

ICES SYMPOSIUM REPORTS 2009

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The 2009 European Marine Sand and Gravel Group Conference
Rome, Italy, 7 May 2009

2009 International Nutrients Scale System (INSS) International Workshop
UNESCO , Paris, France, 10–12 February 2009

The ICES Deep-Sea Symposium – Issues Confronting the Deep Oceans (ICDO)
Azores, Portugal, 27–30 April 2009

ICES-GLOBEC Symposium on “Marine Ecosystems: from function to prediction”
Victoria, British Columbia, Canada, 22–26 June 2009

Sixth International Conference on Marine Bioinvasions
Portland, Oregon, USA, 24–27 August 2009

Cephalopod International Advisory Council, CIAC '09 symposium on
“The effects of environmental variability on cephalopod populations”
Vigo, Spain, 3–11 September 2009

ICES Symposium on Rebuilding Depleted Fish Stocks - Biology,
Ecology, Social Science and Management Strategies
Warnemünde, Germany, 3–6 November 2009



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1 The 2009 European Marine Sand and Gravel Group Conference

Convener: Kristina Gamst (UK)

Venue and dates: Rome, Italy, 7 May 2009

The third EMSAGG conference "A wave of opportunities for the marine aggregates industry" was held on 7 May 2009 at the Frentani Conference Centre in Rome, Italy. Daniel Leggett, Dredging International Ltd, UK, and chairman of EMSAGG, chaired the conference, which was attended by over a hundred delegates from across Europe. The conference was opened with a chairman's welcome to the exciting programme with presentations from leading European figures, and provided an effective means of gaining information and contacts.

The first session, Legislation and policy, was chaired by Daniel Leggett and a key note speech was offered by Diego Paltrinieri, chief executive, Arenaria Srl. Diego Paltrinieri welcomed all delegates to Italy on behalf of Arenaria Srl and also presented a statement from the Ministero dell Ambiente e della Tutela del Territorio del Mare. This showed that marine resources are becoming increasingly important in flood and coastal defence and construction activities, and also that marine resources are an emerging market compared to the terrestrial resources.

The session continued by exploring the development of an integrated approach to maritime policy in Europe through integrated sectoral planning. This highlighted where those working on marine sand and gravel need to feed into the marine planning process. The session also looked at coastal zone management and underlined the importance of planning ahead for the use of resources and integration of dredging, recreation, and coastal protection needs in the face of climate change. Two papers were given in this session:

- The integrated EU maritime policy and maritime spatial planning – the way ahead, Nicole Schaefer, European Commission, DG Mare, Belgium
- Sediment management and integrated coastal zone management, Sergio Cappucci, ENEA, Italy.

The second session, Exploration and exploitation of marine sediments, was chaired by EMSAGG steering committee member Marit Brommer from Royal Haskoning, UK. The session examined several relevant issues including the importance of digital information, measurements and modelling in the marine environment.

It also outlined the very topical and highly interesting Maasvlakte 2 project in the context of environment impact assessment and an innovative cobble beach concept developed by the leading contractor consortium, PUMA.

Four papers were delivered:

- Digital geological information and competition for space in the marine environment: the rise of marine spatial planning, Robert Gatliff, British Geological Survey, United Kingdom
- Volumetric evolution of the Flemish sandbanks: measurement and numerical modelling, Dries Van den Eynde, the Management Unit of the North Sea Mathematical Models, Belgium
- Maasvlakte 2 project: sand extraction licensing, with an EMSAGG focus on the environmental impact assessment conducted by the Port of Rotterdam,

Ad Stolk, Ministry of Transport, Public Works and Water Management, Rijkswaterstaat North Sea Directorate, The Netherlands

- Maasvlakte 2 project: the winning DCM bid with an EMSAGG focus on the innovative cobble beach concept as sea defence, Gerard Loman, PUMA (joint project venture of Boskalis and Van Oord for the extension on the Port of Rotterdam), The Netherlands.

The third session, Sustainable beach nourishment, was chaired by another EMSAGG steering committee member, Brigitte Lauwaert, Management Unit of the North Sea Mathematical Models, Belgium. This session saw an interesting mix of papers covering several sustainable and environment topics, such as ecological landscaping, environmentally friendly dredging concepts as well as innovative approaches including the Pevensey Bay Coastal Defence project – a public private partnership.

This first afternoon session also included four papers, namely:

- Building with nature: mega nourishments and ecological landscaping of extraction areas, Jan van Dalssen, TNO Imares, The Netherlands
- Faunal friendly dredging, Ray Drabble, APBMer, UK
- Pevensey Bay sea defence PFI: a unique approach to sea defences, Ian Thomas Pevensey Coastal Defence Ltd, UK
- Quality and quantity of sand deposits on the Adriatic continental shelf, Antonio Cattaneo, ISMAR-CNR, Italy.

The fourth and final session, Security of marine aggregates supply, was chaired by the vice-chair of EMSAGG, Cees Laban, Deltares, the Netherlands. The session offered an overview of security of supply and associated issues in France, Germany and Italy.

This session included three papers:

- Marine aggregates in France: current production, materials, constraints expected and experienced and future development, David Clavelaeu, Eurovia, France
- Experiences on permitting planning for gravel dredging in the German North Sea sector, Volker Patzold, Büro Dr. Ing. V. Patzold, Germany
- Security of marine aggregate supply in Italy, Anna Bortolussi, Arenaria Srl, Italy.

Day one of the conference concluded with the EMSAGG chairman's closing remarks and a drinks reception where the noise level was a testament to the interest, value and enthusiasm of the attendees and the opportunity to make contacts and discuss, with peers, matters across different countries and disciplines.

