased opportunities for marine scientific research.

Biological sample sharing

One of the goals of the WG is to enhance the distribution and use of specimens collected at vents (one of the tenets of the InterRidge "Code of Conduct"). We have posted a model of sample sharing agreement on the website to facilitate these exchanges should such an agreement be necessary (<http://www.interridge.org/node/16694>). Essentially, this agreement states:

- what the interested person is planning to do with the sample(s) (as a quick description),
- that the person will only do that planned work or ask for permission if he/she would like to do something else,
- that this research is not for the private sector (university and affiliated can have the samples for free),
- that he/she will not give these samples to someone else before that other person signs a similar agreement

The statement will also require that, if the shared sample should be used for a publication, the researcher should acknowledge the person who provided the sample and the grant(s) (as well as funding agencies) that allowed the sample collection.

This form is only a model and can be modified. Although initially planned for biological samples, it could easily be used for other types of samples. There is obviously no possible enforcement, however our community of researchers is small and misbehavior will inevitably become common knowledge.

As listing possible samples to be shared on a website does not seem the best way to facilitate sample sharing, we are exploring the possibility of a forum hosted on the Vent Ecology WG pages where researchers in need of samples could post their requests, and researchers of the WG could re-direct these requests to people they think may possess such samples. More work will take place on this in the upcoming year.

Meetings

Panel discussion organized by the French Academy of Overseas Sciences and IOC-UNESCO on "Exploitable mineral resources (polymetallic nodules, cobalt-rich crusts, hydrothermal polymetallic sulphides) in the abyssal and bathyal

domains: options for the conservation and management of the biodiversity of associated ecosystems”. The meeting was held on November 10th, 2010, at UNESCO in Paris, France. For more details, see above.

The EU-funded Coordination Action for Research Activities on life in Extreme Environments (CAREX) is organizing a conference on Life in Extreme Environments, October 18th-20th 2011 in Dublin, Ireland.

6.f Discussion of Working Groups and new WG proposals

Three proposals for new WG have been tabled: (See Appendix III p. 50)

- “Southern Mid-Atlantic Ridge Targeted Exploration” (SMART); C. Devey
- Intra-oceanic Arc and Backarc Systems; Maria Seton
- Oceanic Detachment Faults: J. P. Canales & J. Escartín

DISCUSSION

“SMART”

GC - Does location have a precedent?

BM – Hydrography and biogeography of the SMAR are more important and are the drivers of this proposal, rather than the region.

JD – the name of the WG should be changed to reflect the focus on processes, with the best place to study these processes being the circum-Antarctic ridges. In the past, StComm decided against geographically based WG because they encouraged insularity.

BM – SWIR was a very similar WG with a geographical focus – it was pitched with the main subject being the ultra-slow spreading ridges, and the best place to study them was the SWIR.

CG – At the LRE workshop, 5 disciplines’ perspective was unanimous for S Atlantic as a focus.

BM – IR pulls together the community to tackle difficult areas to get to: hence we have encouraged a Circum-Antarctic Ridges WG proposal and workshop.

CG – IR exists for ethical reasons and international collaboration. Process or geographical orientation is not important. The main question is: is there merit for international coordination and a force for good?

JD – Countries can apply to the ISA to explore an area for resources. National funding may be discouraged for areas not in their national interest. But processes are everywhere and regardless of national interest.

CG – 24 places were identified in LRE workshop. The WG considered the entire planet and asked: where will we learn most about processes? The South Atlantic was the answer we got.

JD – Suggest changing the name by taking one process as a front.

NS – Suggest keep LRE WG, and let it focus on an area. Call it “Targeted Exploration WG”.

BM – SMART may overlap with Circum-Antarctic Ridges WG (proposal expected soon).

ACTION

StComm agreed to support this proposal conditionally. Proposer was asked to rename the WG title, without geographical reference, but to preface with the outcome of LRE workshop – i.e. that the S. Atlantic was the area identified where multiple processes could be studied.

StComm asked that the proposal be resubmitted by email, but a decision will be deferred until the Circum-Antarctic

Ridges proposal is discussed at TDP.

INTRA-OCEANIC ARC AND BACKARC SYSTEMS

BM – this proposal expands IR objectives into arc and backarc systems. From a process point of view, it is a welcome move.

CG – important for seafloor minerals processes – cannot separate different arc systems.

JD – will Australia increase its IR activity, by becoming Associate Members?

BM – Australians are making the majority of the WG members. The Chair becomes an ad hoc member of StComm. IR has never required WG members to be paid-up members – it can only encourage.

JD – this opportunity should be used to suggest membership.

CG – a Co-Chair could come from an experienced IR member named as a potential member, to help build engagement and make an argument for involvement. The case for membership can be made - \$20,000 over three years from other countries – difficult to make the case otherwise in eg. Russia.

BM – Is the scope acceptable?

JC – It is not a usual IR title as it raises the question of subduction.

JD – The Australian members are modellers; NZ members are more interested in processes and data collection. The science questions are already prioritised in the WG membership.

CG – Needs to be more focused. Qu 8 is an anomaly.

NB – Title needs to be more explicit.

JD – Future members need to be contacted. Wait a year?

BM disagreed.

JD asked that StComm commit to reading revised proposal, and not accept it by default.

ACTION

BM – to contact Australians about Associate membership.

DM - reply to Chair, asking her to:

- delete Qu 8
- confirm potential members
- produce a more focused title
- circulate proposal to WG members
- resubmit by email in time for TDP

OCEANIC DETACHMENT FAULTS

BM – Escartin was asked to include biology and construct a greater gender balance in the WG.

NB – the revised proposal is more clearly focused on geophysics, so approved.

CG – there is enough scientific material included. Mineralisation is dealt with in other WGs. Frueh-Green very knowledgeable.

BM agreed that mineralisation aspects were too broad to include.

ACTION

In favour of approving, but as not quorate, the revised proposal will be circulated to the StComm, with a recommendation to accept.

DM to contact JE.

BM welcomed Jiancai Jin to the meeting.

7 National Data Portals

A discussion led by Chris German of each country's efforts towards data compilation and dissemination.

DISCUSSION

CG – data must be as free as possible to all scientists. All data in Ridge2000 / NSF research must be public within 2 years. NOAA – all data is available immediately. It would be good if other countries did the same. Ridge 2000 data is maintained at Lamont Doherty, a data repository.

NS – JAMSTEC provides database - cruise data available after one year and can be downloaded from website.

JD – France has a data repository. A French scientist can make a request but it is not guaranteed. It is in French so more difficult for international scientists. Government agencies are the owners of data and try to sell it to companies, so there is not free access.

BM – Scientists have two years to put it in the public domain.

JL – Scientists have all the cruise data so do not need a permit. Others have to apply to the data centre and need a permit from the ministry.

