



Hubert-Jean Ceccaldi · Ivan Dekeyser  
Mathias Girault · Georges Stora *Editors*

## Proceedings of the 13<sup>th</sup> French-Japanese Oceanography Symposium



# Global Change: Mankind-Marine Environment Interactions



Hubert-Jean Ceccaldi • Ivan Dekeyser  
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French-Japanese Oceanography  
Symposium



Springer



*Editors*

Hubert-Jean Ceccaldi  
Université de la Méditerranée  
Centre d'Océanologie de Marseille  
Laboratoire de Microbiologie, Géochimie  
et Ecologie Marines (L.M.G.E.M.)  
Campus de Luminy, case 901  
13288 Marseille, cedex 09  
France  
hubert.ceccaldi@univmed.fr  
and  
27 rue Rocca, 13008 Marseille  
France  
ceccaldi.hubert@orange.fr

Ivan Dekeyser  
Université de la Méditerranée  
Centre d'Océanologie de Marseille  
COM OSU  
Campus de Luminy, case 901  
13288 Marseille, cedex 09  
France  
ivan.dekeyser@univmed.fr

Mathias Girault  
Université de la Méditerranée  
Centre d'Océanologie de Marseille  
Laboratoire de Microbiologie, Géochimie  
et Ecologie Marines (L.M.G.E.M.)  
Campus de Luminy, case 901  
13288 Marseille, cedex 09  
France  
mathias.girault@univmed.fr  
and  
Tokyo University of Marine Sciences and Technology  
Faculty of Marine Science  
5-7 Konan 4, Minato-ku  
108-8477 Tokyo  
Japan

Georges Stora  
Université de la Méditerranée  
Centre d'Océanologie de Marseille  
Laboratoire de Microbiologie, Géochimie  
et Ecologie Marines (L.M.G.E.M.)  
Campus de Luminy, case 901  
13288 Marseille, cedex 09  
France  
georges.stora@univmed.fr

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*Cover figures:* "Wedded rocks", connected by a holy rope and a small torii, northern coast of the Sea of Japan (photograph by Hubert Ceccaldi); Marseille harbour and church Notre Dame de la Garde (painting by Georges Briata).

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First plenary conference, opening session of the 13th French-Japanese Oceanography Symposium (Colloque franco-japonais d'Océanographie)

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Prof. TAKAI Rikuo, Tokyo University of Marine Science and Technology and Prof. Yvon BERLAND signing of the agreement between the “Université de la Méditerranée” and “Tokyo University of Marine Science and Technology”.

From the left, Dr. IZUMI Mitsuru, Vice-President, Director of the Office of Liaison and Cooperative Research; Dr. TAKAI Rikuo, President, Pr. Roger GIUDICELLI, Vice-President; Prof Yvon BERLAND, President; M. BAMBA Masahiro, Consul général of Japan in Marseille.



# Global Change: Mankind-Marine Environmental Interactions

- **Aquaculture:** resource preservation and harmonious management
- **Artificial Reefs:** enhancement and protection of natural environments
- **Biodiversity:** impact of human activities, invasive species, and protection of natural environments
- **Coastal Managements:** interactions between ports and natural environments, ecological and economical consequences
- **Observation of Marine Environment:** emergence of new technologies
- **Physical, Chemical, Biological and Biogeochemical Functioning:** natural and anthropic environments



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Marseille L.M.G.E.M. Campus de Luminy, case 901, 13288 Marseille cedex 09  
Courriel: cfjo-sec@com.univmed.fr

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## Foreword

Son Excellence Monsieur Iimura Yutaka  
Ambassadeur du Japon en France

Le 13<sup>ème</sup> Colloque franco-japonais d'Océanographie s'est déroulé en 2008, l'année célébrant le 150<sup>ème</sup> anniversaire des relations diplomatiques entre nos deux pays.

Dès la signature du traité franco-japonais de paix, d'amitié et de commerce en 1858, le Japon s'est empreint de l'influence de la France. Notre pays a pu disposer des techniques et des savoirs français dans de très nombreux domaines visant à l'édification d'un Etat moderne tels que la pensée politique, le code civil, l'organisation de l'armée et de la police et l'industrie. La France a également été influencée par le Japon, bien que de façon plus modeste et essentiellement dans le domaine des arts et de la culture. La peinture de style Ukiyo-é et les poteries japonaises sont à l'origine du "Japonisme" qui a joué un rôle décisif dans la genèse de l'impressionnisme et de l'Art Nouveau.

