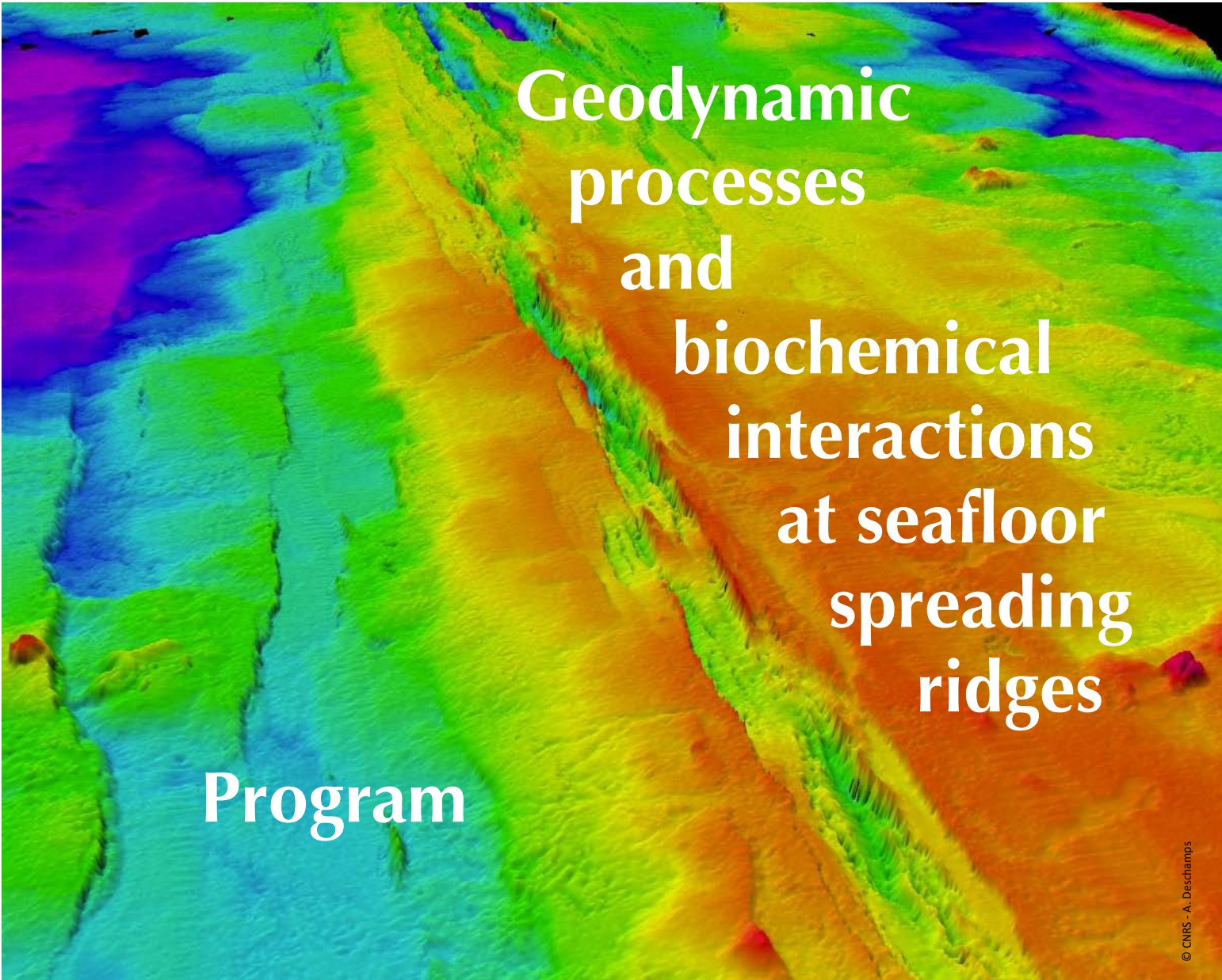


# GEOCEAN

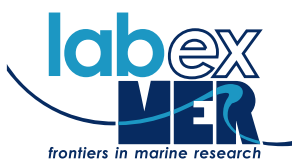
**Symposium Jean Francheteau & Summer School  
August 27-31, 2012 - Brest, France**