GC – Russia is similar to France.

SS – Nautilus reports are written by collaborators. Scientists working with Nautilus have the right to publish. There is 1Tb of water column data not on a website.

GC – ISA has a global database on metallic sulphides and on the Central and S. Atlantic. Marcus Vendler is the contact. ISA accepts MOR data, which is good for those without a central database. With permission, this is a good way to make data available, eg Korea, Ireland.

CG – Ask Ed Urban at SCOR how to donate data.

ACTION

StComm to send to IR Office a weblink / contact person for metadata.

GC to send DM contact details of Marcus Vendler.

DM to contact EU at SCOR.

8 Status of IR vents database and ChEss database

Discussion led by B. Murton.

DISCUSSION

BM – We should look into the possibility of continuing the updating of the database as a wiki, with updates vetted by the IR Office. A policy of submission would be set out, supported by publication/proof. ChEss database will remain static for the near future. It is hosted at Southampton, and was updated until end of 2010.

CG – Can we ask Vent Ecology WG to maintain databases. They have the expertise to do the verification.

NB – Could INDEEP have a role?

CG – Jon Copley could verify.

SS – Postgrad/postdoc could be employed – IR could ask a company to provide funding for half/one day per week.

ACTION

DM – to contact INDEEP, Vent Ecology WG Chairs about maintaining the databases.

9 Chinese and Russian applications for exploration licences and related issues

Presentations to be made by:

Jin Jiancai (COMRA)

Georgy Cherkashov (Russia)

Samantha Smith (Nautilus Minerals)

DISCUSSION

COMRA presentation

NB - Does COMRA have interaction with universities and other groups?

JJ - COMRA is a coordinator, with 20 people in the office. Main work is done by universities and institutions. It is the national data centre in China.

CG - When licences are granted, does that restrict other nations?

JL - Research cruises are still allowed.

BM - After a licence is granted, holders should encourage further research.

JJ - COMRA has to continue with research, assessment etc.

JD - Are research cruises required to ask for permission, or to inform of their presence?

JJ - No. COMRA has invited international scientists on cruises for polymetallic nodules. The annual report goes first to LTC who checks activities. It is open data, the only restriction is on resources data.

GC – In the convention, scientific research is allowed in licence areas. There has been no change, so there is no need to inform, but it would be good for collaboration.

CT – Collaboration is good for sharing data and samples, and saves time.

G. Cherkashov presentation

BM began a discussion on the size and distribution of deposits and processes.

GC – The oldest basalts offer the biggest deposits, but are low quality. Highest quality is found in ultramafic systems.

JC – We need clarification of terms.

CT – Are there eg of deposits covered by sediments?

GC – Yes, one metre of sediment

BM – Are inactive deposits degrading?

GC – There are zones of refinement, so we need drilling.

CG – What other work will be done in this area?

GC – Need to relinquish blocks in 8 years. Principles of selection:

- Already discovered

- Already indicated in the sediment, water column, electrical anomalies
- Prognosis based on tectonic magmatic processes

BM – JJ & GC – are there opportunities for cruise bursaries? (Yes)

CG – May be an opportunity for collaboration with OCC WG?

JJ – We need bi/multinational collaboration for environmental work.

SS – Can you collaborate with industry?

GC – Not yet.

SS – Companies have different rules with the ISA, than with countries.

ACTION

DM to follow up on possible cruise bursary opportunities.

Jiancai Jin left the meeting.

Samantha Smith (Nautilus Minerals) presentation

SS and GC left the meeting.

BM asked for views about working with Nautilus Minerals (NM).

JD – Exercise caution, so as not to lose credibility. IR scientists free to go on NM cruises, but not as IR representatives.

CG agreed with JD. More companies will be involved in future and it would be wrong if NM claimed endorsement from IR. The only safe option is to have no relationship with NM. The perception of independence is too important.

NS – We don't want IR in a NM list of universities it works with. Agreed that individuals can work with NM.

CG – IR must not jeopardise national funding.

JC – Must maintain independence.

BM- One objective of the IR Office is to increase its visibility to policy makers. This might be jeopardized by a financial link to a private company. But IR can still advertise placements on individual cruises in NM ones.

JD – We could match cruise and student, with NM paying the bursary, but they might use the IR logo. This is a similar situation with COMRA, but this is a government agency. But IR should keep in touch with NM – a very good presentation.

ACTION

DM to ask SS for cruise programme.

DM – suggest to INDEEP that they contact NM for funding for ChEss database.

10 Workshop and Meeting reports

10.a Geological carbon capture & storage in mafic and ultramafic rocks, Muscat, Oman, 8-10 Jan 2011

Report by Eleanor Berryman, IR-sponsored student, McGill Univ, Canada

In January 2011, 87 scientists representing 15 countries gathered at Sultan Qaboos University near Muscat in the Sultanate of Oman. Their reason for being there was the three-day IODP/ICDP Workshop on Geological Carbon Capture and Storage in Mafic and Ultramafic Rocks. The attendees came from a wide range of fields and included geologists, biogeochemists and engineers. Individual research posters were organised into themes comprising field observations (ophiolite studies, studies of oceanic lithosphere and basaltic crust, on-shore basaltic aquifers and reservoirs, sedimentary basins, industrial waste and urban soils), laboratory studies, hydrodynamic and thermodynamic modeling, and the development of new techniques with application to field scale characterisation, societal impact, and industrial applications. By bringing together this critical mass of expertise, the conference aimed to bring mineral carbonation to the forefront of research on geological carbon capture and storage (CCS).

Full report on the website.

*10.b Circum-Antarctic Ridges, InterRidge International Workshop, Toulouse, France, 28-30 September 2011
Presentation by S-H Park*

The scientific rationale for this workshop is that mid-ocean ridges around Antarctica have been poorly surveyed, mostly because of their location in high latitudes and areas of rough seas. However, circum-Antarctic ridges are unique due to their shallow water depths, ultra-slow or intermediate spreading rate, and complicated series of transform offsets compared to low-latitude ridges. A number of scientific issues at various scales in space and time are ideally addressed in these areas, such as:

- The boundaries and fluxes between the « Pacific-Atlantic » and « Indian » mantle domains.
- The along-axis variability in ridge morphology, magma supply and basalt chemistry at constant spreading rate.
- The migration and exchanges between biological communities.

Circum-Antarctic ridges represent over one third of the global mid-ocean ridge system. They remain the last unknown sections of ridge, but a lot of science cruises occur in the southern ocean, involving mostly oceanographic studies. It is time to focus an international effort to survey these ridges, to discover new tectonic contexts, new hydrothermal vents, new species and new ways to connect all these. These ridges will most probably have an important place in the IR research objectives for the next decade and one of the main objectives of the workshop was to discuss the possibility of an InterRidge Working Group on this subject.