Aujourd'hui il existe entre la France et le Japon des liens forts dans les relations commerciales, les investissements, les échanges entre collectivités locales, l'enseignement supérieur et la recherche, les sciences et les technologies. La coopération dans le domaine de l'océanographie a commencé il y a déjà plus de cinquante ans avec les recherches menées par le bathyscaphe français dans la Fosse du Japon. Les deux Sociétés d'Océanographie franco-japonaises ont largement contribué à la développer.

Je tiens à rendre hommage aux nombreuses personnes qui ont travaillé à l'organisation de ce colloque et apprécie leur passion sans laquelle cette manifestation n'aurait pas eu lieu. Enfin, je tiens à les féliciter du très grand succès qu'elle a rencontré.

M. Yutaka Iimura  
Ambassadeur du Japon en France

Translation

The 13th France-Japan Colloquy in Oceanography took place in 2008, the year celebrating the 150th anniversary of the official diplomatic exchanges between our two countries.

Since the signing of the France-Japan Treaty of Peace, Friendship and Trade in 1858, Japan has been marked by French influence. Our country has been able to

use French techniques and knowledge in numerous areas in order to edify a modern State, for example, in political thinking, developing a civilian code of justice, organization of the army and police, and in industry.

France has also been influenced by Japan, although more modestly and essentially in the domain of arts and culture. Paintings of Ukiyo-é and Japanese ceramics are linked to the origins of the “Japonisme,” which played a decisive role in the genesis of impressionism and Art Nouveau.

Today, this relationship still exists between France and Japan, with strong links in commercial trade, investments, exchanges in the fields of local collectives, upper level education, science, and technology. The cooperation in the field of oceanography began more than 50 years ago with the research involving French bathyscaphs in the Japanese trench. The two Sociétés franco-japonaises d’Océanographie have broadly contributed to that development.

I am paying tribute to the numerous persons who have worked for the organization of the colloquy, and I appreciate their passion, without which that event should not been happened. Finally, I would like to congratulate them for the very large success obtained.

Monsieur le Professeur François Gros  
Secrétaire perpétuel honoraire de l'Académie des Sciences

Il m'est particulièrement agréable de rédiger la préface de cet ouvrage qui regroupe les textes des communications présentées au cours du 13<sup>ème</sup> Colloque franco-japonais d'Océanographie. Cette importante réunion scientifique s'est déroulée à Marseille et à Paris entre le 8 et le 12 septembre 2008.

Ce Colloque couvre un champ continu de la recherche en sciences et technologies marines depuis les caractères physiques et chimiques des océans jusqu'aux aménagements du littoral, en passant par la biodiversité, l'aquaculture et les récifs artificiels.

L'Académie des Sciences est attentive à de telles activités qui renforcent les liens existant entre les océanographes français et leurs confrères du Japon. Certaines Fondations de l'Institut se sont d'ailleurs donné pour mission d'aider de telles initiatives comme l'aide apportée par M. le Chancelier Gabriel de Broglie. Le Comité consultatif conjoint franco-japonais que j'ai co-présidé de longues années considère aussi avec un grand intérêt les rencontres de ce niveau qui, grâce à l'établissement de relations personnelles entre chercheurs des deux pays, complètent parfaitement les relations établies entre les administrations et entre les organismes officiels des deux pays.

Ce colloque très ouvert donne surtout des perspectives vers des domaines réellement porteurs d'avenir, comme les biotechnologies marines, la biogéochimie, les technologies d'aquaculture, de nouvelles approches en biodiversité des populations marines, les nouveaux types de récifs artificiels et les tout récents appareillages permettant des observations très fines du milieu marin. Les plus hautes instances de chacun des deux pays – Ambassades, Ministères, Directions nationales et régionales de la recherche scientifique – ne s'y sont pas trompées en accordant leur soutien à cette manifestation. Des perspectives vers la médecine et vers la pharmacie sont déjà ouvertes en nutrition, santé, nouveaux médicaments, cosmétiques, pour ne prendre que quelques exemples. L'établissement, à cette occasion, d'un jumelage entre deux universités, française et japonaise, favorisera grandement le flux de ces échanges, bénéfiques aux deux partenaires. Il pourrait servir d'exemple à d'autres universités.

