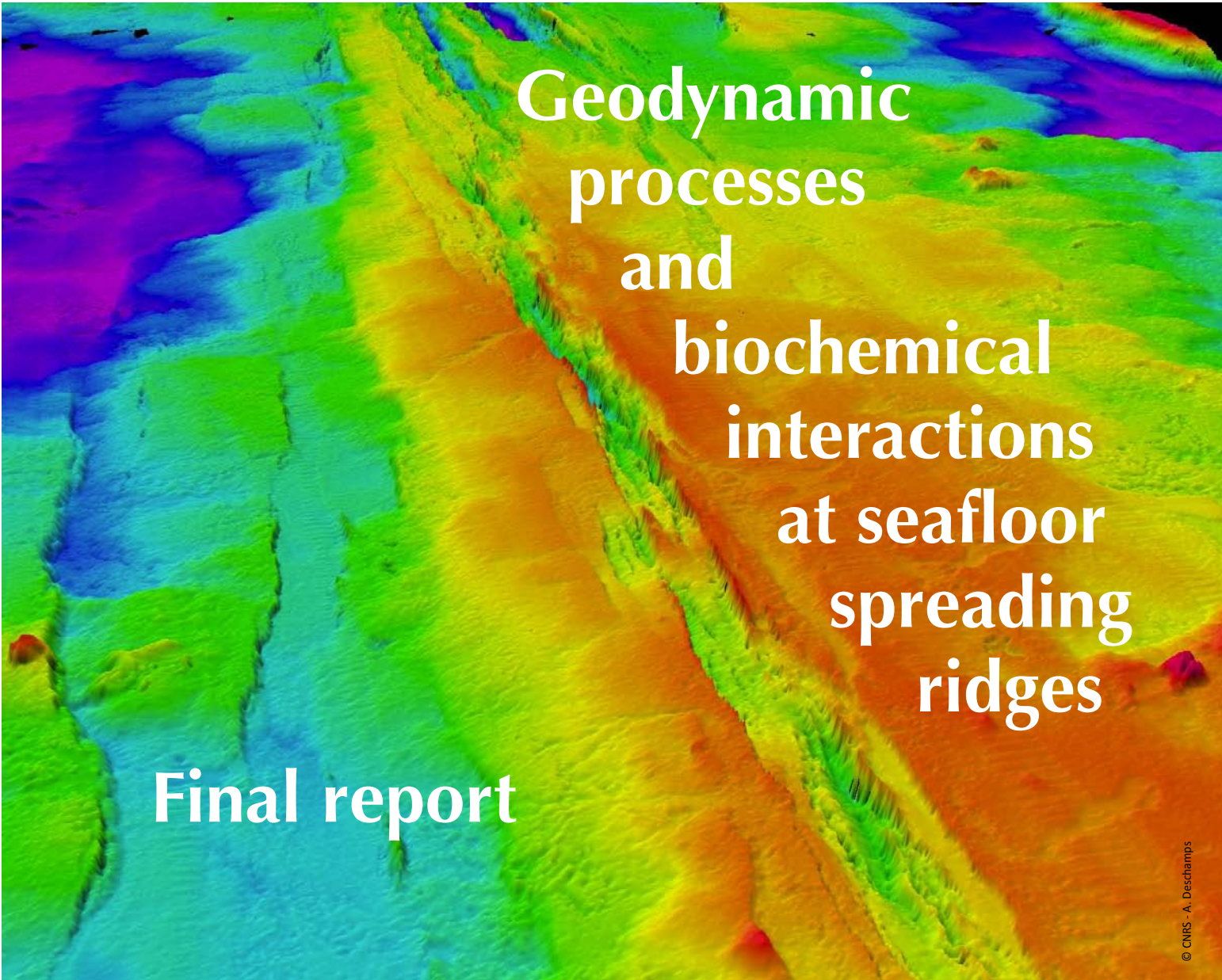


# GEOCEAN

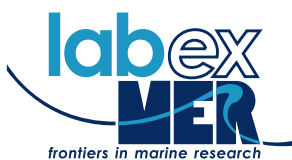
**Symposium Jean Francheteau & Summer School  
August 27-31, 2012 - Brest, France**