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

**Program**

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**Organizing committee:**

Jean-Yves Royer <sup>1</sup>

Olivier Rouxel <sup>2</sup>

Corinne Le Floch-Laizet <sup>3</sup>

Aurélie François <sup>3,4</sup>

Patricia Merny <sup>4</sup>

Dominique Gac <sup>1</sup>

Jacques Déverchère <sup>1</sup>

Anne Deschamps <sup>1</sup>

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Université de Bretagne Occidentale, Brest (UBO)

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Ifremer

Région Bretagne

Conseil Général du Finistère

Brest Métropole Océane (BMO)

**Venues:**

Institut Universitaire Européen de la Mer (IUEM, UBO)

Rue Dumont D'Urville

29280 Plouzané – France

<http://www-iuem.univ-brest.fr>

Ifremer

Centre de Brest

29280 Plouzané – France

<http://www.ifremer.fr>

<sup>1</sup> Laboratoire Domaines Océaniques (UMR6538), IUEM

<sup>2</sup> Département Géosciences Marines, Ifremer

<sup>3</sup> Labex MER, IUEM

<sup>4</sup> IUEM

## Jean Francheteau (1943–2010)

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Jean Francheteau, pioneering marine geologist and geophysicist, AGU Fellow, and emeritus professor at the University of Brest (Université de Bretagne Occidentale), died on 21 July in St-Renan, Brittany, France, at the age of 67 after a long illness. With his passing, the field of Earth sciences lost a major contributor to the development of a definitive theory of plate tectonics and one of the first to make visual geological observations on the deep seafloor. Such scientific accomplishments, coupled with his personal charm and the ability to collaborate with researchers from many institutions, ensured that he had a huge influence not only on the world of research but also on teaching and the application of ethics to science.

Jean arrived at Scripps Institution of Oceanography in La Jolla, Calif., in 1966 after obtaining a diploma in mining engineering at the prestigious École Nationale Supérieure de la Métallurgie et de l'Industrie des Mines in Nancy, France. He chose Victor Vacquier as his thesis supervisor and began working in Vic's lab with John Sclater, ostensibly on heat flow measurements.

Jean had a defining effect on this research program, moving it very far from heat flow. As a second-year graduate student he persuaded Harmon Craig, a seagoing geochemist, to devote 2 days of his precious shipboard sampling time to the topographic and magnetic surveys of two adjacent major seamounts in the central Pacific; these runs ultimately yielded excellent magnetic pole positions. After hearing a talk on the 1967 *Nature* paper (216, 1276–1280) by Dan McKenzie and Bob Parker quantifying Tuzo Wilson's theory of rigid plates, Jean looked around for tectonic problems in the oceans to examine from a quantitative approach. First, he tackled the stability of the finite rotation poles that describe the motion of the Pacific plate by examining the trends of the major North Pacific fracture zones. Next, he and John Sclater decided to investigate the arguments—raised by Russian publications—that the apparent equality of heat flow between oceans and continents presented a serious problem to the overall theory of plate tectonics. In contrast, they were able to show that the existing heat flow data and the subsidence of the mid-ocean ridges both bore simple relationships with the age of the ocean floor that actually strongly supported the theory.

Following these publications, Vacquier and Sclater left for 3 months at sea, expecting that Jean would integrate all of his already published papers as his doctoral

thesis. But, instead, they found that in their absence, Jean had prepared as his thesis a global examination of paleomagnetism and plate tectonics without a single reference to his five already published papers!