Aussi suis-je heureux de remercier les deux Sociétés franco-japonaises d'Océanographie, l'Université de la Méditerranée, le Centre d'Océanologie de Marseille et les Comités d'organisation qui, dans chacun des deux pays, ont mis sur pied cette intéressante et si productive manifestation. Elle aura des suites dans le prochain colloque au Japon dans un proche futur et demeurera, j'en suis convaincu, d'une grande fécondité dans un avenir plus lointain. Que les organisateurs, et notamment les Professeurs Hubert Jean Ceccaldi, Imawaki Shiro et Yagi Hiroki soient vivement loués pour cette belle réussite.

Prof. François Gros, Secrétaire perpétuel honoraire de l'Académie des Sciences

Translation

I am particularly glad to draw up this foreword of this book, gathering the texts of the communications presented during the 13th France-Japan Colloquy of Oceanography. This important scientific meeting was held in Marseille, then Paris, between September 8 and 12, 2008.

That meeting covered a continuous field of research in marine sciences and technologies, from physical and chemical characteristics of the oceans, to coastal management, and moving to biodiversity, aquaculture, and artificial reefs.

The French Academy of Sciences pays attention to such activities, as they reinforce the existing links between the French oceanographers and their Japanese colleagues. One of the founding principles of the Institut de France is to help to such initiatives, with the cooperation of Chancellor Gabriel De Broglie.

The joint France-Japan Consultative Committee, which I have co-chaired for many years, is also interested in such high-level meetings because they make the personal relationships easier between researchers of both countries, completing perfectly, by that way, the relationships established between administrations and official bodies of the two countries.

This meeting provided above all perspectives on scientific fields that are very promising for the future, such as marine biotechnologies, biogeochemistry, technologies of aquaculture, new approaches to the domain of biodiversity of marine populations, new models of artificial reefs, and very recent apparatus leading to very fine observations of the marine surroundings. The highest official bodies in each country – Ministries, Embassies, National and regional political and administrative bodies in scientific research – have taken appropriate decisions to help this event with their strong supports. Other perspectives in the fields of medicine and pharmacy have been already opened in nutrition, health, new drugs, and cosmetics, to name a few examples. Signing a document to establish a “twinning” between two universities, French and Japanese, at this point will facilitate greatly the flux of exchanges, for the benefit of both partners. It will constitute a good example for other universities.

Accordingly, I am glad to thank the two Sociétés franco-japonaises d’Océanographie, the University of Méditerranée, the Centre d’Océanologie de Marseille, and the two organizing Committees; in each country, they have set up this very interesting and productive event. It will certainly produce numerous after effects, such as a new meeting in Japan in the near future, and it will induce fruitful work together in the future.

I am glad to express my sincere praise to the organizers, and in particular Professors Hubert Jean Ceccaldi, Imawaki Shiro, and Yagi Hiroki for this nice success.

Monsieur le Professeur Yvon Berland  
Président de l'Université de la Méditerranée

L'Université de la Méditerranée et le Centre d'Océanologie de Marseille, dirigé par le Professeur Ivan Dekeyser, ont pleinement participé au 13<sup>ème</sup> Colloque franco-japonais d'Océanographie qui s'est tenu au mois de septembre 2008. Ce dernier était organisé avec les deux Sociétés franco-japonaises d'Océanographie du Japon présidée par Professeur Imawaki Shiro et la Société franco-japonaise de France, présidée par le Professeur Hubert Jean Ceccaldi.

Ce fructueux colloque permettra de renforcer notablement dans le futur une coopération interuniversitaire qui existait déjà, mais de façon plus modeste, dans le domaine de l'Océanologie.

L'Université se réjouit d'avoir pu apporter son concours à cette belle réussite, notamment en hébergeant les séances d'échanges scientifiques à la Faculté de Pharmacie grâce à son Doyen Patrick Vanelle, et en participant à son soutien administratif.

L'Université se félicite particulièrement d'avoir établi de façon formelle, à la faveur de ce colloque, des accords d'échanges scientifiques et techniques avec les Professeurs Takai Rikuo et Izumi Mitsuru, respectivement Président et vice-Président de l'Université des Sciences et Technologies marines de Tokyo, au cours d'une cérémonie amicale à laquelle ont participé les Professeurs Yvon Berland et Roger Giudicelli, respectivement Président et vice-Président de l'Université de la Méditerranée, plus de quarante congressistes scientifiques japonais, Monsieur Bamba Masahiro, Consul Général du Japon à Marseille et Monsieur Jean-Louis Armand, Conseiller pour la Science et la Technologie de l'Ambassade de France à Tokyo.