EMSAGG would also like to thank all speakers and delegates for their valuable contribution to an interesting and successful conference. The conference proceedings can be found on the EMSAGG website: www.ciria.org/emsagg

The conference was hosted by Arenaria Srl and sponsored by Boskalis International, CTG Italcementi Group, Gardline Environmental Limited and the International Council for the Exploration of the Sea (ICES).

The conference was supported by British Geological Survey, Provincie Noord – Brabant and Ministero dell Ambiente e della Tutela del Territorio del Mare.

2 2009 International Nutrients Scale System (INSS) International Workshop

Principal conveners: Michio Aoyama (Japan), Andrew Dickson, (USA), David Hydes, (UK), Akihiko Murata, (Japan); Jae Oh, (Monaco), Patrick Roose, (the Netherlands), and Malcolm Woodward, (UK)

Venue and dates: UNESCO, Paris, France, 10–12 February 2009

Introduction

The comparability and traceability of chemical data in the world's oceans are fundamental issues in marine science, and they are particularly important for studies of global change. An "International Workshop on Chemical Reference Materials in Ocean science" was held in Tsukuba, Japan on 29 October – 1 November 2007 and focused on the measurement of nutrients and of ocean CO₂ parameters. In the meeting, we discussed the current status of available chemical reference materials in ocean science, and agreed to establish international collaborations in order to promote the use of reference materials, and to develop new chemical reference materials where they were not available to researchers. Participants of the workshop agreed to continue the international collaborations with the aim of establishing global comparability and traceability of the nutrients data from the world oceans. An "International Nutrients Scale System (INSS)" in seawater was agreed as the appropriate way to achieve this goal.

In 2009, a second INSS international workshop was held to discuss progress since 2007 and future tasks. The International Nutrients Scale System (INSS) workshop, organized by Michio Aoyama, Andrew Dickson, David Hydes, Akihiko Murata, Jae Oh, Patrick Roose and Malcolm Woodward, was held at UNESCO, Paris, France on 10–12 February 2009. The workshop focused on the ongoing international collaboration of establishing global comparability of the nutrient data from the world oceans. The objectives of the workshop were to i) provide an updated manual of nutrients analysis by the INSS group; ii) review the usage of nutrients and carbonate system data in oceanography and, hence, the necessity of INSS; iii) report results from the "2008 RMNS inter-comparison experiments"; iv) update the plan of "short-term stability experiment-characterization of RMNS" in 2009–2011; v) develop non-toxic CRMs for the CO₂ System; and vi) expand the RMNS for DOC, DON and DOP references.

The workshop was attended by 37 participants from eleven different countries representing the global scientific community, UNESCO-IOC, and other international organizations. The workshop was comprised of invited and contributed talks, poster presentations, and plenary discussions. Scientific discussion focussed on the need for comparability of nutrients data in the world ocean. The participants agreed that by establishing the INSS, the comparability and traceability of nutrients data in seawater could be ensured. Thus, not only the study for nutrients in seawater itself will move forward, but the amount of accumulated anthropogenic CO₂ can be more accurately evaluated, and that all of these measurements are essential for the study for global warming. Participants also agreed to publish a new manual for nutrient analysis, including analytical methods with the greatest accuracy currently being achieved by the ocean community. The results will contribute to the study of nutrients in seawater, as well as the study of both global warming and ocean acidification, due to increased emissions of anthropogenic CO₂.

The workshop produced a series of action items and submitted a proposal of "ICES-IOC study group on Nutrients Standards - SGONS" to the 25th IOC general assembly and ICES annual meeting. This proposal was presented at the 25th IOC general assembly was adopted in June 2009.

Overview

The World's ocean is greatly impacted by the global environmental changes that are occurring due to the heat and gas exchange processes. Particularly, the fact that the ocean is absorbing the CO₂ in the atmosphere works effectively to slowdown global warming which is currently a potentially critical global problem.

Accordingly, it is a critical issue to determine the amount of anthropogenic CO₂ transported into the ocean interior more accurately, in order for studying and forecasting the global warming effects. However, because the global comparability of nutrients concentration data in the world ocean for calculating the human-induced CO₂ effects has not yet been established, it is still difficult to find out at this time whether the nutrients concentration changes in the ocean interior are natural fluctuations or are caused by human activities (Bindoff *et al.*, 2007). This is essentially due to the lack of any global comparability of nutrients concentrations.

The requirement for the development of reference materials for nutrients in seawater, RMNS, in order to be able to accurately measure and compare nutrients in seawater, has been pointed out by the IOC and other organizations (IOC-IAEA-UNEP, 1995), and the research has also been continuing to be presumed. However, the desired RMNS has not yet been achieved.

In order to work towards improving the situation, the "2007 Workshop on chemical reference materials in ocean science" (Aoyama *et al.*, 2008) was held in Tsukuba, Japan, in October 2007, at which meeting the international collaboration present agreed to begin the process to be able to establish a global comparability of nutrients concentration.

CRM's (Certified Reference Materials) for establishing the traceability of nutrients data are now under the ongoing process of certification for the RMNS, at the NMIJ (National Metrology Institute of Japan), and such CRMs for nutrients analyses are expected to be distributed sometime in the very near future.

Inter-laboratory comparison studies for RMNS were conducted in 2003 and 2006, and then followed again by an exercise performed by 58 laboratories from 15 countries in 2008, and the high level of internal comparability in each laboratory was indicated.