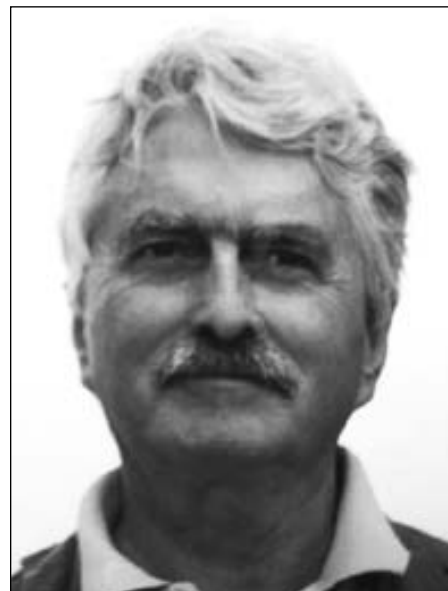
Jean left Scripps at age 27, with an international reputation and an understanding of marine science at the highest level, to return to Brittany, where he had spent his childhood. He joined the new Center of Oceanography in Brittany (COB), where Xavier Le Pichon had assembled a team of highly regarded marine geologists and geophysicists. After 2 years of intense effort, Jean and Le Pichon, together with Jean Bonin, authored a book, *Plate Tectonics*, which was the first book that captured both the conceptualization and the application of the theory of plate tectonics. In a published review of this book, Fred Vine wrote, "I find it impossible to find fault with this book," incredibly high praise from this eminent British scientist. The authors followed this with a series of seminars and educational courses that were highly regarded nationally.

While at COB, Jean was heavily involved in submersible research on the Mid-Atlantic Ridge. He was a leader in the French-American Mid-Ocean Undersea Study (FAMOUS) expeditions in 1973 and 1974 that made early integrated deep-sea observations along the Mid-Atlantic Ridge near the Azores. This was the beginning of true, visual geological exploration of the oceans.

From 1978 through 1983, Jean was a major player in notably productive dives using French and American submersibles and the lead author on several papers that reported the discovery of active hydrothermal sites and identifiable mineral deposits with associated ecosystems at the crest of the East Pacific Rise. He left Brittany in 1981 to move to the Institut de Physique du Globe de Paris, where he led the marine group participating in significant oceanographic expeditions along the Pacific spreading centers. Key parts of these observations were made using submersibles, including a bathyscaphe.

In 1992, Jean returned to Brest, this time as a professor of geophysics at the University of Brest. He chaired the doctoral school in marine sciences there from 1999 to 2007. He also led the research program on spreading ridges at the European Institute for Marine Studies at the Centre National de la Recherche Scientifique (CNRS) from 1991 to 1998.

Jean coauthored more than 90 papers and a major textbook. He made fundamental contributions to plate tectonics and modern marine geology and geophysics. In the



Jean Francheteau

Earth sciences, his work had an incredible range, covering paleomagnetism, plate kinematics, heat flow, hydrothermal circulation, the structure of continental rifts and oceanic spreading centers, oceanic fracture zones, seamounts, and rock magnetism. He ventured and researched all over the world, from the depths of the Atlantic and Pacific oceans to the heat of the Afar Depression (in northeastern Africa) and the heights of Tibet.

Through his research and his editorial activities (he served as editor of *Geophysical Journal International* from 1988 to 2010), Jean had an encyclopedic knowledge of oceanography that was tapped extensively by every colleague who had the opportunity to work with him. He received many international honors, including Fellow of the Royal Astronomical Society (1974), Fellow of the American Geophysical Union (1984), CNRS Silver Medal (1982), and the Grand Prize in Marine Sciences (1995) from the French Academy of Sciences.

In 1970, Jean married Marta Lerrick, who moved with him to Brest, where they settled into a marvelous old house in Locmaria-Plouzané with their (ultimately) five children. Jean was the complete scientist: a superbly trained French engineer, a key participant in one of the major revolutions in the Earth sciences, a marvelous seagoing colleague, a great leader of expeditions, and a major participator in a series of nationally broadcast conferences on science and ethics. With his charm, modesty, and willingness to collaborate and share data with associates around the world, Jean was a gifted ambassador of all that was best in French research.