De très intéressantes journées scientifiques ont été vécues. Elles conduiront à établir des orientations générales sur les relations entre l'homme et les milieux marins. Elles devraient aussi renforcer les liens entre les équipes de chercheurs des deux pays, en les incitant à travailler ensemble dans le but essentiel de pouvoir partager leurs connaissances.

C'est grâce à ces connaissances nouvelles mises en commun que pourront s'établir et se développer des projets de recherche originaux dans des disciplines qui, compte tenu des problèmes environnementaux très actuels, sont appelés à jouer un rôle primordial à l'échelon mondial.

Prof. Yvon Berland  
Président de l'Université de la Méditerranée

Translation

Université de la Méditerranée and Centre d'Océanologie de Marseille, lead by Professor Ivan Dekeyser, have taken a full part to the Colloque franco-japonais d'Océanographie held in September 2008. That meeting was organised by the Société franco-japonaise d'Océanographie of Japan led by Professor Imawaki Shiro and by the Société franco-japonaise of France, led by Professor Hubert Jean Ceccaldi.

This fruitful meeting will give a new framework to intensify notably the future a cooperation between universities that already exists, and more modestly, in the field of marine sciences.

Our university is very glad to have given its support to this nice success, in particular the sessions of scientific exchanges in the amphitheatres of the Faculty of Pharmacy, thanks to the cooperation of the Dean, Professor Patrick Vanelle, with the help of his efficient administrative staff.

Our University is particularly glad to have formally established, in the framework of that binational meeting, scientific and technical agreements with Professors Takai Rikuo and Izumi Mitsuru, respectively, President and Vice-President of the Tokyo University of Marine Sciences and Technology, during a friendly ceremony, with the participation of the Vice-President Roger Giuducelli and the leading team of the University de la Méditerranée. More than 40 scientists travelled from Japan to attend the meeting. We have been glad also to receive Mr. Bamba Masahiro, General Consul of Japan in Marseille, and Mr. Jean-Louis Armand, Main Advisor for Science and Technology in the French Embassy in Tokyo.

Very interesting scientific meetings took place. They will lead to establishing general directions for the future concerning the relationships between mankind and marine environments. They will also strengthen the links between the teams of the two countries, inciting them to work together with the final aim to share their knowledge.

Thanks to this new knowledge acquired in common, new projects of research will be established and developed in some disciplines having strong links with very contemporary problems at a global scale, at the world dimensions.

Monsieur Tominaga Shigeatsu

Président du Conseil d'administration de la Fondation Franco-Japonaise Sasakawa

“Homme libre toujours tu chériras la mer! La mer est ton miroir; tu contemples ton âme” écrivait Arthur Rimbaud. Ces vers nous rappellent à quel point la mer est précieuse pour l'homme. La mer est aussi, pour l'homme, un moyen de liberté car elle lui permet de se connaître plus profondément. La chérir, l'aimer, la connaître, c'est se comprendre soi-même.

La mer est un miroir, et dans cet échange franco-japonais, connaître signifie, non seulement analyser, étudier les écosystèmes, mais également comprendre le rapport singulier qu'entretiennent, du fait de leur histoire et de leur géographie particulière, la France et le Japon. Le partage des connaissances, l'étude des différences méthodologiques, conceptuelles, permettent aux scientifiques, non seulement de progresser dans leur compréhension de ces objets très complexes que sont les écosystèmes marins et côtiers, mais, en élargissant les champs de recherche aux domaines juridiques, urbanistiques, philosophiques, anthropologiques, la mer, objet d'étude, redevient le miroir où les particularités françaises et japonaises se reflètent et se comprennent.

De nos jours plus personne n'ignore à quel point les écosystèmes marins et côtiers sont fragiles. Les hommes modifient, parfois bouleversent, ces équilibres fragiles. Or, du devenir de ces écosystèmes dépend l'avenir de l'humanité.

Comprendre leur évolution, les causes de ces changements, les raisons des bouleversements est devenu aujourd'hui une nécessité vitale.