Some organizations have already performed the high accuracy observation of nutrients in seawater using the RMNS (Aoyama *et al.*, 2006, 2007, 2008), and the effort to establish the comparability of nutrients data has been started. It was evaluated that we needed to hold an international workshop in order to be able to make progress with the discussions and agreements for such international activities.

For that reason, this workshop was held at UNESCO in Paris in February 2009, which had 40 researchers from two international organizations and 11 countries. At the meeting, following much discussion, the participants agreed to the following major decisions:

- 1) By establishing the INSS (International Nutrients Scale System), the comparability and traceability of nutrients data in seawater can be ensured. Thus, not only the study for nutrients in seawater itself will move forward,

but also the amount of accumulated anthropogenic CO₂ will be accurately evaluated, as knowledge of both of these parameters are essential for the study for global warming.

- 2) By ensuring the comparability of pH measurements, the evaluation of the impact to the ocean of acidification, due to the increased amount of emissions of anthropogenic CO₂ to the atmosphere, will become possible.
- 3) By publishing a new manual for nutrients analysis, the analytical methods with the greatest accuracy which is currently being achieved by our community can be shared with the remainder of the world science community. These decisions are expected to contribute to the improvement of the studies of nutrients in seawater, as well as the study of both of global warming and ocean acidification, due to increased emission of anthropogenic CO₂.

This workshop was sponsored by the International Ocean Carbon Coordination Project (IOCCP), Intergovernmental Oceanographic Commission (IOC), Central Research Institute of Electric Power Industry (CRIEPI/Japan), Meteorological Research Institute (MRI/JAPAN), Institut français de recherche pour l'exploitation de la mer (IFREMER/France), International Atomic Energy Agency (IAEA), International Council for the Exploration of the Sea (ICES), Japan Agency for Marine-Earth Science and Technology (JAMSTEC/Japan), Kansai Electric Power Company Inc. (Japan).

3 The ICES Deep-Sea Symposium – Issues Confronting the Deep Oceans (ICDO): The Economic, Scientific, and Governance Challenges and Opportunities of Working in the Deep Sea.

Conveners: Robert J. Brock (USA) and Gui Menezes (Portugal)

Venue and dates: Azores, Portugal, 27–30 April 2009

About 170 marine scientists, engineers, attorneys, resource managers, and students from 26 countries gathered in Horta (Faial Island, Azores, Portugal) on 27–30 April 2009 for the ICES Deep-Sea Symposium - Issues Confronting the Deep Oceans (ICDO): The Economic, Scientific, and Governance Challenges and Opportunities of Working in the Deep Sea.

The international symposium brought together various sectors of the deep sea (e.g., fisheries, energy exploration and development, mining, biotechnology, ocean exploration, engineering, law, marine science), to discuss current and future needs of working and undertaking scientific investigations in the deep sea and learn of recent deep-sea technological advancements, projects, and scientific findings. Members of interested companies, NGO's, national and local administration and international organizations (e.g. FAO) were also present.

The deep sea is usually defined as starting at the end of the continental shelf at a depth of 200 m. With the desire to find and develop new resources such as fisheries, oil and gas, mineral deposits, and pharmaceutical compounds, technological advancements have allowed industry and scientific investigators to move their activities more and more into deeper water. These technological advancements represent opportunities. However, deep-water activities also represent challenges in the form of technological needs at great depths, potential environmental impacts, and governance issues ensuring that these deep-water activities are compatible with regional, national, and international laws and treaties.

The Symposium was organized in six main thematic sessions:

- Session A – Governance and Legal Considerations - Co-Chairs: Dr. Rebecca Lent; Dr. Ronan Long
- Session B and D – Energy and Mineral Exploration, Climate Change and Ocean Acidification - Co-Chairs: DR. Marion Gehlen, Prof. Steve Scott, Prof. Dorik Stow
- Session C and F – Deep-Sea Technology and Biotechnology Research - Co-Chairs: Prof. António Pascoal; Dr. Dana Yoerger; Dr. Roland Person; Dr. Salvatore Arico
- Session E – Fisheries and Ecosystem Sustainability and Conservation - Co-Chairs: Prof. Anthony Grehan; Prof. Peter Auster; Dr. Mário Rui Pinho

The opening session was chaired by the Secretary of Environmental and the Sea of the Azores Government, and has the presence of the Sub-Secretary of Fisheries, the Mayor of the City of Horta, the Dean of the University of the Azores, and Dr. Adi Kellerman (Head of Science Program of the ICES). An opening lecture was made by Prof. Paul Tyler and the ending lecture was made via video-conference from Italy by Prof. Roberto Danovaro from the Department of Marine Science of the Polytechnic University of Marche.

The symposium had about 96 oral presentations, including 11 thematic keynote presentations and more than 30 posters. The symposium was daily transmitted online via internet, and additionally, about 300 people per day accompanied the event from many different parts of the world (New Caledonia, Norway, Russia, USA, UK, Spain, etc).

The quick technological developments, the globalizations of the climate changes, the deep-sea fisheries, the potential of mineral and energy exploration, the bio-prospection are putting more pressure on the deep-sea ecosystems. Because all this, the deep-sea ecosystems need to be approach in a multidisciplinary way. A large amount of the deep-sea remains unknown, however recent research are showing that the deep-sea has a greater influence and importance in the planet.

A special session was also held to discuss/present the major decisions and scientific criteria recently developed by the CBD (Convention on Biological Diversity) and UN FAO (Food and Agricultural Organisation) concerning conservation of the high seas. This special session provided an opportunity for deep sea researchers to learn about these international decisions, the associated scientific criteria, and to discuss how on-going research could link into the decision-making processes.