At the time of going to press, a workshop report was not available. A new WG proposal is expected for discussion at the StComm meeting.

DISCUSSION

S-HP – The workshop was very successful. 40 people registered, 23 gave oral presentations, both multidisciplinary and multinational. There was insufficient time for a full discussion on a WG proposal, but we hope to distribute that soon.

BM – Is the regional aspect going to be a problem, following earlier discussion about SMART WG proposal?

JD – No. It is difficult to reach, and different science is done on different segments.

BM – StComm needs to give a clear steer. The proposal is welcomed, being less geologic, more exploration-based.

11 Workshops and meetings proposed for later this year and 2012

Dec. 3, 2011	InterRidge: Third Decadal Plan 2014-2023 discussion meeting, San Francisco, USA
Dec. 5-9, 2011	AGU Fall Meeting 2011, San Francisco, USA
Feb. 16-20, 2012	AAAS meeting, Vancouver, Canada
Feb. 19-24, 2012	Ocean Sciences Meeting, Salt Lake City, USA
Apr. 9-12, 2012	Ventbase 2012, NUI, Galway, Ireland
Apr. 22-27, 2012	European Geosciences Union (EGU) General Assembly, Vienna, Austria
Aug. 13-17, 2012	Asia Oceania Geosciences Society (AOGS), Singapore
Dec. 03-07, 2012	13th International Deep-Sea Biology Symposium, Wellington, New Zealand

Also in 2012 (dates and venues to be determined):

InterRidge Steering Committee

Hydrothermal Energy and Ocean Carbon Cycles, SCOR Working Group, European venue

International Conference: Indian Ocean Ridges and Hotspots, Mauritius

ACTION

DM to advertise Third Decadal Plan to National Correspondents.

12 InterRidge Finances

12.a InterRidge Budget 2011

Please refer to Appendix IV p. 57 for the estimated budget for 2011.

DISCUSSION

BM - Looking to increase bursaries and fellowships. 5-year plan to reduce surplus.

ACTION

Increase IR fellowships to four in 2012, and review year on year.

Allow flexibility in demand between fellowships and bursaries.

12.b Status of payment of billed nations

All invoices were paid for 2010. (This excludes Portugal, which was not billed). USA has confirmed its payment of the InterRidge subscription for 2012.

13 Terms of Reference: Funding criteria for IR-sponsored meetings

A discussion earlier in the year centred on financial support of meetings and what items could be covered by InterRidge sponsorship, and also the optimal time required to advertise a meeting. A summary of the discussion can be seen in Appendix V, p. 58.

DISCUSSION

It was agreed that WG Chairs should be trusted to know their community and how to spend the IR funds. Convenors are encouraged to plan well in advance for a successful meeting (but no time limit was set). It was also thought that, in principle, funding should go to early career scientists, but this need not be exclusively so. Reference to AGU procedures was asked to be omitted.

ACTION

The changes have been made to Appendix 5, pg 69.

14 Next InterRidge Office

Discussion as to where the IR Office might relocate in 2013-15.

Suggested timeline:

- Mid-Jan 2012 Completed draft of Third Decadal Plan
- 31 March 2012 Deadline for consultation
- 30 April 2012 Publish final Third Decadal Plan
- 21 May 2012 Deadline for bids for hosting IR Office 2013-15
- 2-3 June 2012 StComm meeting ratification

ACTION

The call for hosting the next IR Office will be issued in January 2012, with a deadline in late May 2012.

15 StCOM meeting location and date

Recent StCOM meetings: 2011 China, 2010 UK, 2009 France, 2008 USA, 2007 Brazil, 2006 Russia, 2005 Germany, 2004 Korea, 2003 Japan, 2002 Italy, 2001 Japan.

DISCUSSION

JC – It was noted that out of a possible four members from Germany and USA, only one alternate was in attendance. There should be a mandate in the Terms of Reference that at least one representative from each of the Principal Members should attend the StComm, and that Associate members should attend also. Skype should be discouraged.

ACTION

StComm accepted an invitation from GC to hold the 2012 StComm meeting in St Petersburg, 2-3 June 2012.

DM to ask GC for confirmation.

DM to ask DF and CG to nominate a second USA StComm member.

DM to add representation advice to Terms of Reference.

16 Meeting Adjourns

BM thanked our Chinese hosts, and all local staff, for the excellent meeting. He thanked our three guests who gave presentations, and expressed the view that the new WGs were leading IR forward.

InterRidge Steering Committee Meeting 2011

Appendices

APPENDIX I

InterRidge Chairs and Coordinators – Past and Present

InterRidge Chairs

Bramley Murton (UK)	2010 - present
Jon Copley, co-chair (UK)	2010 - present
Jian Lin, chair (USA)	2007 - 2009
Chris German, co-chair (USA)	2007 - 2009
Colin Devey (Germany)	2004 - 2006
Kensaku Tamaki (Japan)	2000 - 2003
Mathilde Cannat (France)	1997 - 1999
Roger Searle (UK)	1994 - 1996
John Delaney, co-chair (USA)	1991 - 1993
H. David Needham, co-chair (France)	1991 - 1993

InterRidge Coordinators

Debbie Milton	Jan 2010 - present
Stace Beaulieu	Oct. 2007 – Dec 2009
Rhian Waller	Jan. - Oct. 2007
Sabine Lange	July -Dec. 2006
Valérie Epllé	May - July 2006
Kristen Kusek (Education & Outreach)	March 2004 - Dec. 2007
Katja Freitag	March 2004 - May 2006
Agnieszka M. Adamczewska	Nov. 1999 - March 2004
Cara Wilson	March 1997 - Nov. 1999
Ruth Williams (acting)	Oct. 1996 - March 1997
Heather Sloan	Oct. 1993 - Oct. 1996
Trileigh Stroh	1991 - Oct. 1993

InterRidge Steering Committee Members - Past and Present

Canada

Steve Scott	2004 - 2006
S. Kim Juniper	1998 - 2003

China

Jiabiao Li	2008 - present
John Chen	2004 - present

France

Nadine Le Bris	2009 - present
Jérôme Dymont	2001 - 2010
Françoise Gaill	2004 - 2008
<i>ad hoc</i>	1998 - 2003
Javier Escartin, <i>ad hoc</i>	2002 - 2003
Mathilde Cannat	1997 - 2000
Catherine Mével	1999 - 2003
<i>ad hoc</i>	1997 - 1998
Daniel Desbrières, <i>ad hoc</i>	1997
	1991 - 1996
Jean Francheteau	1991 - 1998
H. David Needham, <i>ad hoc</i>	1995 - 1996
	1991 - 1994

Germany

Nicole Dubilier	2005 - present
Colin Devey	1999 - present
Peter M. Herzig	1996 - 2000
Roland Rihm	1995 - 1998