Parce que la mer représente tant pour l'humanité, en tant que Président de la Fondation Franco-Japonaise Sasakawa dont la mission est de développer des relations de culture et d'amitié entre la France et le Japon, je suis heureux que nous ayons soutenu ce colloque organisé par les deux Sociétés franco-japonaises d'Océanographie de France et du Japon, et par le Centre d'Océanologie de Marseille. Cette réunion aura permis à plus de 150 chercheurs, principalement français et japonais, de se rencontrer de façon concrète, d'échanger et ainsi de faire progresser le savoir et contribuer à éclairer l'avenir. Les liens entre nos deux pays, dans les domaines de l'océanographie et dans les disciplines connexes s'en trouvent ainsi renforcés. De tous mes vœux, j'espère que les relations nouées pendant ces quatre jours de conférences perdureront.

Pour conclure, permettez-moi de remercier tous les partenaires qui avec nous ont soutenu cet événement ainsi que M. Hubert-Jean Ceccaldi, qui a su trouver les mots et nous convaincre de l'importance des relations franco-japonaises dans ce domaine.

M. Shigeatsu Tominaga,  
Président du Conseil d'administration de la Fondation Franco-Japonaise  
Sasakawa

Translation

“Man of freedom, always you shall cherish the Sea! The sea is your mirror; you contemplate your soul” wrote the French poet Arthur Rimbaud. These verses remind us that the sea is precious for mankind. The sea is also, for any man, a means of freedom because it gives to each one the possibility to know himself more deeply

To cherish it, to love it, to know it is also understand himself.

The sea is a looking glass and, in this France-Japan exchange, to know means, not only to analyze, to study the ecosystems, but also to understand the peculiar relationships to keep alive the exchanges between France and Japan, because there is some resemblance of their peculiar history and geography. The sharing of their knowledge and the study of their methodological and conceptual differences lead the scientists not only to progress in the understanding of these very complex objects of the marine and the coastal ecosystems, but also to widen the fields of research to the domains of law, urbanism, philosophy, anthropology, etc. The sea, as an object of study, becomes again the mirror where the French and Japanese peculiarities are reflected and leads us to understand each other.

Today, nobody ignores the fact that the marine coastal ecosystems are fragile. Mankind modifies and sometimes disrupts these fragile equilibriums. Yet, the evolution of these ecosystems in the future depends on mankind. Understanding their evolution, the origin of these changes, and the reasons for these upheavals are becoming a vital necessity.

Because the sea represents so much for mankind, as I am the President of the Fondation Franco-Japonaise Sasakawa whose mission is to develop relationships in culture and friendship between France and Japan, I am glad to have established the support for this meeting, organized by the two Sociétés franco-japonaises d'Océanographie from France and from Japan, as well as the Centre d'Océanologie of Marseille. This meeting has induced the active presence of more than 150 people, mainly French and Japanese, to meet each other, directly, then to exchange information and to make progress in knowledge and to contribute to improving the future. The links between our two countries in the field of Oceanography and other related disciplines will be strengthened. In all my wishes, I hope that the links established during these 4 days of conferences will continue in the future.

To conclude, let me thank all the partners with whom we have cooperated in support of that event, as well as Mr. Hubert-Jean Ceccaldi, who found the words to convince us of the importance of the France-Japan relationships in that domain.

Monsieur le Professeur Imawaki Shiro  
President of the Société franco-japonaise d'Océanographie du Japon

The year 2008 was the 150th anniversary of the cultural exchange between Japan and France, which originated from the trade treaty between the two countries signed in 1858, near the end of Edo era. During the one and a half centuries, we have had very rich exchange activities between the two countries in various fields.

In April 1960, the Japanese-French Oceanographic Society (Société franco-japonaise d'Océanographie) was established in Japan in order to stimulate the scientific exchanges between Japan and France in the fields of oceanography and fisheries. The establishment was mostly indebted to the late Professor emeritus Tadayoshi Sasaki of Tokyo University of Fisheries. It was almost 50 years ago. Today, the Society has about 200 regular members. The Society holds its scientific conference in June every year. In 1963, we started to publish a society bulletin "Umi" in Japanese, which is called "La mer" internationally. The bulletin has been issued four times a year. In 1966, we established a Society prize. Its first winner was Professor emeritus Kenzo Takano of the University of Tsukuba, who stayed at Grenoble University in France for several years in the 1960s.

In 1984, the French-Japanese Oceanographic Society was established in France. It was deeply indebted to Professor emeritus Hubert Jean Ceccaldi of "Ecole Pratique des Hautes Etudes." Professor Ceccaldi served as the Director of the Maison Franco-Japonaise in Tokyo for 4 years from 1988 and contributed tremendously to cultural exchanges between the two countries.