This session entitled: Linking Deep Sea Science to International Decisions: Vulnerable and Ecologically Significant Areas, was co-chaired by Dr. Jeff Ardron and Dr. Elizabeth McLanahan. The discussion topics were:

- Quick review of CBD & FAO decisions, criteria and work to date
- How can the criteria be (better) applied in the short term based on existing research and data?
- What additional research will be required in the medium term to fill critical gaps? –open discussion
- Next steps –open discussion

In the end of the Symposium a preliminary summary of the different thematic sessions were made by appointed co-chairs.

All participants were invited to publish their works in a Special volume of the ICES Journal of Marine Science which is preview to be launched in July 2010.

Co-sponsors: International Council for the Exploration of the Sea (ICES), Government of the Azores (Tourism Department and the Science Department), IMAR Center of the University of the Azores, University of the Azores, U.S. National Oceanic and Atmospheric Administration (NOAA), the projects CoralFish (EU-FP7), CONDOR (EEA Grants), City Council of Horta, ZON Açores, Horta Regional Museum, and Marques e Silva, Lda.

4 ICES-GLOBEC Symposium on “Marine Ecosystems: from function to prediction”

Conveners: Manuel Barange (UK), Eileen Hofmann (USA), and Ian Perry (Canada)

Venue and dates: Victoria, British Columbia, Canada, 22–26 June 2009

The third, and final, Open Science Meeting (OSM) for the Global Ocean Ecosystems Dynamics (GLOBEC) Programme was held at the Victoria Conference Centre in Victoria, British Columbia, Canada, on 22–26 June 2009. It followed two previous highly successful GLOBEC Open Science Meetings, in 1998 in Paris, France and 2002 in Qingdao, China. The aim of GLOBEC has been to advance understanding of the structure and functioning of the global ocean ecosystem, its major subsystems, and its response to physical forcing so that a capability can be developed to forecast the responses of the marine ecosystem to global change. The purpose of this OSM was to contribute to the synthesis and integration of GLOBEC’s activities, to trace (as the subtitle of the Symposium indicates) our journey from ecosystem function to ecosystem prediction. The format of the Symposium involved two days of intense and focused workshops on 10 topics:

- Modelling ecosystems and ocean processes: the GLOBEC perspective of the past, present and future;
- Comparisons of processes and climate impacts in sub-Arctic and Antarctic marine ecosystems: observations and modelling approaches;
- Worldwide large-scale fluctuations of sardine and anchovy;
- Krill biology and ecology in the world's oceans;
- Biogeochemistry of the oceans in a changing climate;
- Continuous Plankton Record surveys of the global ocean;
- Cod and Climate Change: the past, the present and future challenges;
- Plankton phenology and life history in a changing climate: observations and modeling;
- Climate impact on ecosystem dynamics of marginal seas;
- Socio-economic dynamics and ecosystems, governance implications.

These were followed by a day of reviewing and summarising GLOBEC achievements to date, and three plenary sessions on the latest advances in:

- Ecosystem structure, function and forcing;
- Ecosystem monitoring and prediction;
- Ecosystem management and their human dimensions.

The OSM concluded with a thought-provoking session on *Marine Ecosystem Science: Into the Future* and, since GLOBEC will formally close in early 2010, a symbolic “hand-over” of GLOBEC’s outstanding research questions to the Integrated Marine Biogeochemistry and Ecosystems Research (IMBER) project.

In the late 1980s, when the GLOBEC programme was being developed in the United States the scientific view of the ocean was very different from what it is today. Oceanographers and fisheries scientists were just beginning to work together in a true inter-disciplinary fashion, images of a global ocean from satellites were becoming available, desktop computers were slow and bulky, the internet (and Email) did

not exist, and the major forcings on the ocean were seen to be climate variability (by oceanographers) and fishing (by fisheries scientists).

Now, 21 years after the workshop in Wintergreen, VA that led to the GLOBEC approach, the marine world looks very different. Satellites provide rapid and global coverage of an increasing array of ocean properties, massive amounts of data are instantly available over the internet, young scientists are routinely trained with both oceanographic and fisheries backgrounds, multi-disciplinary research projects are being developed in full collaboration with social scientists, and the main drivers of change in marine ecosystems are realised to be climate, humans, and their interactions. The sessions and presentations at this 3rd Open Science Meeting (OSM) showed, the international GLOBEC programme has had a significant role in effecting these changes.

This 3rd OSM would not have happened without the support of several of GLOBEC's partner organisations. We thank our co-sponsoring organisations Fisheries & Oceans Canada, International Council for the Exploration of the Sea, Institute for Coastal and Ocean Research of the University of Victoria, the US National Science Foundation, Ocean Networks Canada, North Pacific Marine Science Organisation (PICES), Scientific Committee on Antarctic Research, Scientific Committee on Oceanic Research, Research Council of Norway, and the University of Victoria for all of their support.

The meeting was well attended, with over 300 participants from 34 countries. The dedication, commitment and enthusiasm of all the scientists of GLOBEC has been a reademark of GLOBEC, and this was so during the OSM as well. The proceedings from the Symposium will be published in a future issue of *Progress in Oceanography*. Presentations and posters from the meeting are available on the GLOBEC web site under GLOBEC 3rd OSM.

Again, we thank ICES for their generous contribution and for their support of GLOBEC in the North Atlantic region over the duration of the programme.