**Geodynamic  
processes  
and  
biochemical  
interactions  
at seafloor  
spreading  
ridges**

**Final report**

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# GEOCEAN

## **Geodynamic processes and biochemical interactions at seafloor spreading ridges: A Symposium in tribute to Jean Francheteau and Summer school**

*GEOCEAN Symposium and Summer School, Brest, France, 27-31 August 2012*

*Convenors: Jean-Yves Royer (IUEM), Olivier Rouxel (Ifremer)*

*Summer school report by: Stefan Lalonde (IUEM), Elisabeth Muller (Oxford Univ.), Bleuenn Gueguen (IUEM and Ifremer)*

In August 2012, an international cohort of over 100 young and established scientists assembled at the European Institute for Marine Studies (IUEM) and Ifremer in Brest. Drawing them together on the Brittany coast was a symposium in tribute to Jean Francheteau and a summer school focused on “Geodynamic processes and biochemical interactions at seafloor spreading ridges”, the first of several such meetings enabled by the recently successful Labex MER initiative, a 10 year “cluster of excellence” program that assembles top-ranked laboratories in the field of marine sciences in western France and ensures their future excellence in research and collaboration. The meeting was further made possible by additional support from the University of Brest, CNRS, Ifremer, the Region of Brittany, the General Council of Finistère, and the Urban Community of Brest. Attendees represented a wide swath of scientific interests, including the kinematic and thermo-mechanical evolution of plates, geodynamic processes at seafloor spreading centers, the geochemistry of hydrothermal fluids and fluid-rock interaction, microbial biogeochemistry and ecosystems in extreme environments. An equally wide cross-section of career stages were represented, including senior and emeritus scientists intimately involved in the initial development of plate tectonic theory, mid- and early-career researchers leading the charge today, and young graduate students eager to make their mark. Uniting this diverse group is the legacy their respective fields share in the study of seafloor spreading centers and the development of plate tectonic theory. No single individual represents this legacy better than Jean Francheteau, Professor at the University of Brest who passed away in July 2010 and to whom the symposium was dedicated.



*Part of the attendees to the GEOCEAN Symposium in tribute to Jean Francheteau*



The **Symposium** was organized in two day-long sessions on plate tectonics and processes at seafloor spreading centers, two fields in which Jean Francheteau made inspiring breakthroughs and discoveries. The welcome address by Jean-Yves Royer, Pascal Gente (vice-President for research at the University of Brest) and Jean-François Stephan (Head of the Earth and Space Science Institute at CNRS) was complemented by a testimonial by Sarah Francheteau-Berman, Jean's daughter, on how his family viewed and lived his scientific activities. Xavier Le Pichon and W. Jason Morgan recalled Francheteau's contribution to finite plate reconstructions. Robert Ballard, Richard Hey, Claude Rangin and Thierry Juteau brought lively memories of Francheteau's involvement in the frontier exploration of the mid-oceanic ridge system, from the FAMOUS expedition on the Mid-Atlantic Ridge to the exploration of the East Pacific Rise with submersibles that led to the discovery of hydrothermal smokers and deep-sea ecosystems. Pierre Choukroune, Claude Jaupart, Richard Gordon, Michel Diament, Emile Okal, Louis Géli and Yossi Mart presented syntheses on various topics illustrating the breadth of Francheteau's scientific interests in the origin of plate tectonics, heat-flux on the continents, current plate motion, intraplate volcanism, oceanic earthquakes and back-arc basins. The second day was devoted to seafloor spreading processes, including the ophiolite record of the generation and evolution of oceanic crust, volcanologic, geophysical and geochemical high-resolution observations from active ridges and deep-sea drilling efforts (Thierry Juteau, Mathilde Cannat, Alessio Sanfilippo, Michael Perfit, Catherine Mével, Anne Deschamps), as well as the dynamics of fast-spreading ridges and overlapping spreading centers (Jason Phipps-Morgan, Lars Rüpke, Richard Hey). A poster session concluded the symposium and covered various topics in line with the oral sessions: geophysical modeling of Earth's dynamics and transform faults, studies of hydrothermal sites in various environments, petro-geochemical investigations of deep-sea materials, and microbial ecology and interactions at hydrothermal sites and in deep cores. The symposium was very successful in bringing together several generations of scientists from the early days of mid-oceanic ridge exploration to the most up-to-date and state-of-the-art studies of seafloor spreading processes. In this respect, Jean Francheteau continued to play his role as a catalyst for gathering scientists from different fields. Session breaks and dinner at the Oceanopolis aquarium provided many opportunities for cross-field stimulating discussions.