The Japanese-French Oceanographic Society in Japan and French-Japanese Oceanographic Society in France have been stimulating oceanographic activities between the two countries. The two societies started to hold joint oceanographic symposia. The first symposium was held in Montpellier in 1983. The present symposium in Marseille and Paris in 2008 is the 13th, and we have almost 40 scientists from Japan.

This is a very brief summary of the history of exchange activities in the oceanography and fisheries fields. Another field of ocean sciences may be ocean engineering. France has been leading the world in deep ocean expeditions. The manned deep-sea vessel, the bathyscaphe F.N.R.S. III, visited Japan in 1958; it was 50 years ago. French and Japanese scientists carried out a deep ocean expedition in Japan Trench in that bathyscaphe. In 1962, another bathyscaphe, "Archimede," visited Japan to carry out a deep ocean expedition in Chishima Trench. Those activities using bathyscaphes were succeeded by IFREMER in France and JAMSTEC in Japan. JAMSTEC built manned deep submersibles called "Shinkai 2000" and "Shinkai 6500" to contribute to deep ocean science.

In the field of physical oceanography, France has been contributing tremendously. In the field of satellite altimetry, CNES of France launched a satellite TOPEX/POSEIDON in 1992 in collaboration with NASA of the United States of America. This satellite measured variations of the sea-surface height very precisely. Nowadays, physical oceanographers are addicted to satellite altimetry. Its successor, Jason-1 of CNES and NASA, has already finished its job, and Jason-2, launched in June 2008, is now operating. France is leading in the satellite altimetry observation of oceans.

The next meeting, the 14th Japan-France Oceanography Symposium, will be held in Kobe, Japan, in 2010. Kobe is a sister city of Marseille. The year 2010 is the 50th Anniversary of the Japanese-French Oceanographic Society, and the Symposium is one of the activities of celebrating the anniversary. As the President of the Society, I would like to invite all of you to participate in the 2010 Symposium in Kobe.

Finally, I would like to thank the organizing committee led by Prof. Hubert Jean Ceccaldi and also Prof. Hiroki Yagi of Otaru University of Commerce, Japan, for their perfect preparation of the symposium.

Prof. Shiro Imawaki.  
President of the Japanese-French Oceanographic Society

Le maire de la ville de Marseille  
Jean-Claude Gaudin

Notre ville a eu le plaisir d'accueillir le 13<sup>ème</sup> Colloque Franco-Japonais d'Océanographie dont le Centre d'Océanologie de Marseille était le principal partenaire. Les échanges et les communications scientifiques de ce colloque et leur publication sont du plus grand intérêt pour Marseille dont la bordure maritime s'étend sur 57 km.

Cette façade littorale représente un espace fragile où se concentrent les enjeux et les défis liés à sa préservation et à sa valorisation. Aussi, dans le cadre de son engagement en faveur de la protection de l'environnement et du développement durable, Marseille a lancé et réalisé d'importants projets.

Géolide, la plus grande station biologique enterrée au monde pour le traitement des eaux usées, est en service. L'implantation de récifs artificiels dans la rade du Prado recrée des conditions favorables à la prolifération de la faune et de la flore. Quant au Parc Maritime des Iles du Frioul, il est intégré dans le réseau Natura 2000.

Le Groupement d'Intérêt Public des Calanques préfigure le Parc National des Calanques, le premier parc national périurbain pour protéger et valoriser les espaces naturels et exceptionnels, terrestres et maritimes, du site. De plus, la Ville a défini le "Plan de Gestion de la Rade de Marseille" destiné à mettre en cohérence les différentes politiques publiques intervenant sur cette zone.

D'autre part, ce colloque a contribué à conforter les liens que notre ville a tissés avec le Japon, en particulier avec la ville-port de Kobé, avec laquelle Marseille a échangé un serment de jumelage il y a près d'un demi siècle. L'accueil de cette manifestation s'inscrit donc dans la vocation d'ouverture et d'échanges de notre ville et la tenue de ce colloque d'intérêt international contribue au rayonnement scientifique et intellectuel de Marseille.

Jean-Claude Gaudin  
Maire de Marseille  
Vice-Président du Sénat

Translation

Our city has had great pleasure in welcoming the 13th Colloquy of Franco-Japanese Oceanography; the Centre d'Océanologie de Marseille was the main partner.