5 Sixth International Conference on Marine Bioinvasions

Conveners: Judith Pederson (USA), Gil Rilov (USA), and Mark Sytsma (USA)

Venue and dates: Portland, Oregon, USA, 24–27 August 2009

Scientific Steering Committee:

- Mark Sytsma, Meeting Host, Portland State University, USA; Jeb Byers, University of Georgia, USA; Jeff Crooks, Tijuana River NERR, USA
- Lisa Drake, SAIC/Naval Research Laboratory, USA
- Anders Jelmert, Institute of Marine Research, NORWAY
- Yoon Lee, National Fisheries R&D Institute, Busan, SOUTH KOREA
- Whitman Miller, Smithsonian Institution, USA
- Henn Ojaveer, Estonian Marine Institute, ESTONIA
- Gil Rilov, Oregon State University and University of Haifa, USA / ISRAEL
- Thomas Therriault, Fisheries and Oceans CANADA
- Chela Zabin, Smithsonian Institution and University of California-Davis, USA

Advisors:

- Judith Pederson, MIT Sea Grant College Program, USA
- Jim Carlton, Williams College, USA

Co-Sponsors:

The Aquatic Bioinvasions Research and Policy Institute at Portland State University, ICES, PICES, MIT Sea Grant College Program, NOAA, and the Pacific States Marine Fisheries Commission.

In 1999, the Conference on Marine Bioinvasions was one of the very first major meetings to focus specifically on marine bioinvasions. Subsequently, the Conference has been held biennially at locations throughout the US and in New Zealand bringing together scientists and managers to address the science of bioinvasions and support decisions to prevent and management new introductions. The Sixth International Conference on Marine Bioinvasions, hosted at Portland State University from 24 to 27 August 2009 brought together 179 participants from 19 countries. The Conference was co-sponsored by the Aquatic Bioinvasions Research and Policy Institute at Portland State University, the International Council for the Exploration of the Seas (ICES), and the North Pacific Marine Science Organization (PICES), the MIT Sea Grant College Program, the National Oceanic and Atmospheric Administration (NOAA), and the Pacific States Marine Fisheries Commission (PSMFC).

The conference topic areas were: Ecological and Evolutionary Impacts, Management Rapid Response and Eradication, Invasion Patterns over Time, Predicting the Scale and Diversity of Invasions, Detection and Measuring and Predicting Spread. Special sessions were convened on Lionfish, Green Crab Management, and Propagule Pressure. Plenary lectures were delivered by Professor Anna Occhipinti-Ambrogi, University of Pavia, Italy on Alien Species as an aspect of Global Change; Professor Sergej Olenin, Unifob AS, Bergen, Norway and CORPI, Klaipeda University, Lithuania, on Patterns and impacts of marine bioinvasions in Europe; and Professor Yoon

Lee, National Fisheries R&D Institute, Busan, South Korea. In addition, there were 127 oral and 24 poster presentations.

The collective discussions from the 2009 meeting presentations provided insight into the progression of marine invasion science as a discipline that has continued to enhance understanding of the basic ecological processes related to marine invasions, as well as the evaluation and documentation of their impacts. The proliferation of studies on life histories, environmental factors, and biological impacts of invaders on ecosystems is valuable to risk assessments and management options and has spawned development of theoretical models for future experimental research. Along with economic assessments, these studies can become powerful tools for managers and policy makers alike. Yet we still have many challenges. Among these is the need to close the gap in our understanding of impacts, prevention, and mitigation of marine invaders, as well as evaluating the role of introduced species in the context of global climate change. Armed with current knowledge, however, we can make predictions, develop risk scenarios, and test hypotheses that should provide managers with greater certainty and more tools for preventing invasions and managing past invasions.

Copies of the Conference Agenda and Abstract Book will be available at:

<http://www.clr.pdx.edu/mbic/>

6 Cephalopod International Advisory Council, CIAC '09 symposium on "The effects of environmental variability on cephalopod populations"

Conveners: Ángel Guerra (Spain), Ángel F. González (Spain), Santiago Pascual (Spain), María Teresa Fernández (Spain), Francisco Rocha (Spain), Jesús S. Troncoso (Spain)

Venue and dates: Vigo, Spain, 3–11 September 2009

We would like to start this report remembering three outstanding researchers who passed away during the last three years: Martina Compagno-Roeleveld, Peter R. Boyle and Martin J. Wells. The Cephalopod International Advisory Council Symposium (CIAC'09) was dedicated to the memory of their careers, completely devoted to the study of cephalopods.

The CIAC'09 symposium finalized with a banquet in the Parador Conde de Gondomar in Bayona in September 10th. The meeting was held in the Social Centre of Caixanova in Vigo (Spain). In total, 194 experts in cephalopods of the whole world have attended the CIAC 2009 symposium. Of these, 32 were Spanish. It is necessary to distinguish the large participation, a splendid new for CIAC, of researchers representing many Latin America countries like Mexico, Brazil, Peru, Chile and Argentina. Approximately, 33% of the participants were newly graduate or postdoctoral students, and, on the other hand, 6% of the attendants received some help on behalf of the organizing Committee and ICES in concepts like, for instance, travel and subsistences or reduced fees.

Besides the excellent inaugural and of closing talks, given by Sigurd von Boletzky and Paul Rodhouse, respectively, 99 oral communications and 91 posters were presented. Also *Eolo* helped us and the weather was really fantastic during the symposium. That favoured the development of the complementary activities of the congress, as the visit to the National Park of the Atlantic Islands, Santiago de Compostela and the scuba-diving in the Ría de Vigo.