*Part of the attendees to the GEOCEAN Summer School*

After the two-day Symposium, nearly 40 participants remained for the three-day **summer school** that followed. The summer school was divided into three themed sessions, one per day, where invited experts presented each theme through a combination of classroom lectures and interactive training sessions. On the first day and following a welcome and introduction by organizers Olivier Rouxel and Jean-Yves Royer, Debbie Milton provided an introduction and

overview of Interridge. Michael Perfit, Benoit Ildefonse, and Wolfgang Bach then followed with lectures covering geodynamics and petro-geochemical processes at seafloor spreading ridges and flanks, complemented by hands-on exercises in geodynamic modeling (Anne Deschamps), core logging techniques (Louise Anderson), and petrological description (Wolfgang Bach, Benoit Ildefonse, and Gilles Chazot). The second day, focusing on fluid-rock interactions and geochemistry of seafloor hydrothermal systems, featured presentations by Yves Fouquet, Margaret Tivey, Brian Glazer, and Brandy Toner. Brian Glazer and Brandy Toner led training sessions on in-situ electrochemical analysis and the treatment of x-ray spectroscopic data, respectively, while Yves Fouquet, Olivier Rouxel and Jean-Alix Barrat directed sessions on seafloor mineral deposits and isotope geochemistry. The morning of the third and last day explored geobiological interactions in extreme environments through lectures by Stefan Lalonde, Olivier Rouxel, Anne Godfroy, and Pierre-Marie Sarradin. The afternoon of the last day included a presentation on European funding opportunities for students and postdocs by Lucie Roa, but was largely set aside for what proved to be a lively roundtable discussion of the big picture scientific questions in each theme, along with the future research directions and methodological advances required to inform them.

Opinions and interests were as broad as the group of researchers represented, yet several key themes and ideas emerged as separate focus groups shared the results of their individual discussions in front of the entire summer school. The geodynamic and petro-geochemical discussion group highlighted current shortcomings in the integration of studies spanning disparate spatial and temporal scales. It was suggested that future investigations should better emphasize the consideration of both mineralogical data probing cm- to mm-scales and remote sensing data that can provide meter- to kilometer-scale geological context. The fluid-rock interaction and seafloor hydrothermal geochemistry discussion group pointed out a distinct lack of quantitative constraints on seafloor hydrogeology; further investigation of substrate permeability, reaction rates, and fluid flows were identified as essential. Finally, the geobiology in extreme environments discussion group emphasized three main points: (1) that our current understanding of the deep biosphere is not anymore limited by available methodology, but rather a limited survey of potentially-important habitats; (2) symbiosis is hugely important at all scales in chemosynthetic ecosystems, however its investigation is hampered by current sampling technology, particularly with regards to maintaining *in-situ* temperatures and pressures during sampling, and (3) that linking organisms and their environment at the seafloor is essential and benefits greatly from *in-situ* measurement and a follow-the-energy approach.

Whether relating to the oceanic lithosphere, hydrothermal fluids, or microbial ecology, several key themes proved universal among the diverse discussion group themes. First, the importance of *in-situ* measurement and observation was emphasized across disciplines. Framing observations and analyses in their geological, geochemical, or biological *in-situ* context is a costly yet essential aspect of seafloor research that each of the focus groups emphasized independently. Related to context was the idea and importance of heterogeneity, and the difficulties inherent in defining it across disciplines. Also emphasized was the need for comprehensive and well-defined avenues of data sharing; the cost and effort involved in research at the seafloor warrants an open and lively exchange of data and samples. Lastly, it was recognized across disciplines that field work and the analysis of natural samples benefit significantly from complimentary experiment or modeling efforts on land, and that tight coordination between such efforts represents an important but perhaps underutilized avenue for facilitating discovery.