The exchanges and the scientific communications of that meeting and their publication are of highest interest for Marseille, with its littoral reach 57 km long.

That coastal area represents a fragile space where numerous important stakes and challenges linked to its preservation and its development are concentrated. So, in the framework of the commitment to protect the marine environment and sustainable development, Marseille has launched and carried out important projects.

Géolide, the largest underground biological water treatment facility in the world, is functioning. Immersion of artificial reefs in the Prado Bay create favorable conditions for the proliferation of marine fauna and flora. The maritime natural park of the Frioul Islands is integrated in the Natura 2000 network

The public interest group “Calanques” is a prefiguration of the new natural marine park, the first periurban national park existing, in order to protect and enhance the value of the exceptional terrestrial and maritime natural spaces, of this site. Moreover, the city has defined “Management Planning of the Larger Bay of Marseille” with the aim to add coherence to the different public policies acting within that area.

However, this scientific meeting represent a valuable contribution to strengthen the links with Japan, particularly with the port city of Kobé, with which Marseille exchanged an oath of twinning almost half a century ago. In this, the welcome of this scientific event fits well with the attitude of opening and of exchanges of our city and this international meeting as a concrete contribution to the scientific and intellectual fame of Marseille.

## Preface

For a long time, very fruitful dialogues have been established between Japanese and French oceanographers, by means of different kind of contacts. These dialogues and our common scientific meetings are continuing by this Colloque franco-japonais d'Océanographie.

Personally, I have also had the chance to promote these exchanges directly several times with the Société franco-japonaise of Japan, especially when I was Director of Maison franco-japonaise (Nichi-Futsu Kaikan) in Tokyo, for 4 years. It was a nice opportunity to establish new personal contacts, exchanges, seminars, visits to laboratories and research centers, meetings in Japanese municipalities, receiving students for work on their thesis, etc. Such relationships are one of the best ways to understand another approach to scientific problems and to get to know another culture better.

This 2008 scientific meeting in Marseille is the 13th of a rather long series. Fortunately, as a good symbol, it was the year of the 150th anniversary of the trade and friendship treaty established in 1858 between Japan and France. We have received the support of the French Academy of Sciences and the Foundation Louis D., of the Embassy of Japan, of the Maison de la Culture du Japon à Paris, of the Conseil Régional Provence Alpes Côte d'Azur, of the Conseil Général des Bouches du Rhône, of the Municipality of Marseille, of the Faculty of Pharmacy, of the Agence de l'Eau Rhône Méditerranée Corse, of Fondation franco-japonaise Sasakawa, and several other public and private organisations. We are glad to have received numerous members of the Société franco-japonaise d'Océanographie of Japan and a number of Japanese scientists to stimulate personal, friendly, and efficient scientific exchanges between Japanese and French specialists in the oceanography and fisheries fields.

It is also a great pleasure for me to thank President Imawaki Shiro, recently elected President of the Société franco-japonaise d'Océanographie of Japan, and especially, on the Japanese side, a sincere cordial message to my friends of more than 25 years, Professors Yagi Hiroki, Komatsu Teruhisa and Koike Yasuyuki, and Drs. Arakawa Hisayuki and Tanaka Tsuneo. All my sincere thanks also go to colleagues of the Organizing Committee, such as Professor Ivan Dekeyser, Drs. Georges Stora, Yves Henocque, Patrick Baraona, Guy Herrouin, Eric Delort, MMr. Mathias Girault, Maurice Libes, Mrs Catherine Walch, Brigitte Pantat, and Dominique Poirot also for their invaluable efforts in the preparation and the success of this symposium.

We would like to thank especially Professor François Gros, Honorary Perpetual Secretary of the French Academy of Sciences, for his kind and continuous support

of our Society within the exchanges between Japan and France in the field of marine sciences and to express our grateful thanks to Mr. Gabriel de Broglie, Chancellor of the Academy, for the grant obtained from the Foundation Louis D.

We are greatly indebted to His Excellency Mr. Iimura Yutaka, for his constant support during the preparation of our program, for his presence and his address during the meeting in Maison de la Culture du Japon à Paris. We are strongly indebted to Ambassador Iimura for having invited the main organizers of this meeting for an exceptional reception at his residence.