—JOHN SCLATER, Scripps Institution of Oceanography, University of California, San Diego, La Jolla; E-mail: jsclater@ucsd.edu; and XAVIER LE PICHON, Collège de France, Aix en Provence, France

## Selection of Jean Francheteau's publications (> 90)

- Francheteau, J. & J.G. Sclater, **1969**. Paleomagnetism of southern continents and plate tectonics, *Earth and Planetary Science Letters*, **6**, 93-&.
- Francheteau, J., J.G. Sclater & H. Craig, **1969**. Magnetization of a recently discovered seamount in Central Pacific, *Geophysics*, **34**, 645-&.
- Sclater, J.G. & J. Francheteau **1970**. Implications of terrestrial heat flow observations on current tectonic and geochemical models of crust and upper mantle of Earth, *Geophysical Journal of the Royal Astronomical Society*, **20**, 509-&.
- Francheteau, J., C.G. Harrison, J.G. Sclater & M.L. Richards, **1970**. Magnetization of Pacific Seamounts - A preliminary polar curve for Northeastern Pacific, *Journal of Geophysical Research*, **75**, 2035-&.
- Francheteau, J., J.G. Sclater & H.W. Menard, **1970**. Pattern of relative motion from fracture zone and spreading rate data In North-Eastern Pacific, *Nature*, **226**, 746-&.
- Francheteau, J. & X. Le Pichon, **1972**. Marginal fracture zones as structural framework of continental margins in South-Atlantic Ocean, *American Association of Petroleum Geologists Bulletin*, **56**, 991-&.
- Le Pichon X., J. Francheteau & J. Bonnin - Plate Tectonics - Elsevier 300pp - **1973**
- Needham, H.D. & J. Francheteau, **1974**. Some characteristics of rift valley in Atlantic Ocean near 36°48' North, *Earth And Planetary Science Letters*, **22**, 29-43.
- Molnar, P. & J. Francheteau, **1975**. Relative Motion of hot spots in Atlantic and Indian Oceans during Cenozoic, *Geophysical Journal of the Royal Astronomical Society*, **43**, 763-774.
- Molnar, P. & J. Francheteau, **1975**. Plate tectonic and paleomagnetic implications for age of Deccan Traps and magnetic anomaly time scale, *Nature*, **255**, 128-130.
- Francheteau, J., P. Choukroune, R. Hekinian, X. Le Pichon & H.D. Needham, **1976**. Oceanic fracture zones do not provide deep sections in crust, *Canadian Journal of Earth Sciences*, **13**, 1223-1235.
- Le Pichon, X., J.C. Sibuet & J. Francheteau, **1977**. Fit of continents around North-Atlantic Ocean, *Tectonophysics*, **38**, 169-209.
- Le Pichon, X. & J. Francheteau, **1978**. Plate-tectonic analysis of Red-Sea - Gulf of Aden Area, *Tectonophysics*, **46**, 369-406.
- Francheteau, J., D. Needham, P. Choukroune, T. Juteau, M. Seguret, R.D. Ballard, J. Fox, W. Normark, A. Carranza, D. Cordoba, J. Guerrero, C. Rangin, H. Bougault, P. Cambon & R. Hekinian, **1978**. Massive deep-sea sulfide ore-deposits discovered by submersible on the East Pacific Rise - Project Rita, 21-Degrees-N, *Comptes Rendus Academie des Sciences Serie D*, **287**, 1365-&.
- Tapponnier, P. & J. Francheteau, **1978**. Necking of lithosphere and mechanics of slowly accreting plate boundaries, *Journal of Geophysical Research*, **83**, 3955-3970.
- Francheteau, J., T. Juteau & C. Rangin, **1979**. Basaltic pillars in collapsed lava-pools on the deep ocean-floor, *Nature*, **281**, 209-211.
- Francheteau, J., H.D. Needham, P. Choukroune, T. Juteau, M. Seguret, R.D. Ballard, P.J. Fox, W. Normark, A. Carranza, D. Cordoba, J. Guerrero, C. Rangin, H. Bougault, P. Cambon & R. Hekinian, **1979**. Massive deep-sea sulfide ore-deposits discovered on the East Pacific Rise, *Nature*, **277**, 523-528.
- Ballard, R.D., J. Francheteau, T. Juteau, C. Rangin & W. Normark, **1981**. East Pacific Rise at 21°N: the volcanic, tectonic, and hydrothermal processes of the central axis, *Earth and Planetary Science Letters*, **55**, 1-10.