India

K. A. Kamesh Raju	2005 - present
Abhay V Mudholkar	2002 - 2004
Ranadhir Mukhopadhyay	2000 - 2001

Italy

Enrico Bonatti	1998 - 2002
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Japan

Hidenori Kumagai	2009 - present
Jun-ichiro Ishibashi	2006 - 2010
Nobukazu Seama	2005 - 2008
Masataka Kinoshita	2002 - 2004
Toshitaka Gamo	2001 - 2004
Kantaro Fujioka	1999 - 2001
Hiromi Fujimoto	1997 - 2000
Tetsuro Urabe	1994 - 1998
Kensaku Tamaki	2000 - 2004
	1992 - 1997

Korea

Sung-Hyun Park	2007 - present
Sang-Mook Lee	2001 - 2006

Norway

Rolf Pedersen	2001 - present
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InterRidge 2011 Steering Committee Report

Eirik Sundvor	1996 - 2000	Roger C. Searle	1994 - 1998
		Martin Sinha	1991 - 1996
Portugal		USA	
Pedro Ferreira	2009 - present	Daniel Fornari	2009 - present
Fernando Barriga	2001 - 2008	Jian Lin, chair	2007 - 2009
Ricardo Santos, <i>ad hoc</i>	2002 - 2003	<i>ad hoc</i>	1999 - 2003
Miguel Miranda	1996 - 2000	Chris German, co-chair	2007 - 2009
Spain		Donna Blackman	2005 - 2008
Rosario Lunar	2005 - 2008	Charles Fisher	2002 - 2005
Juan José Dañobeita	1995 - 1998	Deborah Smith	2003 - 2004
Miquel Canals	1995 - 1998	Spahr C. Webb, <i>ad hoc</i>	2002 - 2003
UK		Christopher G. Fox, <i>ad hoc</i>	1998 - 2001
Richard Hobbs	2011 - present	David Kadko	1999 - 2001
Alex Rogers	2007 - 2011	Alan Chave, <i>ad hoc</i>	1997 - 2001
Tim Henstock	2004 - 2011	Dave Christie	1997 - 2002
Paul Dando	1999 - 2006	Karen Von Damm	1996 - 1998
Damon Teagle	2002 - 2003	Lauren Mullineaux, <i>ad hoc</i>	1996 - 2000
Christopher R. German, <i>ad hoc</i>	2002	Robert S. Detrick	1992 - 1995
	1997 - 2001	John Delaney	1991 - 1994
Philippe Blondel, <i>ad hoc</i>	1997 - 2002	P. Jeff Fox	1991 - 1995
Lindsay Parson, <i>ad hoc</i>	1996 - 1998	Charles H. Langmuir	1991 - 1996

InterRidge National Correspondents - current

Principal Members:

China – J. Chen (2004 - confirmed in 2008)
 France – Jérôme Dymont (2004 - confirmed in 2008)
 Germany - Colin Devey (1998 - confirmed in 2008)
 Japan – Kyoko Okino (2005 - confirmed in 2008)
 UK – Richard Hobbs (2011 -)
 USA – Dan Fornari (2009 -)

Associate Members:

India – K. A. Kamesh Raju (2002 - confirmed in 2008)
 Korea – Sung-Hyun Park (2007 - confirmed in 2008)
 Norway - Rolf Pedersen (2001 - confirmed in 2008)

Corresponding Members:

Australia – Jo Whittaker (2010 -)
 Austria - Monika Bright (2001 - replied to email 2009)
 Brazil - Suzanna Sichel (1997 - confirmed in 2008)
 Bulgaria – Vesselin Dekov (2009 -)
 Canada – NO correspondent
 Chile – Juan Diaz-Naveas and Luis Lara (2007 - confirmed in 2008)
 Chinese Taipei – Saulwood Lin (2008 -)
 Denmark – NO correspondent
 Iceland - Karl Grönvold (1992 - NOT confirmed in 2008)
 Italy – Paola Tartarotti (1997 - confirmed in 2006)
 Mauritius - Daniel P. E. Marie (2002 - NOT confirmed in 2008)
 Mexico - NO correspondent
 Morocco - Jamal Auajjar (1998 - confirmed in 2006)
 New Zealand – Richard Wysoczanski (2010 -)
 Philippines - Graciano P. Yumul, Jr. (2000 - confirmed in 2008)
 Portugal – Pedro Ferreira (2009 -)
 Russia - Sergei A. Silantyev (1998 - confirmed in 2008)
 South Africa - Petrus Le Roux (2006 - NOT confirmed in 2008)
 Spain – Rosario Lunar (2006 - replied to email 2007)
 Sweden - Nils G. Holm (1993 - confirmed in 2006)

Switzerland - Gretchen Früh-Green (1995 - confirmed in 2006)
SOPAC – Aquila Tawake

APPENDIX II

DEEP NEW WORLD:
A GLOBAL
OUTLOOK ON DEEP
SEA
CHEMOSYNTHETIC
ECOSYSTEMS AFFECTED BY HUMAN ACTIVITIES

Introduction

Chemosynthetic ecosystems including hydrothermal vents and cold seeps are considered to have the highest biomass and productivity of all deep-sea ecological environments. Many of these biological communities are proximal to a variety of natural resources that are already or are becoming accessible to human activities. Methane cold seeps tend to occur in relatively shallow areas of the continental shelf that make them vulnerable to certain fishing practices and hydrocarbon exploration and development. Hydrothermal vent systems, lying in much deeper areas of the oceans, are associated with industrial and precious mineral deposits that are now becoming accessible with new technologies and techniques. In both cases, applying common marine management practices does not adequately address specific characteristics inherent to chemosynthetic systems.

As policy makers, environmental organizations and private sector interests seek to forward their respective agendas, there is a clear and imminent need for an authoritative source of accessible information on various topics related to deep-sea chemosynthetic ecosystems. Building upon this need, the Global Outlook on Deep Sea Chemosynthetic Ecosystems Affected by Human Activities aims to provide a multi-thematic overview of the key aspects related to deep sea chemosynthetic communities and their sensitivities to various human activities including extractive practices, fisheries and scientific research. Although based on the latest scientific work produced by leading experts, the style and language are designed for non-experts.

This Outlook will span a range of themes that include among others:

- the state of the knowledge of biological,
- physical and geological processes that characterize the different types chemosynthetic ecosystems,
- an assessment of current and future human activities that affect chemosynthetic communities,
- societal perspectives on chemosynthetic ecosystem value
- the identification of key management goals that ensure a balance between sustainable use and protection,
- principles of Marine Management Area design specific to these type of ecosystems
- examination of applicability of sustainable economic principles linked to resource development affecting chemosynthetic ecosystems

Project Coordinating Institution

UNEP/GRID-Arendal

UNEP/GRID-Arendal is an official United Nations Environment Programme (UNEP) collaborating centre located in Arendal, Norway with outposted offices in Ottawa and Stockholm. UNEP/GRID-Arendal's mission is to provide environmental information, capacity building services and innovative communication tools, methodologies and products for information management and outreach. UNEP/GRID-Arendal seeks to make credible, science-based knowledge understandable to the public and to decision-makers (www.grida.no).