It is clear from the exit survey that the 2012 GEOCEAN symposium and summer school was a great success in the eyes of the participants. The organizers wish to thank the Labex MER program and external sponsors for their generous support, and Corinne Floc'h-Lazet, Dominique Gac, and Aurélie François in particular for their personal assistance. Finally, a warm thank you is extended to the participants, who made for a symposium and summer school that we are certain would have made Jean Francheteau proud.

## Annex 1: Final program of the GEOCEAN Symposium and Summer School

# Symposium

## Monday August 27, 2012 (Amphi A, IUEM)

8h30 **Welcome & Registration**

### Session 1: In memory of our colleague and friend Jean Francheteau

9h00 **Jean-Yves Royer, Pascal Gente (Univ. Brest), Jean-François Stéphan (INSU CNRS) and Sarah Francheteau-Berman**  
*Welcome address*

9h30 **Xavier Le Pichon (Collège de France, Aix-en-Provence)**  
*From Paleomagnetism to Plate tectonics, the contribution of Jean Francheteau to the discovery of finite Plate tectonics*

10h00 **W. Jason Morgan (Princeton Univ.)**  
*Jean Francheteau and plate reconstructions*

10h30 **Coffee Break**

11h00 **Pierre Choukroune (Univ. Aix-Marseille)**  
*When did Plate Tectonics start ?*

11h30 **Richard Hey (Univ. Hawaii), Fernando Martinez, Asdis Benediktsdóttir & Armann Höskuldsson**  
*Jean Francheteau & Seafloor Spreading Reorganizations: Microplates, Propagators, Overlappers & Iceland*

12h00 **Claude Rangin (CEREGE, Aix-en-Provence)**  
*"Déchirures": Continental Break-up & Tear-off*

12h30 **Lunch Break at IUEM**

### Session 2: Plate tectonics: kinematics & thermo-mechanical evolution of plates

14h00 **Robert Ballard (URI Center for Ocean Exploration), live from E/V Nautilus**  
*Dr. Jean Francheteau's Contribution to the Study of the Earth*

14h30 **Richard Gordon (Rice Univ., Houston TX) & Jay K. Mishra**  
*Current global plate motions: Shrinking plates & transform faults*

15h00 **Claude Jaupart (Institut de Physique du Globe de Paris)**  
*Thermal Structure and Stability of Thick Continental Lithosphere*

15h30 **Michel Diament (Institut de Physique du Globe de Paris)**  
*Intraplate volcanism in the South Pacific, what have we learned from satellites ?*

16h00 **Coffee Break**

16h30 **Emile Okal (Northwestern Univ., Evanston IL)**  
*T-waves: guardians of hidden ocean processes*

17h00 **Louis Géli (Ifremer, Brest)**  
*Earthquake precursors and supercritical fluids at oceanic fracture zones*

17h30 **Yossi Mart (Univ. Haifa)**  
*The life cycle of back-arc basins: an experimental approach*