The triennial CIAC award for excellence in published cephalopod research was to the paper published in *Cladistics*, 24 (2008): 853–860: "The thermohaline expressway: the Southern Ocean as a centre of origin for deep-sea octopuses". Authors: Jan M. Strugnell, Alex D. Rogersd, Paulo A. Prodo, Martin A. Collins and A. Louise Allcockb researchers from the University of Cambridge, UK, Queen's University Belfast, UK, British Antarctic Survey, Cambridge UK, the Zoological Society of London, UK and National University of Ireland.

The award for the best poster in CIAC'09 symposium was to: "Ocean acidification and the cuttlefish *Sepia officinalis*: behavioural and energetic consequences of cuttlebone ultra-structural changes". Authors: Lyons GN, Gutowska MA, Melzner F, Wilson RP, Liebsch N, Allcock AL, Scantlebury M & Houghton JDR reachers from. Queen's University Belfast, UK, Alfred-Wegener-Institute for Polar and Marine Research, Germany, Leibniz Institute of Marine Sciences, Germany, Swansea University, UK and National University of Ireland.

We are very grateful to the sponsoring organisations of this event: Spanish National Research Council (CSIC), the Ministry of Science and Innovation, The Regional Government of Galicia of Galicia (Xunta de Galicia), The International Council for the Exploration of the Sea (ICES), the Zoological Society of London, the North Pacific Atlantic Organization (PICES), the University of Vigo, the City Council of Vigo and Caixanova.

The diffusion in the mass media was directed by the press office of the Delegation of the CSIC in Galicia. Ana Bellón, person in charge of this bureau, has the dossier of press. The news on this event was present in all local, regional and also national newspapers, radio and TV. Fishing Industries newspaper extracted a long article with some nice photos. Also it will spread in the Newscast of the Malacological Spanish Society. This news did not limit itself in the day of the inauguration and closing, but they were communicating throughout the week that lasted the event.

The components of the inaugural table were: the Conselleira do Mar de la Xunta of Galicia, the dean of the Faculty of Sciences of the Mar of the University of Vigo, the delegate of ICES in Spain, the president of the CIAC and both organizers. The congress was closed by the Mayor of Vigo.

We are now in full publishing process. As already informed, the communications that in the opinion of the referees have the sufficient quality, will be published later in two mainstream and high standard journals: *ICES Journal of Marine Science* (Guest editors: Ángel F. Gonzalez, Greta Pecl and Graham J. Pierce) and *Fisheries Research* (Guest editors: Ángel Guerra, Louise Allcock and Joao Pereira). Other communications will be published in *Iberus*, scientific journal of the Spanish Malacological Society.

The Local Organizing Committee wants to thank all of you that accompanied us in Vigo during the 4 workshops and the symposium meetings for your active participation and nice collaboration all the time. Thank you very much for the large number of messages received in this sense.

We would like to congratulate the new President of CIAC, Graham J. Pierce and the new members of the CIAC Executive Committee, and we wish them all the best for the incoming years, which are expected to be exciting.

The CIAC Executive Committee decided to elect three honorary life CIAC members to Sigurd von Boletzky (Observatoire Océanologique de Banyuls-sur-Mer, France), Chingis M. Nigmatullin (Atlantic Research Institute of Marine Fisheries and Oceanography, Kaliningrad, Russia) and Frederick G. Hochberg (Dept. of Invertebrate Zoology Santa Barbara Museum of Natural History, Santa Barbara, California, USA) for their achievements during their outstanding careers.

The CIAC Executive Committee decided that the next symposium will be held in Florianópolis (Brasil). Erica Vidal will be the main organizer of this event and we would like to thank her for the work she made to prepare all issues related to the Brazil proposal. We are sure it will be another great event and we would like to give Erica all the support she needs. It would not be fair to forget the magnificent effort made our Japanese colleagues, headed by Yasunori Sakurai; we are sure that they will carry on to held again a CIAC meeting in Japan.

Conclusions:

- 1) The cephalopods demand a very special vision from the point of view of the research, exploitation and marketing. The main reasons are because these organisms have short life cycles and experience very dramatic changes in its population abundance. In this scenario, fishing management is difficult enough and needs a constant monitoring.
- 2) The best way of applying the ecological vision to the exploitation of cephalopods, and probably also valid to other many marine species, is to realize the investigations of a multidisciplinary way, that is to say, considering not only its biology and population dynamics but how they are influenced by

atmospheric - oceanic factors, such as temperature, force and wind direction, nutrients presence in the water, and quantity of chlorophyll, phyto and zooplankton. With the results of this congress a global vision has been obtained of what the Climatic Change has supposed in the distribution and abundance of numerous cephalopod populations.