Partner Organisations (proposed)

InterRidge

InterRidge promotes interdisciplinary, international studies of oceanic spreading centers by creating a global research community, planning and coordinating new science programs that no single nation can achieve alone, exchanging scientific information, and sharing new technologies and facilities. InterRidge is dedicated to reaching out to the public, scientists and governments, and to providing a unified voice for ocean ridge researchers worldwide. (<http://www.interridge.org/>)

International Seabed Authority

The International Seabed Authority is an autonomous international organization established under the 1982 United Nations Convention on the Law of the Sea and the 1994 Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea. The Authority is the organization through which States Parties to the Convention shall, in accordance with the regime for the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction (the Area) established in Part XI and the Agreement, organize and control activities in the Area, particularly with a view to administering the resources of the Area. (<http://www.isa.org.jm/en/home>)

Results chain

INPUTS	ACTIVITIES	OUTPUTS 2012-2013	OUTCOMES	IMPACT
<p>FUNDS</p> <p>PARTNERSHIPS</p> <p>STRONG BRANDING</p> <p>ENVIRONMENTAL AND ECOLOGICAL ECONOMIC PRINCIPLES</p> <p>SOCIAL MEDIA APPLICATIONS</p> <p>INNOVATIVE FACILITATION PROCESSES</p> <p>EXPERIENCE DRIVEN APPROACH</p>	<p>ESTABLISHMENT OF STEERING COMMITTEE</p> <p>SYNTHESIS OF THE STATE OF THE KNOWLEDGE OF VARIOUS NATURAL AND HUMAN-CENTRIC TOPICS LINKED TO DEEP SEA CHEMOSYNTHETIC ECOSYSTEMS</p> <p>SYNTHESIS OF POLICY PERSPECTIVES AND RECOMMENDATIONS</p>	<p>1 “ATLAS” TYPE PUBLICATION USING NON EXPERT LANGUAGE AND NARRATIVE</p> <p>DEDICATED WEB PORTAL DEVELOPED AND POPULATED</p> <p>SOCIAL MEDIA STRATEGY IMPLEMENTED FOR THE OVERALL THEME OF FULL COSTING OF UNCONVENTIONAL ENERGY SOURCES</p> <p>TARGETED FACILITATION ACTIVITIES AIMED AT ENHANCING DECISION MAKER ENGAGEMENT</p>	<p>RELEVANT DECISION MAKERS FROM ALL LEVELS AND SECTORS ARE INCLUDED IN THE DEVELOPMENT OF VALUABLE AND REALISTIC DEEP SEA MARINE MANAGEMENT PLANNING IN AREAS OF NATIONAL JURISDICTION AND AREAS BEYOND</p> <p>THE WEBSITE IS INCREASINGLY ACTIVE IN DEBATING ISSUES RELATED DEEP SEA ECOSYSTEMS AND THE DEEP OCEANS IN GENERAL</p>	<p>COUNTRIES MAKE USE OF THE KNOWLEDGE AND EXPERIENCE PROVIDED BY THE OUTLOOK TO ACHIEVE A STANDARD, REALISTIC AND BALANCED MANAGEMENT MECHANISM ALLOWING FOR SUSTAINABLE HUMAN ACTIVITIES WHILE ENSURING LONG TERM RESILIENCE AND HEALTH OF DEEP SEA ECOSYSTEMS,</p>

Strategy and Methodology

Deliverables

The proposed outputs are:

1. An electronic publication (e-book), which would have the advantages over a printed publication of broad exposure and ease of distribution, as well as being easier to update. This medium allows for dynamic graphics, interactive figures and multimedia content. An example e-book produced by UNEP/GRID-Arendal can be viewed at www.grida.no/publications/vg/kick/ebook.aspx.
2. A limited printing of a hardcopy version is also proposed, for distribution to policy makers and to targeted stakeholders.
3. A dedicated web portal containing the latest scientific research results in a format accessible to decision makers, the general public and the media. Versatile web applications, interactive, dynamic visualization tools and dedicated evolving indicators are all tools proposed to be included in the portal. This tool is planned to allow for research scientists to update outputs with new data and is meant as a long term repository of accessible, mainstream scientific knowledge and multimedia content on chemosynthetic systems.
4. A targeted outreach process dedicated to creating a space for dialogue between the scientific community, the informed public and decision makers. Formats can include a world café forum, organized debate and/or media moderated discussions. The exact format would be determined by the project Steering Committee.

5. A social media strategy to foster increased awareness of issues and interest on the subject matter that could lead to influence on policy development.

Foundational template

The Global Outlook for Ice and Snow (www.grida.no/polar/news/2397.aspx), is a recent large scope thematic assessment produced by UNEP/GRID-Arendal for World Environment Day (2007) and the International Polar Year, and serves as the basic model for the proposed publication.

Primary target audience

Issues relating to the management and valuation of deep sea ecosystems involves engagement by global decisions makers. The Outlook will focus its style, language and outreach approach to the needs of decision makers.

Proposed project cycle

Proposed project launch March 2012 with final deliverables by March 2013

Proposed project budget range

The budget for previous products of this type ranges from USD400,000 to USD500,000 including full print production. Funding is typically raised from multiple sources.

Proposed General Workplan

- a) Organise and setup Steering Committee
- b) Identify and secure collaboration of additional stakeholders
- c) Secure funding for development phase
- d) Organise content, contributing institutions and authors
- e) Secure funding for authoring, review, production and launch phases
- f) Author teams prepare first draft
- g) Review chapters (peer review) and review overall issue coverage (Steering Committee)
- h) Lead authors prepare second drafts based on review comments and any additional content prepared
- i) Final content reviewed by Steering Committee
- j) Final production, including editing, graphics production, design and digital publication
- k) Launch of full products (early 2013)

APPENDIX III

Proposal for IR Working Group: “Southern Mid-Atlantic Ridge Targeted Exploration” (SMART) Submitted by Colin Devey

The InterRidge Long-Range Exploration Working Group (LREWG) made enormous headway in scoping both the scientific drivers for and the technological requirements of long-range exploration of the spreading axes.