18h00 **End of Session**

*Transportation to Oceanopolis*

19h00 **Dinner at Oceanopolis**

## Tuesday August 28, 2012 (Amphi A, IUEM)

### Session 3: Processes at seafloor spreading centers

9h00	<b>Thierry Juteau (Univ. Brest)</b> <i>Ophiolites and oceanic crust : the permanent dialog</i>
9h30	<b>Catherine Mével (Institut de Physique du Globe de Paris)</b> <i>Drilling the oceanic lithosphere</i>
10h00	<b>Mathilde Cannat (Institut de Physique du Globe de Paris)</b> <i>Axial-valley bounding faults and the exhumation of mantle-derived rocks at slow spreading ridges</i>
10h30	Coffee Break
11h00	<b>Alessio Sanfilippo (Univ. di Pavia) &amp; Riccardo Tribuzio</b> <i>Building of the deepest gabbroic crust at a fossil slow spreading centre (Pineto gabbroic sequence, Alpine Jurassic ophiolites)</i>
11h30	<b>Lily Muller (PhD, Univ. Oxford) &amp; Anthony Watts</b> <i>Seamount morphology and structure of the Southwest Indian Ridge (40°E - 60°E)</i>
12h00	<b>Michael Perfit (University of Florida, Gainesville FL)</b> <i>Mid-Ocean Ridge Volcanism on the East Pacific Rise: Integrated Volcanologic, Geophysical and Geochemical Studies</i>
12h30	Lunch Break at IUEM
14h00	<b>Jason Phipps Morgan (Univ. Cornell, Ithaca NY)</b> <i>A dynamic theory for the morphology of Overlapping Spreading Centers</i>
14h30	<b>Lars Rüpke (Helmholtz Center for Ocean Research, Kiel), Sonja Theissen-Krah, Karthik Iyer &amp; Jason Phipps Morgan</b> <i>Crustal accretion and hydrothermal convection patterns at fast-spreading ridges</i>
15h00	<b>Anne Deschamps (European Institute for Marine Studies, Brest), Morgane Le Saout, Adam Soule, Pascal Allemand, Brigitte Van Vliet Lanoe &amp; Christophe Delacourt</b> <i>Submarine and aerial inflated lava flows</i>
15h30	<b>Poster presentations</b> <i>5 minutes / poster</i>
16h30	Final address, Coffee Break & Poster session

**Cécile Grigné (European Institute for Marine Studies, Brest), Chantal Tisseau, Manuel Combes, Marc Parenthoën, Sébastien Le Yaouanq & Jacques Tisseau**  
*Multi-agent modeling of Earth's dynamics*

**Hailong Bai (PhD, Univ. Maryland, College Park MD), Laurent Montesi & Laura Hebert**  
*Origin of Crustal Thickness Anomalies at Oceanic Transform Faults*

**Brais Anne (Obs. Midi-Pyrénées, Toulouse), Olga Gomez & Raymond Lataste**  
*Off-axis seamounts on the flanks of the Southeast Indian Ridge. Implications for mantle dynamics east of the Australia-Antarctic Discordance.*

**Morgane Le Saout (PhD, Univ. Brest), Anne Deschamps, Adam Soule, Pascal Allemand & Pascal Gente**  
*Lava flows morphologies at the intersection of the East-Pacific Rise with the Mathematician hot-spot, 16° N.*

**Christine Andersen (PhD, Univ. Kiel), Lars Rüpke & Sven Petersen**  
*Tectono-magmatic controls on hydrothermal activity at the Mid-Atlantic Ridge vent fields Logatchev and 5°S*

**Thibaut Barreyre (PhD, IPG Paris), Javier Escartin, Rafael Garcia & Mathilde Cannat**  
*Structure and temporal variation in fluid outflow at the deep-sea Lucky Strike hydrothermal field (Mid-Atlantic Ridge) from seafloor imagery and temperature records*

**Rosa-Maria Prol-Ledesma (PhD, UNAM Mexico) & Marco Antonio Torres-Vera**  
*Large scale hydrothermal flow in a sedimented spreading center in the northern gulf of California, Mexico*

**Guy Evans (PhD, MIT/WHOI) & Margaret Tivey**

*Geochemical and Morphological Diversity of Vent Deposits from the Lau Back-arc Basin Arising from Variations in Igneous Rock Composition and Volcanic Arc Influence*

**Bleuenn Gueguen (PhD, Univ. Brest), Olivier Rouxel & Yves Fouquet**

*Ni isotope in ferromanganese crusts and deep-sea-clays: hydrogenetic and authigenic precipitation of Mn-oxides*

**Stéphane Rouméjon (PhD, IPG Paris) & Mathilde Cannat**

*Tectonic initiation of serpentinization: mesh-texture development, in exhumed peridotites, at slow and ultraslow-spreading ridges*

