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Report of the Workshop on How Models help us to understand Climate Change Evolution and Impacts in the Regional Oceans (WKMCCEI)

12–14 January 2010

Brussels, Belgium



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International Council for
the Exploration of the Sea

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Executive summary

The ICES Workshop on How Models help us to understand Climate Change Evolution and Impacts in the Regional Oceans (WKMCCEI), chaired by Stéphanie Ponsar, was held in Brussels, Belgium, on 12–14 January 2010. There were 16 participants representing 8 nations.

The objective of the workshop was to provide contributions to the topics that would be covered by the chapter 12 of the ICES Position Paper on Climate Change. The approach was to gather experts in modelling climate changes at the regional scale covering the wide range of topics related to the problematic. Five main themes had been identified at the ICES level and are described in the Terms of Reference of the workshop given in Annex 3.

1 Opening of the meeting and discussions

The meeting was opened by the following presentations:

- Stéphanie Ponsar: Introduction and objectives of the workshop
- Georges Pichot: What is ICES and why the ICES Workshop on Models and Regional Climate Change
- Claire N. Parker: What has been achieved at the Copenhagen Climate Summit

After each session (corresponding to each theme), there was a general discussion between all the participants to identify the key issues. Each speaker was invited to bring a summary of his/her presentation. The last half day of the workshop was dedicated to drafting the structure of the chapter. The summaries brought by the speakers were compiled to serve as a basis for the chapter draft.

2 Modelling Chapter overview

The following structure for the chapter was adopted:

1. Role and feedback of the oceans in climate change:
 - 1.1. Heat budget
 - 1.2. Ocean acidification
2. Modelling the effects of climate change on oceans from global to regional scale
3. Modelling regional changes in marine ecosystems:
 - 3.1. Modelling changes in hydrodynamics, biogeochemical processes and lower trophic levels at the regional scale
 - 3.2. Modelling changes at higher trophic levels

Key issues related to the modelling of climate change at the regional scale were identified:

- the need for sufficiently good and long time series of observations of the ocean state to validate models;
- the need for a better assessment of ocean variability for e.g., ocean colour, dynamics, clouds;
- the need for a better characterization of surface fluxes and local processes controlling the upper mixed layer in the ocean for the last 20 years;
- the need for coupled ocean-atmosphere models even at the regional scale;
- the critical role played by the initial conditions for the output of global scale models;
- the critical dependence of regional models on the output (e.g., boundary forcings) provided by global ocean models.

3 Recommendations

The following recommendations with regard to the ICES data base were formulated:

- Time series for plankton and nutrients from ICES surveys begin in the last century, however there is a need for a better availability of these data. People would like to have access not only to the data products but also to the original measurements. Hydrographic data are well quality controlled but ecological data are not necessarily validated. Data concerning the abundance of phyto and zooplankton are badly needed as well as mooring information. It is mentioned that the DMI data base is an example to follow in terms of user-friendliness for data accessibility. Another wish is to have oceanic and model products provided by the ICES working group WGOOFE incorporated into the ICES data base.
- A better design of the sites where data are needed for model validation could be obtained from observing system simulations experiments (OSSEs).

Annex 1: List of participants

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Annex 2: Agenda

Day 1: Tuesday, 12 January 2010

09.00-09.30: Welcome. Registration, coffee and tea, cookies

09.30-10.00: Stephanie Ponsar: Introduction and objectives of the workshop

10.00-10.30: Georges Pichot: What is ICES and why an ICES workshop on models and regional climate change

10.30-11.30: Claire N. Parker: What has been achieved at the Copenhagen climate change summit

11.30-12.30: Claire N. Parker: Key issues in the climate change debate for 2010

12.30-14.00: Lunch

THEME 1: Modelling the feedbacks of the oceans on climate change

14.00-15.00: Daniela Matei: Quantifying the role of ocean initial conditions in decadal prediction

15.00-15.30: All: Discussion and conclusions on theme 1

THEME 3: Modelling the effects of climate change at a lower spatial scale (down-scaling)

15.30-16.30: Andreas Sterl: Downscaling: modelling the effects of climate change at a higher spatial scale

16.30-17.00: Coffee break

17.00-18.00: Joel Chasse: Development of regional ocean climate models to downscale the large scale climate scenarios to the Canadian Atlantic shelf