The resulting report (see

http://www.interridge.org/files/interridge/LREWG_Report_Final_web_0.pdf) highlighted several regions of the world’s oceans which, for many ridge-related scientific disciplines, it would be important to explore thoroughly and on a large scale. One of these key regions is the Southern Mid-Atlantic Ridge (SMAR) including its Equatorial Fracture Zones (Devey et al., IR News, 2010). The science drivers for SMAR exploration range from those of biodiversity and the links in terms of gene flow between the Southern Ocean and the Arctic, questions of the interplay between magmatism and tectonics during slow spreading and the physical oceanography of ocean mixing above the rough slowspreading bathymetry. The LREWG Workshop report has already stimulated some initial cruise activity in the region, but an international coordination of the work and discussion of the results is sorely needed if we are to capitalize on this work. We (a subset of the original LREWG members, augmented by new members from relevant disciplines/regions) propose that InterRidge set up a Working Group for this purpose. This Working Group will be the first to tackle part of the "global exploration" theme which came out strongly in the LREWG report and will allow us to develop methods to best achieve the global exploration aims. The aims of the SMART Working Group are:

1. Collate and combine information already available from recent and older cruises to establish a thorough "State of the art" of Southern MAR studies. For this work active participation of scientists from many countries working toward this common goal is essential - a core strength of InterRidge.
2. Provide focus for the international coordination of further South Atlantic exploration, specifically aiming to identify and then fill gaps in our knowledge of this relatively unexplored region. We will convene a Workshop to produce a project plan of how to explore the SMAR thoroughly in the next 5-10 years, defining and prioritizing goals, identifying cruises needed.
3. In a larger framework, the South Atlantic Basin as a whole is an important yet relatively little-explored ocean region. We expect the SMART WG to provide a seed to establish basin-scale studies within the framework of bodies such as SCOR. This could spearhead international efforts to use the Atlantic Basin as a test-bed for collection and synthesis of, for example, the phylogeographic history of chemosynthetic faunas (vent and seep) from the Arctic to the Antarctic and to study gene flow. These efforts, in collaboration with mapping, physical oceanographic studies, studies of reproductive biology & larval distributions, and modeling efforts would make important contributions to science and to management of resources associated with chemosynthetic ecosystems.

The Working group will achieve its aims with a group meeting in late 2012 to identify, collate and combine data from the different nations (Aim 1). The WG membership has been chosen specifically to include representatives from nations with previous and planned ridge-related activity in the area. This meeting will be held in Cape Town, providing additional capacity-building possibilities, too. The outcome should be a clear overview of the state of knowledge and immediate plans for international research in the Southern Atlantic. This will be an ideal preparation for the second phase which, in late 2013, will see a workshop being held (provisionally in Rio de Janeiro) to formulate project plans for the continued exploration of the SMAR. This will likely include discussing how we intensify the exploration at high southern latitudes (as far south as the Bouvet Triple Junction at 55°S. This may require pooling of several national polar capabilities and a review of the state of autonomous underwater vehicle capability to explore these particularly extreme regions), a further area prioritized for future internationally-coordinated exploration at the LREWG Workshop. Furthermore the Workshop will be tasked with determining if any target areas in the SMAR region warrant the mounting of time-series and/or constant monitoring activities which, due to its remoteness, are probably only realizable as part of an internationally coordinated effort and, hence, entirely the kind of activity at which InterRidge excels.

Why InterRidge?

Achieving the aims set out here will require international collaboration to (1) bring together diverse and scattered data sets and (2) mobilize ships and equipment for this large-scale exploration exercise. We expect the lessons learnt in the Working Group to be a useful template for InterRidge to develop global exploration activities in many of the World's oceans throughout its 3rd Decade. It is particularly timely to begin this work in the South Atlantic because increasing access to open ocean exploration assets in the region (notably in Brazil) have suddenly rendered this type of international approach particularly tractable in this previously rather "remote" ocean basin.

Proposed Working Group members who have contributed to this document:

1. Colin Devey (IFM-GEOMAR, Germany)
2. Chris German (WHOI, USA)
3. Sidney Mello (Univ. Federal Fluminense, Brazil)
4. Lucia Campos (Univ. Federal do Rio de Janeiro, Brazil)
5. Anton le Roex (Univ. Cape Town, South Africa)
6. Cindy Van Dover (Duke University, USA)
7. Gwyn Griffiths (NOC, Southampton, UK)
8. Koichi Nakamura (AIST, Japan)
9. Shinsuke Kawagucci (JAMSTEC, Japan)
10. Jiabiao Li (2nd Inst. of Oceanog., China)
11. Marcia Maia (Univ. Brest, France)
12. Andrey Gebruk (Moscow, Russia)
13. Nicole Dubilier (Max-Planck Inst., Bremen, Germany)

APPENDIX III (Cont.)

Proposal for IR Working Group: Intra-oceanic Arc and Backarc Systems

Working Group members:

Maria Seton (USyd, Chair), Jo Whittaker (USyd), Dietmar Müller (USyd), Richard Wysoczanski (NIWA/U. Victoria), Richard Arculus (ANU), Cornel de Ronde (GNS Science), Michael Gurnis (Caltech)

Potential future members: Sven Petersen (GEOMAR, Germany), Colin Macpherson (Durham, UK), Erin Todd (Munster, Germany), Jim Gill (UCSC, USA), Bob Embley (NOAA, USA), Ian Wright (Southampton, UK), Shuichi Kodaira (JAMSTEC, Japan), Fernando Martinez (UHawaii, USA), John Suppe (NUT, Taiwan), Junichiro Ishibashi (U. Kyushu, Japan), Ken Takai (JAMSTEC, Japan)

Context

Convergent margins, where oceanic lithosphere is subducted back into the mantle, form the key interface for large-scale chemical and thermal recycling amongst the ocean, crust, mantle, and atmosphere. Intra-oceanic convergent margins typically produce a forearc-island arc-backarc sequence within an extensional stress regime above the subducting slab. The evolutionary cycle of a typical intra-oceanic island arc-backarc sequence is intricately linked to the evolution of subduction and crustal accretion, from the initiation of subduction to the eruption of island arc rocks and episodic backarc basin rifting and spreading to eventual termination of subduction and backarc closure. The episodic nature of arc-backarc systems leaves behind a series of remnant arc-backarc and active arc-backarc sequences, which can be clearly observed in the seafloor fabric of the Western Pacific. Backarc closure leads to the accretion of island arc-backarc sequences to the continental margins as ophiolites, producing one of the fundamental components of continental crust. The hydrothermal systems that reside within the island arc-backarc ridge crests form massive sulphide deposits and ancient equivalents once accreted to the margin.

The thermal, geochemical and structural characteristics of intra-oceanic island arc-backarc systems during their active phase are predominately influenced by slab melts, the mantle wedge and the underlying flow regime. Rock compositions and mineralization hosted by intra-oceanic island arc volcanics and backarc basin basalts have a distinct geochemical signature largely influenced by the subducted oceanic lithosphere, sediments and seamounts on the down-going slab as it interacts with the forearc during subduction. The concentration of gases and some elements in hydrothermal fluids expelled at vent sites of submarine volcanoes along the backarc basin ridge crests, which can be many times higher than seen at normal spreading ridge sites, are a result of the interaction with hydrous and volatile-rich slab melts and changes between ambient mantle temperature. The mode of extension and the crustal accretion pattern found in backarc basins may be driven by the small-scale convection within the mantle wedge, its temperature and viscosity and/or changes in surface kinematics between the down-going and over-riding plates.