**Margaret Tivey (Woods Hole Oceanographic Institution, MA) & Anna-Louise Reysenbach**

*Use of thermocouple arrays for study of microbial colonization in very young (days to weeks old) vent deposits*

**Pauline Henri (PhD, IPG Paris), Céline Rommevaux-Jestin, Bénédicte Menez & Françoise Lesongeur**

*Basalt alteration by endemic microorganisms of hydrothermal vents*

**Maria-Cristina Ciobanu (Ifremer, Brest)**

*Microbial diversity of marine sediments from the Canterbury Basin, New Zealand (IODP Leg 317)*

**Nolwenn Callac (PhD, Univ. Brest), Olivier Rouxel, Françoise Lesongeur, Carole Decker, Céline Liorzou, Claire Bassoullet, Karine Estève, Patricia Pignet, Sandrine Cheron, Joel Etoubleau, Yves Fouquet, Céline Rommevaux-Jestin & Anne Godfroy**

*Continuous enrichment culture using diluted hydrothermal fluid as medium: insights into sulfur and iron biogeochemical cycles, microbial actors, and mineral interactions in active deep-sea vent chimney of Guaymas Basin*

18h00

End of Symposium

## *Summer School*

### Wednesday August 29, 2012 (Amphi B, IUEM)

8h45 **Olivier Rouxel & Jean-Yves Royer**  
*Welcome at IUEM and logistics*

9h15 **Debbie Milton (NOC, Southampton)**  
*InterRidge*

#### Session 1: Geodynamics & petro-geochemical processes at seafloor spreading ridges and ridge flanks

9h45 **Michael Perfit (Univ. Florida, Gainesville FL)**  
*Crustal accretion and petro-geochemical processes at seafloor spreading ridges*

10h45 Coffee Break

11h00 **Benoit Ildefonse (Geosciences, Montpellier)**  
*Formation and evolution of the oceanic lithosphere*

12h00 **Wolfgang Bach (University of Bremen)**  
*Alteration of the Oceanic Lithosphere and Implications for Seafloor Processes*

13h00 Lunch Break at ENSTB

14h00 **TRAINING SESSION A (2 groups) PC rooms; IUEM**  
*A1: Geodynamic modeling: Anne Deschamps (IUEM, Brest)*  
*A2: Logging techniques: Louise Anderson (University of Leicester)*

16h00 **TRAINING SESSION B (2 groups) IUEM; LDO conference room (include coffee break)**  
*B1: Petrological description / Macro description: W. Bach / B. Ildefonse*  
*B2: Petrological description / Microscope: G. Chazot (IUEM, Brest)*

18h00 End of day



## Thursday August 30, 2012 (Salon de l'océan, Ifremer)

8h45 **Welcome at Ifremer and program of the day**

### Session 2: Fluid-rock interactions & geochemistry of seafloor hydrothermal systems

8h55 **Yves Fouquet (Ifremer, Brest)**

*Seafloor hydrothermal systems and mineral resources at the seafloor*

9h45 **Margaret Tivey (Woods Hole Oceanographic Institution, MA)**

*Geochemical modeling of vent environments*

10h45 Coffee Break

11h00 **TRAINING SESSION C (2 groups)**

*Crustal accretion and petro-geochemical processes at seafloor spreading ridges*

*C1: Sulfide/mineral deposits at seafloor: Yves Fouquet (Ifremer)*

*C2: Geochemical techniques : J.-A. Barrat (IUEM, Brest) & Olivier Rouxel (Ifremer)*

13h00 Lunch Break at Ifremer

14h00 **Brian Glazer (Univ. Hawaii)**

*Microbial geochemistry of deep sea hydrothermal iron*

14h45 **Brandy Toner (Univ. Minnesota, Minneapolis MN)**

*How to use X-ray absorption spectroscopy to measure Fe, Mn, and S in marine particles*