- 3) It has been underlined the benefits of using not harmful systems of observation for the environment, especially ROVs, manned submarines, organisms with marks that provide information route satellite and in wide extensions or ecosystems. Together with the integration of modern and not harmful technologies for the environment, the species and populations, it has been also proposed to enhance multidisciplinary approaches for the study of these marine molluscs.
- 4) In relation with biodiversity, it has been endorsed to continue with studies of identification of new species, principally in deep-sea waters, using both morphological and of molecular methodologies. A web page has been enabled for the identification of cephalopods species threatened or in danger. To date, it seems that there are only a few species of the genus *Nautilus* that are really threatened in its area of distribution. Nevertheless, there are others potentially in danger, as a reef squid (*Sepioteuthis* sp) endemic of the Hawaii islands, some sepiolids or bobtail squids endemic of the Mediterranean, and the white-spotted octopus (*Octopus macropus*) in waters of the Iberian Peninsula.
- 5) The oral and posters presentations strongly propose continuing research works on the early stages of the cephalopod's development and the relation of its abundance and distribution with atmospheric and oceanic parameters, which are those who regulate its survival and therefore, the posterior abundance of exploitable stocks.
- 6) New and effective technologies for age determination in octopuses using growth increments in their stylets or vestigial shells were herein presented. To date, this technique has been successfully applied in two species: *Octopus pallidus* from Australia and *Octopus vulgaris*, which is the most common and profusely exploited worldwide octopus species. These findings are important to know the demographic structure of the populations and to improve its sustainable exploitation.
- 7) Concerning the culture of cephalopods, there are already some cuttlefish species and the Mexican octopus (*Octopus maya*), whose eggs are of approximately 3 cm and has large newly hatchlings, in phase of managing to be commercial developments. The common octopus (*Octopus vulgaris*) on-growing in several regions of the Iberian Peninsula were presented. However, it has been emphasized the importance of paralarvae culture in order to obtain high survival rates (20–25 %). Likewise, to obtain inert and suitable pellets for juveniles and adults of this species. Both are difficult problems that, according to the stage of the current investigations, will need a few years to be solved.
- 8) Many presentations made agreed that it is very important to use adequate management methods for some cephalopod populations nowadays over-exploited, among them those of the common octopus in waters of Central Africa and Europe.
- 9) It was also indicated that there stay still some subexploited cephalopod resources, especially pelagic, for example the orangeback flying squid of the

Mar of Arabia (*Sthenoteuthis oualaniensis*) and the neon flying squid *Ommatrephes bartramii*, of world distribution, which at present is only exploited in the North Pacific.

- 10) Taking into account that cephalopods occupy a main place in the trophic web of all marine ecosystems, both as preys and predators, it is important to consider them to be vectors and transmitters of parasites, for example of *Anisakis*. In consequence, it has been considered basic to reinforce the studies of Parasitic Ecology in the cephalopods.
- 11) Finally, it was unanimous admitted that the effort realized to date by all institutions implied for the protection of the biodiversity and the aquatic ecosystems is insufficient and must be increased. It has also considered that the integrated management of the ocean- considering the human activities that strike negatively on the biological marine diversity and the ecosystems so much within as beyond the waters of national jurisdiction- must be made developing mechanisms that improve the cooperation between the protagonists of all sectors: extractors, scientists, of transformation, commercial, governments and relevant organizations.

7 ICES Symposium on Rebuilding Depleted Fish Stocks - Biology, Ecology, Social Science and Management Strategies

Conveners: Cornelius Hammer (Germany), Olav Sigurd Kjesbu (Norway), Gordon H. Kruse (USA), and Peter Shelton (Canada)

Venue and dates: Warnemünde, Germany, 3–6 November 2009

The Symposium, Rebuilding Depleted Fish Stocks – Biology, Ecology, Social Sciences and Management Strategies, was held at the Yachthafenresidenz Hohe Düne in Warnemünde, Germany during 3–6 November 2009, and was co-convened by Cornelius Hammer (UNCOVER Project Leader and Director, Johann Heinrich von Thünen-Institut, Institute of Baltic Sea Fisheries, Rostock, Germany), Gordon Kruse (University of Alaska Fairbanks, Juneau, Alaska, USA), Olav Sigurd Kjesbu (Institute of Marine Research, Bergen, Norway), and Peter Shelton (Fisheries and Oceans Canada, Science Branch, St John's, Newfoundland, Canada). The Symposium was attended by more than 120 participants from 21 countries including Argentina, Canada, Estonia, Denmark, France, Germany, Iceland, Iran, Japan, Namibia, New Zealand, Norway, Poland, Russia, Scotland, Spain, Sweden, The Netherlands, Turkey, United Kingdom, and the United States of America. Participants also included representatives from the Baltic Fishermen's Association, European Union Commission, International Commission for the Conservation of Atlantic Tunas, Food and Agriculture Organization of the United Nations, International Council for the Exploration of the Sea, Organization for Economic Cooperation and Development, and the World Wildlife Fund for Nature. The Scientific Steering Committee for the Symposium comprised 12 individuals (and I was the one member representing NAFO). Selected papers from the Symposium will be published in a special issue of the ICES Journal of Marine Science subject to a full peer-review process. The Scientific Steering Committee and the four Symposium Co-Conveners will decide on the papers accepted for review. The Guest Editor, Niels Daan (The Netherlands) is responsible for the review process and is the final authority concerning the papers accepted for publication.

The Symposium Keynote Address was presented by Dr. Steven Murawski (Director of Scientific Programs and Chief Science Advisor for NOAA Fisheries, USA) and was entitled "*Rebuilding Depleted Fish Stocks: The Good, the Bad, and the Mostly Ugly*". Dr. Murawski summarized the current state of fish stock rebuilding plans worldwide, noting the plans could be categorized into those that were successful in meeting their objectives (the 'good'), those that were 'paper plans' despite assertions to the contrary (the 'bad'), and those that have been partially to completely unsuccessful despite significant management interventions (the 'ugly'). A fourth category consists of those plans for which categorization is presently too early (the 'incomplete'). Dr. Murawski elucidated the characteristics and attributes of 'good' and 'bad' rebuilding plans, and described the wide array of management measures used in these endeavours. He noted that even when 'good' rebuilding programs had been implemented (involving significant reductions in fishing mortality), some stocks had not responded - or responded more slowly than anticipated. In these cases, a variety of explanations have been offered for the absence or delay in recovery including compensatory natural mortality rates, predator 'pits', climate effects, loss of evolutionary resilience, multispecies effects, and an inability to regain complex life-cycles determined by species co-evolution, migration patterns, and demography. It was noted that most 'good' plans have generally been those for single-species fisheries, and that a challenging problem is the differential pace of stock recovery among productive and relatively unproductive components of mixed species fisheries (where 'weak stock' recovery schemes

may leave recovered or healthy components underfished due to bycatch concerns). He concluded his presentation by highlighting that recovery of 'overfished' stocks will require a more holistic, adaptive, and ecosystem-based approach to rebuilding that incorporates trophodynamics, habitat restoration, and climate effects – and one which is also sensitive to life history and the impacts of fisheries on stock resilience. He emphasized that a more consistent, effective, and politically-supported recovery paradigm was necessary if society was to meet its sustainability goals for fisheries.