- Francheteau, J., **1983**. The oceanic crust, *Scientific American*, **249**, 114-&.
- Francheteau, J. & R.D. Ballard, **1983**. The East Pacific Rise near 21°N, 13°N and 20°S - Inferences for along-strike variability of axial processes of the mid-ocean ridge, *Earth and Planetary Science Letters*, **64**, 93-116.
- Ballard, R.D., R. Hekinian and J. Francheteau, **1984**. Geological setting of hydrothermal activity at 12°50' N on the East Pacific Rise: a submersible study. *Earth and Planetary Science Letters*, **69**, pp 176-186
- Francheteau, J., C. Jaupart, X.J. Shen, W.H. Kang, D.L. Lee, J.C. Bai, H.P. Wei & H.Y. Deng, **1984**. High heat-flow in Southern Tibet, *Nature*, **307**, 32-36.
- Searle, R.C. & J. Francheteau, **1986**. Morphology and tectonics of the Galapagos Triple Junction, *Marine Geophysical Researches*, **8**, 95-129.
- Francheteau, J., A. Yelleschaouche & H. Craig, **1987**. The Fernandez, Juan Microplate North Of The Pacific-Nazca-Antarctic plate junction at 35-Degrees-S, *Earth and Planetary Science Letters*, **86**, 253-268.
- Francheteau, J., P. Patriat, J. Segoufin, R. Armijo, M. Doucoure, A. Yelleschaouche, J. Zekin, S. Calmant, D.F. Naar & R.C. Searle, **1988**. Pito And Orongo Fracture-Zones - The northern and southern boundaries of the Easter Microplate (Southeast Pacific), *Earth and Planetary Science Letters*, **89**, 363-374.
- Francheteau, J., R. Armijo, J.L. Cheminee, R. Hekinian, P. Lonsdale & N. Blum, **1990**. 1 Ma East Pacific Rise oceanic-crust and uppermost mantle exposed by rifting in Hess Deep (Equatorial Pacific-Ocean), *Earth and Planetary Science Letters*, **101**, 281-295.
- Francheteau, J., O. Eldholm & P. Miles, **1991**. The geology, geophysics and metallogeny of the present-day oceans - Selected papers presented at the 5th meeting of the European-Union-Of-Geosciences (Eug-V) In Strasbourg, France, 20-23 March, 1989 - Special Issue - Preface, *Tectonophysics*, **190**, R7-R7.
- Francheteau, J., R. Armijo, J.L. Cheminee, R. Hekinian, P. Lonsdale & N. Blum, **1992**. Dyke Complex Of The East Pacific Rise exposed in the walls of Hess Deep and the structure of the upper oceanic-crust, *Earth and Planetary Science Letters*, **111**, 109-121.
- Francheteau, J., **1993**. Images of the sea-floor, *La Recherche*, **24**, 838-843.
- Hekinian, R., P. Stoffers, D. Ackerman, N. Binard, J. Francheteau, C. Devey and D. Garbe-Shonberg, **1995**. Magmatic evolution of the Easter Microplate-Crough Seamount region (South East Pacific), *Marine Geophysical Research*, **17**, 375-397,
- Francheteau, J., **1996**. The seabed seen from space, *La Recherche*, 30-31.
- Naar, D.F., R. Hekinian, M. Segonzac & J. Francheteau, **2004**. Vigorous venting and biology at Pito Seamount, easter microplate. In *Mid-Ocean Ridges: Hydrothermal Interactions Between The Lithosphere and Oceans*, *Geophysical Monograph Series*, **148**: 305-318.
- Searle, R.C., J. Francheteau & R. Armijo, **2006**. Compressional deformation north of the Easter microplate: a manned submersible and seafloor gravity investigation, *Geophysical Journal International*, **164**, 359-369.
- Geli, L., T.C. Lee, J.R. Cochran, J. Francheteau, D. Abbott, C. Labails & D. Appriou, **2008**. Heat flow from the Southeast Indian Ridge flanks between 80°E and 140°E: Data review and analysis, *Journal of Geophysical Research*, **113**.

## 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*

## GEOCEAN Symposium & Summer School – 27-31 September 2012 - Brest

### **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