15h30 Coffee Break

16h00 **TRAINING SESSION D (2 groups)**

*D1: Spectroscopy: Brandy Toner (Univ. Minnesota), at La Pérouse Library*

*D2: In-situ measurements: Brian Glazer (Univ. Hawaii)*

18h00 End of day

## Friday August 31, 2012 (Amphi B, IUEM)

### Session 3: Geobiological interactions in extreme environments

8h45 **Stefan Lalonde (IUEM, Brest)**

*Introduction to geobiology*

9h45 **Olivier Rouxel (Ifremer, Brest)**

*Isotopic evidence for microbial activity in rocks*

10h45 Coffee Break

11h00 **Anne Godfroy (Ifremer, Brest)**

*Microbial life in hydrothermal active chimneys*

11h45 **Pierre-Marie Sarradin (Ifremer, Brest)**

*Deep-sea ecosystems and habitat characterization*

12h30 Lunch Break at ENSTB

### Session 4: Concluding session

14h00 *Roundtable: three-session restitution addressing, for each theme, the following questions:*

*- What are, in your view, the overall "big-picture" scientific questions ?*

*- What are the most significant future research directions ?*

*- What technological/methodological advances will most improve our understanding ?*

**Discussion leaders: O. Rouxel and S. Lalonde**

15h30 Coffee Break

16h00 **Lucie Roa (Cellule Europe UBO)**

*Research opportunities for students and postdocs in Europe*

16h30 Final address and end of GEOCEAN Summer School

## Annex 2: List of participants to the GEOCEAN Symposium

Participants who also attended the Summer School are outlined in grey.