Special thanks to Professors Yvon Berland and Roger Giudicelli for the support given to our meeting, for giving us the chance to use some of the material possibilities of the Université de la Méditerranée, and for offering a nice reception to the members of the meeting, and especially to Professor Patrice Vanelle, Dean of the Faculty of Pharmacy of Marseille, for the use of the amphitheatres and the numerous facilities of the Faculty. We are glad to express our gratitude to Mr. Jean-Claude Gaudin, Mayor of Marseille, Vice-President of the French Senate, to Mrs. Dominique Vlasto, European Representative, in charge of the Tourism Office, and Mr. Didier Réault, Municipal Delegate in charge of marine and littoral activities in Marseille City, for the grant and the support given to our meeting in Marseille and for the magnificent reception in the historical City Hall. Mr. Réault kindly gave the first address at the opening of our scientific meeting.

We are very pleased to thank deeply Mr. Pierre Boissery, in charge of studies at Agence de l'Eau, Rhône, Méditerranée, Corse, for the efficient help and the support that benefitted our meeting. Mr. Jacques Saugier, chargé de mission for the Economy, and Mr. Philippe Lassalle, chargé de mission for the Integrated Management of Coastal Zone, in the General Secretary of Regional Affairs of the Prefecture have fortunately supported our meeting by their encouragement and by the allocation of a grant contributing to our budget.

Mr. Tominaga Shigeatsu, President of the Fondation Franco-Japonaise Sasakawa and the Administrative Council of the Foundation, has integrated our multidisciplinary project in the program of their activities and has given important material support for our meeting; we are glad to thank all the members of that Council and also Mr. Eric Mollet for his help. In Marseille, we are glad to thank the two successive General Consuls Mr. Kobayashi Masao and Mr. Bamba Masahiro for their kind help and for their participation tinour to our project. We have obtained the support of the Regional Council of Provence Alpes Côte d'Azur, mainly interested in scientific research and coastal management. We would like to express our thanks to Mrs. Christine Sandel, Conseiller for the coastal zone, then Mrs. Genviève Kalfon and Ms Florence Papini, leading the service Enseignement supérieur et Recherche as well as Mrs. Josette Sportiello, Mr. Benoît Vasselin, and Mrs. Valérie Raimondino, driving the Service "Mer." The Conseil Général des Bouches du Rhône helped by giving us very useful materials.

In Paris, we have been very pleased to cooperate with Mr. Nakagawa Masateru, President of Maison de la Culture du Japon (Nihon Bunka Kaikan), and with Mrs Karine Masneri. We used the magnificent meeting room and the French-Japanese translation facilities for a synthesis of the 3-day meetings in Marseille, then to listen to four conferences of high standard given by Professors Taniguchi Akira from Tokyo University of Agriculture Okhotsk at Hokkaido ("Relationships between mankind and marine environments: example of Japan") and Nakagawa Heisuke

from Hiroshima University (“Actual situation and future of aquaculture with examples on fish species in Japanese coasts”) as well as Mrs. Catherine Bersani, General Inspector in the French Ministry of Ecology (“New criteria to be used on the evolution of laws in regulation of coastal zones”) and Professor Bernard Salvat, from Ecole Pratique des Hautes Etudes (“Actual situation and recent evolution of coral reefs in the world”).

We are glad to benefit from the presence of eminent persons such as Mr. Jean-Yves Perrot, President Directeur Général of the Institut Français pour l’Exploitation de la Mer (IFREMER), and Dr Emmanuel Thouard, in charge of international relationships with Asian countries.

We would like to thank also the Ministry of Foreign Affairs for the support of His Excellency Mr. Gildas Le Lidec, Ambassador of France in Japan, and Professor Jean-Louis Armand, Conseiller pour la Science et la Technologie in the French Embassy in Tokyo, who participated personally in our meetings in Marseille and Paris. We are thanking also the Centre National de la Recherche Scientifique (CNRS) and the Institut National des Sciences de l’Univers (INSU) for their interest concerning our 13th Colloquy on Franco-Japanese Oceanography.

We are deeply indebted to Dr. Robert Doe, to Ms Nelly Hemink and to Mrs. Nina Bennink, scientific editors for Springer, for their patience and their help in the publication of this book.

This meeting opens new ways for future cooperative programs and personal exchanges for mutual benefit to the two communities of researchers. The following meeting will be held in Kobe and in Tokyo in October 2010. We are quite glad to pursue with success this fruitful common adventure.

Prof. Hubert Jean Ceccaldi  
Président de la Société franco-japonaise d’Océanographie



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