The remainder of the Symposium considered recent scientific research and advances related to the status and recovery of overexploited and depleted fish stocks, focusing on sharing ideas and experiences (across disciplines and among stakeholders) related to biological and ecological evaluations of stock recovery and socioeconomic and management aspects of stock rebuilding. The entire Symposium was held in plenary (*i.e.*, no concurrent sessions) and comprised five themes:

- 1) The Impact of Fisheries and Environmental Impacts on Stock Structure, Reproductive Potential and Recruitment Dynamics: Chaired by Toyomitsu Hori (Japan) and C. Tara Marshall (Scotland)
- 2) Trophic Controls on Stock Recovery: Chaired by Axel Temming (Germany) and Bjarte Bogstad (Norway)
- 3) Methods for Analyzing and Modelling Stock Recovery: Chaired by Ana Parma (Argentina) and Laurence Kell (Spain)
- 4) Social and Economic Aspects of Fisheries Management and Governance: Chaired by Denis Bailly (France) and Douglas Wilson (Denmark)
- 5) Management and Recovery Strategies: Chaired by Joseph Powers (USA) and Fritz Köster (Denmark)

Each Theme Session opened with a keynote address by an invited speaker, which was then followed by 9–11 contributed oral presentations. In total, 53 papers were orally presented in the five sessions. As well, a formal poster session comprising 28 posters was held on the evening of the third day of the Symposium (although the posters were on display during the entire Symposium).

The final day of the Symposium included a Panel Discussion, which involved a moderator (Ralf Röchert, Germany) and eight international experts representing science, the fishing industry, NGO conservation groups, and management authorities (Michael Anderson, Baltic Fishermen's Association; Kevern Cochrane, FAO; Poul Degnbol, EC DG MARE; Gordon Kruse, University of Alaska Fairbanks; Philippe Moguedet, EC DG Research; Karoline Schacht, WWF Germany; and Peter Shelton, DFO Canada). The Panel Session was divided into five blocks (representing the five theme sessions), each opened with a brief summary by the corresponding Session Chairs of the principal findings of his/her theme session, followed by discussions and comments by the Panel members and by the audience.

For the final wrap-up, the Symposium Keynote Speaker, Dr. Steven Murawski, provided his observations on the key take-home messages from the Symposium. Among the points highlighted were:

- 1) There is currently available a rich knowledge of stock rebuilding experiences to draw upon.
- 2) Now is a critical time in the recovery debate, but more information is needed on socioeconomic considerations/impacts, and more interactions

are needed with stakeholders. There is a need to clearly describe downside losses and upside benefits of recovery programs.

- 3) Stock recovery plans represent the most widespread wildlife planning experiments available anywhere. As such, it is imperative that these plans be documented, archived, and the experiences with these plans communicated to all.
- 4) We need to think carefully about stock recovery as the end points may not be well known. Hence, an adaptive approach may be essential.
- 5) Significant investments will be required in fishery science in the future. The current models to assess stocks were developed when fishing mortality rates were generally between $F=0.3-0.8$. However, new assessment tools will be needed when stocks are managed at much lower rates (e.g., $F=M$). As well, given reduced exploitation rates in the future, there is likely to be a much greater need to move from recruitment surveys to the surveying of adults. Clearly, fishery science will need to be more integrated in the future and explicitly incorporate habitat, environmental, and ecosystem aspects.
- 6) The human and economic costs of stock recovery to society need to be documented and communicated. Recognition of the considerable costs and resources involved in recovery efforts should help management to vigorously avoid stock collapses in the future.
- 7) Stock recovery invariably implies fewer fishermen in the future and significant transition costs. This should be understood and anticipated far in advance. It is also important that any resultant replacement activities of fisheries (e.g., tourism; waterfront housing development; etc.) should not interrupt or impede stock recovery efforts by their resultant impacts.
- 8) While stock recovery may be possible, stock rebuilding may not. If fisheries-induced evolutionary changes have occurred, or if ecosystem and climate changes have significantly altered the productivity, demography, or dynamics of depleted fish stocks, restored stocks (in terms of biomass) may differ markedly (i.e., genetically, physiologically, and ecologically) from their status prior to depletion. In some cases, recovery to former biomass levels may not even be possible.
- 9) Uncertainties will always exist with respect to the stock rebuilding/stock recovery process. These uncertainties should not undermine the development and implementation of recovery plans. A precautionary and adaptive approach may be required to avoid delays in taking effective action, not only for stocks already in dire straits, but to keep those that are beginning to show signs of reduction from becoming depleted.
- 10) The current evidence is overwhelming that management can be effective in rebuilding of fisheries and restoring the economic and social benefits derived from sustainable fisheries.

The Symposium was closed at 1:00 PM on 6 November by Cornelius Hammer who thanked the Co-Conveners, the Session Chairs, the presenters, and all of the Symposium participants for their contributions. He also wished everyone a safe trip home, and indicated that the intended publication of Symposium papers in the *ICES Journal of Marine Science* was within a year.