Name	Institution		Name	Institution
1 Ammann Jérôme	IUEM LDO		60 Jacq Céline	IUEM LDO
2 Andersen Christine	GEOMAR, Kiel DE		61 Jamet Guillaume	IUEM LDO
3 Anderson Louise	University of Leicester, UK		62 Jaupart Claude	IPG Paris
4 Aouizerat Arthur	IUEM		63 Juteau Thierry	IUEM LDO
5 Aumond Virginie	IUEM LEMAR		64 Juvigny Thomas	IUEM
6 Authemayou Christine	IUEM LDO		65 Labanieh Shasa	Ifremer
7 Bach Wolfgang	University of Bremen, DE		66 Labry Cyril	IUEM
8 Bai Hailong	University of Maryland, USA		67 Lalancette Marie-Franç.	SHOM, Brest
9 Ballard Robert	University Rhode Island, USA		68 Lalonde Stefan	IUEM LDO
10 Barreyre Thibaut	IPG Paris		69 Laurent Husson	Géosciences Rennes
11 Beaumais Aurélien	IUEM LDO		70 Le Pichon Xavier	Collège de France
12 Bellon Hervé	IUEM LDO		71 Le Roy Pascal	IUEM LDO
13 Bermell Sylvain	Ifremer		72 Le Saout Morgane	IUEM LDO
14 Beuzart Paul	Ifremer		73 Le Texier Léna	IUEM
15 Bornemann Brigitte	Entretiens Science et éthique / Energies de la mer, Brest		74 Léocat Erell	Laboratoire Geoazur, Nice
16 Brandon Vincent	CEA		75 Lucas Sylvain	SHOM, Brest
17 Briais Anne	GET - CNRS & Univ. Toulouse		76 Maia Marcia	IUEM LDO
18 Callac Nolwenn	Université de Brest		77 Marieni Chiara	Univ. of Southampton, UK
19 Cambrai Erwan	IUEM LDO		78 Mart Yossi	University of Haifa, Israel
20 Cannat Mathilde	IPG Paris		79 Merny Patricia	IUEM
21 Chazot Gilles	IUEM LDO		80 Mevel Catherine	IPG Paris
22 Choukroune Pierre	University Aix-Marseille		81 Milton Debbie	Nat. Oceanogr. Centre, UK
23 Ciobanu Maria-Cristina	Ifremer		82 Molliey Stéphane	IUEM LDO
24 Combes Manuel	Lab-STICC, Brest		83 Morgan Jason Phipps	Cornell University, USA
25 Courgeon Simon	IUEM		84 Morgan W. Jason	Princeton University, USA
26 Delacourt Christophe	IUEM LDO		85 Mougél Bérangère	IUEM LDO
27 Deschamps Anne	IUEM LDO		86 Moysan Yann	SHOM, Brest
28 Deverchere Jacques	IUEM LDO		87 Muller Lily	University of Oxford, UK
29 Diamant Michel	IPG Paris		88 Needham David	Ifremer
30 Duchesne Aurélie	IUEM		89 Okal Emile	Northwestern University, USA
31 Emily Etienne	IUEM		90 Paulet Yves-Marie	IUEM
32 Evans Guy	WHOI, USA		91 Pautot Guy	BRGM
33 Floch-Lazet Corinne	IUEM		92 Perfit Michael	University of Florida, USA
34 Francheteau Emmanuel			93 Peron Guillaume	IUEM
35 Francheteau David			94 Poudelet Josiane	Univ. Bretagne Sud, Lorient
36 Francheteau Gabriel			95 Prol-Ledesma Rosa Maria	UNAM, Mexico
37 Francheteau Isaac			96 Quentel Elise	IUEM LDO
38 Francheteau Marta			97 Rabineau Marina	IUEM LDO
39 Francheteau Matthias			98 Rangin Claude	CEREGE, Aix en Provence
40 Francheteau Sarah			99 Recq Maurice	IUEM LDO
41 Francois Aurélie	IUEM		100 Revillon Sidonie	IUEM LDO
42 Gac Dominique	IUEM LDO		101 Rouméjon Stéphane	IPG Paris
43 Géli Louis	Ifremer		102 Rouxel Olivier	Ifremer
44 Gente Pascal	IUEM LDO		103 Royer Jean-Yves	IUEM LDO
45 Geoffroy Laurent	IUEM LDO		104 Ruepke Lars	Helmholtz Center for Ocean Research Kiel, DE
46 Glazer Brian	University of Hawaii, USA		105 Salaun Corinne	IUEM LDO
47 Godfroy Anne	IUEM LMEE		106 Sanfilippo Alessio	Università di Pavia, IT
48 Gordon Richard	Rice University, USA		107 Shulga Nataly	Shirshov Inst. of Oceanology, Russian Acad. of Sciences
49 Graindorge David	IUEM LDO		108 Sibuet Jean-Claude	Ifremer
50 Gregoire Gwendoline	IUEM		109 Stephan Jean-Francois	INSU CNRS
51 Grigne Cécile	IUEM LDO		110 Sukhovich Alexey	IUEM LDO
52 Gueguen Bleuenn	IUEM LDO		111 Tanguy Virginie	IUEM LEMAR
53 Gutscher Marc-André	IUEM LDO		112 Thibaud Rémy	Ecole Navale, Lanvéoc
54 Hardy William	IUEM		113 Tisseau Chantal	IUEM LDO
55 Hekinian Roger	Ifremer		114 Tivey Margaret	WHOI, USA
56 Henri Pauline	IPG Paris		115 Toner Brandy	University of Minnesota, USA
57 Hey Richard	Univ. of Hawaii at Manoa		116 Treguer Paul	IUEM
58 Ildéonse Benoit	Université Montpellier 2		117 Treguier Anne Marie	IUEM LPO
59 Irie Ange	IUEM		118 Van Vliet-Lanoe Brigitte	IUEM LDO

Acronyms of institutions:

CEREGE: Centre Européen de Recherche et d'Enseignement des Géosciences de l'Environnement, Aix en Provence  
GET : Géosciences Environnement Toulouse  
INSU: Institut National des Sciences de l'Univers (CNRS), Paris  
IPG Paris : Institut de Physique du Globe de Paris  
IUEM : Institut Universitaire Européen de la Mer (Université de Brest), Plouzané  
IUEM LDO: IUEM Laboratoire Domaines Océaniques  
IUEM LPO : IUEM Laboratoire de Physique des Océans  
IUEM LEMAR: IUEM Laboratoire des Sciences de l'Environnement Marin  
IUME LMEE : IUEM Laboratoire des Milieux et Environnements Extrêmes  
SHOM : Service Hydrographique et Océanographique de la Marine, Brest  
UNAM : Universidad Nacional Autónoma de México  
WHOI : Woods Hole Oceanographic Institution, Woods Hole, MA USA