The dominant role that the subducting slab and mantle wedge appear to play in governing the dynamics of the of the

entire subduction system requires a renewed focus on the relationship between the surface expression of arc volcanism and backarc seafloor spreading, mantle markers, and the processes occurring in the underlying mantle. In addition, an attempt to deconvolve fluxes from slab-derived elements from the ambient mantle wedge is considered important. Additionally, the working group hopes to foster a holistic approach to address fundamental questions about intra-oceanic arc and backarc basin processes by examining the long-term and short-term evolutionary cycles of these systems using geochemical, hydrothermal, tectonics and subduction dynamics approaches. The working group seeks to bring together experts from both the observational and modeling communities to facilitate the linkage between surface processes and the deep earth.

Science Questions

1. What role does the mantle wedge play in the distribution and composition of magmatism and hydrothermal activity in both the arc and backarc? What is the mode of convection within and around the mantle wedge?
2. Is backarc extension driven by the rollback of the subduction hinge, purely driven by the absolute motion of the over-riding plate or independent of the surface kinematics and instead dominated by magmatism in the mantle wedge by rising diapirs or secondary convection cells?
3. Can we predict what type of mineral deposit might form in the backarc and arc knowing what components are being subducted with the down-going slab (i.e., contributions made by subducted sediments, oceanic plateau, seamounts, etc)? What degree of partial melting is occurring in the underlying mantle wedge, and how are the metals transported to the seafloor (i.e., as magmatic volatiles or simply water/rock reactions)?
4. What is the role of slab-derived fluxes (fluids and melts) in altering the physical and thermodynamic nature of the mantle such as its temperature and redox state? How are lithophile elements that constitute new crust, volatiles (e.g. H₂O, S₂ and CO₂) that drive volcanism and affect climate and life on Earth, and ore-forming metals (e.g. Cu, Pb, Au) concentrated in hydrothermal vents and sulfide deposits, recycled between the Earth's surface and interior?
5. What interdisciplinary methods can be applied to deconvolve fluxes from slab-derived elements from the ambient mantle wedge?
6. Analogue and numerical experiments of subduction have predicted the initiation of backarc extension but what drives the episodic nature of backarc basin opening?
7. Accreted margins contain evidence of obducted forearc-arc-backarc sequences through ophiolitic suites. These ophiolites are often said to have formed via "backarc closure" but what are the driving forces required to close a backarc sequence? How does this relate to the termination of subduction? Backarc opening works on time-scales of tens of millions of years. Does the closure of backarc basins work on similar timescales?
8. Backarc basins are known for the increased heterogeneity in vent fluid chemistry compared to normal MOR systems due to the influence of the subducting slab. What is the link between geochemistry and

microbial diversity in this chemically heterogeneous system?

Timeline

2011: Proposed working group presented to the InterRidge Committee

2012: Initial working group planning meeting before/after the International Geological Convention (ICG), Brisbane, July 2012. All working group members will be invited (extra accommodation costs will be covered, but not airfares)

2013: Second working group meeting to plan workshop before/after the EGU or AGU 2013

2014: Intra-oceanic Arc and Backarc Systems workshop to be held in Sydney, Australia (or New Zealand)

APPENDIX III (Cont.)

Proposal for IR Working Group: Oceanic Detachment Faults

Proponents: J. P. Canales¹ & J. Escartín²

¹ Department of Geology and Geophysics, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, USA

² Equipe de Géosciences Marines, CNRS/Institut de Physique du Globe de Paris, France

Proposed Management:

Co-Chairs: J. P. Canales, J. Escartín.

Group Members:

Früh-Green, Gretchen	ETH, Switzerland <i>frueh-green@erdw.ethz.ch</i>
Hayman, Nick	University of Texas, USA <i>hayman@utig.ig.utexas.edu</i>
John, Barbara E.	University of Wyoming, USA <i>bjohn@uwyo.edu</i>
McCaig, Andrew	University of Leeds, UK <i>A.M.McCaig@leeds.ac.uk</i>
Okino, Kyoko	Ocean Research Institute, Japan <i>okino@ori.u-tokyo.ac.jp</i>
Reston, Timothy	University of Birmingham, UK <i>t.j.reston@bham.ac.uk</i>
Smith, Deborah K.	Woods Hole Oceanographic Institution, USA <i>dsmith@whoi.edu</i>
Sun, Zhen	South China Sea Institute of Oceanology, China <i>zhensun@scsio.ac.cn</i>

After the initial establishment of the Working Group (WG), membership to the WG will remain open to the international scientific community while the WG is active. New members interested in the WG theme will be expected to promote and contribute intellectually to the activities of the WG, and with ideas/suggestions that help carry on the mandate of the WG.

Motivation:

The scientific community held an AGU Chapman Conference on Oceanic Detachment Faults in Agros, Cyprus (8-15 May 2010), to advance understanding of the processes that control oceanic detachment faulting and associated geological, chemical, and biological phenomena. 86 scientists from fields in geosciences and biology attended the conference, which included overview talks on the topic, 3 days of field trips to the Troodos ophiolite, and poster sessions showcasing recent and on-going research and results. Documents, Conference presentations, and additional information from the conference are available at: www.ipgp.fr/rech/lgm/je/Chapman2010.

The conference deliverables include:

- A recommendation to establish an InterRidge (IR) WG to coordinate the wider scientific community and their efforts. The study of oceanic detachment faults has seen an important surge in the last 10 years, mainly through individual projects, but it currently lacks overall community coordination. An IR WG could promote further advancement of research on the topic through integration of studies on specific topics and/or sites, the organization of Sessions at international meetings, establishing links to other

programs and projects (i.e., IODP, GeoPRISMS), or convening a Conference in following years.

- A recommendation to edit a dedicated 'Theme' in the electronic journal G-cubed. In Summer 2010 G-cubed established a dedicated 'Theme on Oceanic Detachment faults', with J. Escartin, J.P. Canales, M. Cheadle, G. Fruh-Green, and B. John as Theme Editors. It currently consists of 15 publications (www.agu.org/journals/gc/themes.shtml).
- A community statement on oceanic detachments, and a consensus on the definition of oceanic detachment fault and oceanic core complex:

“The scientific community present at the 2010 Chapman Conference on Detachments in Oceanic Lithosphere affirmed that extension accommodated by oceanic detachment faults should be recognized as a fundamentally distinct mode of seafloor spreading that does not result in a classical Penrose model of oceanic crustal structure. This type of spreading is characterized by: formation of oceanic core complexes; tectonized and heterogeneous lithosphere; extensive exposure of gabbro and serpentized mantle at the seafloor; some of the largest hydrogen-rich, deep-sea hydrothermal systems and mineral deposits; and large diversity in the deep-sea and subsurface biosphere. The recognition of this mode of spreading is one of the major advances in understanding plate tectonics in the last three decades.”