18.00-18.30: All: Discussion and conclusions on theme 3

Workshop dinner in Brussels City Centre

Day 2: Wednesday, 13 January 2010

THEME 2: Models for predicting effects of climate change at basin and regional scales

09.00-10.00: Hubert Gallee: Development of a regional model for studying climate processes

10.00-11.00: Xavier Fettweis: Microwave data and a regional climate model for studying the Greenland ice sheet surface mass balance over 1979–2009

11.00-11.30: Coffee break

11.30-12.30: Elke Meyer

12.30-14.00: Lunch

14.00-15.00: Corinna Schrum

15.00-15.30: All: Discussion and conclusions on theme 2

15.30-16.00: Coffee break

THEME 4: Anticipating the response of ecosystems to climate change through models

16.00-17.00: Pierre Regnier: Marine methane flux and climate change: from biosphere to geosphere

17.00-18.00: Johan van der Molen

18.00-18.30: All: Discussion and conclusions on theme 4

Day 3: Thursday, 14 January 2009

THEME 5: Modelling changes at all trophic levels

09.00-10.00: Christophe Lett

10.00-11.00: Martin Lindegren: Ecological forecasting under climate change - the case of Baltic cod

11.00-11.30: Coffee break

11.30-12.30: All: Discussion and conclusions on theme 5

12.30-14.00: Lunch

14.00-16.00: All: Final discussions and workshop conclusions

Annex 3: WKMCCEI Terms of Reference

2009/2/SSGEF04 The Workshop on How Models help us to understand Climate Change Evolution and Impacts in the Regional Oceans (WKMCCEI), chaired by Stephanie Ponsar*, Belgium, will meet in Brussels, Belgium, 12–14 January 2010 to:

- a) Review of the state of the art in modelling the feedbacks of the ocean on climate change.
- b) Comparison and validation of models for predicting effects of climate change at basin and regional scales. Identify how ICES data can contribute to validate the models.
- c) How models can predict the effects of climate change at a lower spatial scale (downscaling).
- d) How the response of the ecosystems to climate change can be anticipated using models.
- e) Modelling the production and trophic interactions up to the highest level and how the changes in the flow of material through the food web affect the ecosystem structure.
- f) Summarise the outcome of the workshop into a draft chapter for the attention of the SSICC.

WKMCCEI will report by 15 February 2010 for the attention of SSICC and SCICOM.

Supporting information

Priority	<p>This workshop is essential to respond to many questions that are crucial to anticipate changes in the ecosystems as a consequence of climate change and when possible adopt the policies for adaptation or mitigation.</p> <p>ICES does not have the expertise to respond to these questions and consequently it is necessary to invite experts from academia to lead this discipline. The group MUMM (Belgian Management Unit of the North Sea Mathematical Models) has offered its experience and is willing to collaborate with the ICES SSICC in writing the chapter on "How models help understand climate change evolution in the regional oceans".</p> <p>Thus the work of this group must be considered of having a high priority and being central to the success of the ICES position paper on climate change.</p>
Scientific justification	<p>Models are powerful tools to help us to understand the processes and the functioning of marine ecosystems, but the results of the models are very often projected beyond their significance or are used in an inappropriate manner.</p> <p>Making projections about the effects of climate change in the marine ecosystems is a sensible task and we must be cautious on the assumptions we are making and the manner that the results are interpreted.</p> <p>There is a scientific need to review the state of the art in modelling the feedbacks of the ocean on climate change and also to ensure credible comparison and validation of models for predicting effects of climate change at basin and regional scales.</p> <p>The outcome of this workshop will be a chapter of the ICES position paper on climate change.</p>
Resource requirements	<p>The group will meet in Brussels. So there are not any special requirements from ICES Secretariat.</p>

Participants	The Belgian Management Unit of the North Sea Mathematical Models will lead the organization of this workshop and will identify in collaboration with SSICC the adequate experts to cover all the different approaches and questions to be responded in the ToRs. The total number of experts attending this workshop is estimated to approx. 15 people.
Secretariat facilities	No special requirement from ICES Secretariat.
Financial	The workshop will be funded by the ICES SIF allocated to the SSICC. So this meeting is at ICES expenses.
Linkages to other committees or groups	The results of this workshop are relevant for many working groups interested in climate change.
Linkages to other organizations	Links with other organizations are already established as the coordination of this workshop will be responsibility of a group not involved in the ICES work.