*An **oceanic detachment fault** is a large-offset normal fault formed at or in the vicinity of a mid-ocean ridge that accommodates a significant fraction of the plate separation. Offsets range from kilometers to tens of kilometers or more. Oceanic detachment faults may initiate as steep normal faults at depth, and shallow into low angle extensional faults through rotation of the footwall.*

*An **oceanic core complex** results from the activity of an oceanic detachment fault. The oceanic core complex may expose the footwall of the oceanic detachment fault, exhuming lower crustal and mantle rocks, and be capped by a detachment fault surface that is often marked by corrugations and striations parallel to the extension direction. Alternatively, the detachment fault plane may be buried below the seafloor by rotated blocks of the hanging wall.*

This proposed IR WG shares interests with prior and on-going IR efforts, such as the Deep Earth Sampling WG, and the active WGs on Long-Range Exploration and Seafloor Mineralization. We believe that a dedicated WG on Oceanic Detachment Faults has the potential to help the community advance in an integrated understanding of the tectonic, magmatic, and hydrothermal processes that operate in association with this mode of oceanic accretion that is relatively unknown to date.

Working Group Roles and Planned Activities:

The specific aims of the proposed WG would include:

- Foster and strengthen links to other efforts and programs towards the study of oceanic detachment faults (e.g., GeoPRISMS, IODP, other IR WGs, etc.)
- Advance in the understanding of these structures through the planning of sessions at international meetings (EGU, AGU), and convening of a topic Workshop in the future.

Specifically, we propose to facilitate interactions within the international community and foster scientific advancement, through the following actions:

- a. Meet with members during 2012 AGU Fall meeting (or earlier if there are other meetings we all might attend) to agree on the roadmap ahead and future actions, follow-up on detachment-related cruises, and facilitate communication among groups and coordination of active/future projects.
 - b. Convene a session in 2013 AGU Fall Meeting (session proposal probably due in April 2013).
 - c. Organize a 2-3 day InterRidge Theoretical Institute on a specific topic related to oceanic detachment faulting, (e.g., mechanics of detachment faults). Tentative dates: Spring or Fall 2014.
 - d. Convene a session in the EGU meeting in Spring 2015.
 - e. Encourage the younger generation of scientists to organize/convene a topical Conference (AGU Chapman or similar) in oceanic detachment faulting to wrap up the theme (2016?).
-
- **No index entries found.** Through e-mailing/web site share information regarding on-going projects, planned cruises, and facilitate exchanges and cooperation among scientists.
 - Playing a coordinating role for specific sites and projects if requested by the scientific community.
 - Promote further contributions to the G-cubed Theme, which we expect will become a reference and key compilation of research results in the topic.

APPENDIX IV

InterRidge Estimated Budget for 2011

Item	Actual income	Actual spend \$	Budget \$USD
InterRidge member subscriptions (assuming the current 6 full and 3 associate members)	\$ 165,000		\$ 165,000
Host Nation's additional InterRidge subscription (one extra full membership fee)	\$ 25,000		\$ 25,000
Host Nation's support for InterRidge officers' T&S	\$ 16,800		\$ 16,800
ChEss	\$ 4,744		
Carry Forward of Recurrent Contingency	\$ 123,798		2,644
<i>total income by F/Y</i>	\$ 335,342		\$ 209,444
Expenditure for each financial year			
Salary for InterRidge coordinator (actual: 0.8 FTE)		\$ 133,396	\$ 85,306
InterRidge officers's T&S		\$ 8,876	\$ 25,200
InterRidge Office set-up and consumable costs		\$ 113	\$ 1,500
InterRidge Web Site relocation and maintenance costs at NOCS		\$ 952	\$ 2,000
InterRidge sponsorship of meetings and workshops (e.g. 4 x \$10,000 each)		\$ 25,723	\$ 40,000
InterRidge residential fellowships		\$ 10,000	\$ 10,000
ISA funded fellowships		\$ 15,000	\$
Publishing (InterRidge News and policymakers' brochures)		\$ 4,924	\$ 7,000
Professional and media outreach		\$ 6,342	\$ 7,000
InterRidge mobility awards for science cruise participation		\$ 5,452	\$ 30,000
Contribution in full from InterRidge for student prizes		\$ 1,000	\$ 1,000
InterRidge Office Recurrent Contingency		\$ 123,565	\$ 438
<i>total expenditure by F/Y</i>		\$ 335,342	\$ 209,444
Support in kind (salary and overhead for IR chair and co-chair)			
Host Nation's support for salary (15% FTE) for IR Chair (Murton)			\$ 37,100
Host Nation's support for salary (10% FTE) for IR Co-Chair (Copley)			\$ 14,223

F/Y 2011 to date:

Expenditure: \$211,777

Deficit: \$2,333

Balance at end of 2010: \$123,798

Accounted for by three local meetings with very little costs, and slow uptake of cruise bursary scheme.

APPENDIX V

InterRidge – Terms of Reference

Summary of points raised in email discussion about InterRidge – supported meetings

Criteria for spending IR funds at workshops/conferences

Overarching goal - to use the funds to advance IR goals.

"InterRidge promotes interdisciplinary, international studies of oceanic spreading centers by creating a global research community, planning and coordinating new science programs that no single nation can achieve alone, exchanging scientific information, and sharing new technologies and facilities. InterRidge is dedicated to reaching out to the public, scientists and governments, and to providing a unified voice for ocean ridge researchers worldwide."

Meeting costs

- Cover any facility rental costs (although encourage home institutions to provide these free of charge),
- Cover costs for coffee breaks (to enable informal discussions),
- Cover local logistics (bus transport hotel to conference location, for example),
- Cover costs for local assistance by students (for registration, help with audiovisual equipment during sessions etc.).
- Subsidizing of workshop dinner (i.e. attendees have to make some sort of contribution but IR covers some cost) could also be acceptable as it encourages networking, especially for the younger colleagues.
- Subsidizing of fieldtrips also encourages networking.

Support for attendees

The selection process needs to be fair. In principle, funding students, post-docs etc, is the best way to utilize our funds in terms of travel and accommodations.

Establish a 'template' for future workshop proposers

The StComm should request in the workshop proposal that the organisers explain:

- how much of the budget will go on support
- how they will advertise the chance for support
- what information they require from the applicant
- how they will make the decision

Convenors are encouraged to plan well in advance for a successful meeting.