International Council for the
Exploration of the Sea

C.M. 1993/C:3
Ref. L

# MEETING OF THE ICES WORKING GROUP ON SHELF SEAS OCEANOGRAPHY (WGSSO), PART 2

Charleston, 12 - 13 February 1993

---

* General Secretary
ICES
Palaegade 2-4
DK-1261 Copenhagen K
DENMARK

## TABLE OF CONTENTS

# MEETING OF THE ICES WORKING GROUP ON SHELF SEAS OCEANOGRAPHY (WGSSO), PART 2

**Charleston, 12 - 13 February 1993**

## 1. OPENING OF THE MEETING

The meeting was directly proceeding the joint meeting of the Working Group on Shelf Seas Oceanography (WGSSO) and the Study Group on the Dynamics of Algal Blooms (SGDAB) in which physical and biological oceanographers discussed and planned future field experiments and key processes to be studied. Hence, the following WGSSO discussions were primarily concerned with physical points of view regarding harmful algal blooms. The meeting was chaired by Hans Dahlin, Sweden and B. Håkansson was appointed rapporteur. The list of participants is given in Annex II.

The main part of the meeting of the Working Group on Shelf Seas Oceanography in Charleston, 10 - 13 February 1993, is reported in C.M. 1993/L7.

## 2. TERMS OF REFERENCE

The working group should meet to

a) develop the programme for investigating the dynamics of algal blooms;

b) plan and propose field experiments and modelling to increase the understanding of the physical/chemical factors influencing the development of algal blooms;

c) consider observational strategies leading to improved data evaluation and modelling validation in shelf seas research.

## 3. DYNAMICS OF HARMFUL ALGAL BLOOMS

### 3.1 Evaluation of joint WGSSO/SGDAB session

The group agreed on that the discussions between biologists and physicists during the joint session with SGDAB had been very fruitful despite the differences in how to approach a problem as the dynamics of algal blooms. The algal bloom events clearly involve both biology and physics and a multi-disciplinary strategy for future research developments seems necessary. Furthermore, the SSO group stressed the importance of modelling efforts and such studies should be highly ranked. This is the only way the understanding of DAB can be rationalized and in the future used for predictions. Models may thus enhance the general understanding of why and when algal blooms develop, but it is critically important that the initial conditions are known. Here is a severe problem, since biological/oceanographical real-time monitoring or operational measuring networks are in many cases non-existing.
It is also necessary to introduce theory and modelling in an early stage to help determine what processes can be ignored and what needs to be studied or measured.

Another item stressed in the joint meeting was population growth rate during algal blooms. Dr. Colijn from the Netherlands informed about the research work going on within the EC/STEP programme on algal blooms, which also takes into account growth rate measurements and modelling efforts. Nevertheless, there are only a few measurements on growth rate made in open sea conditions. The evaluation problem is however difficult since growth rate not only has a biological component (nutrients, grazing etc.) but also a physical component (dispersion and/or accumulation by convergence). This key process needs a close cooperation of scientists working in dynamical oceanography and biology in order to make progress in understanding and modelling the evolution of blooms. Within the ICES community one possibility to push forward the multi-disciplinary work on the subject is to continue joint-meetings of Shelf Sea Oceanography and algal blooms working groups.
It was also suggested that this joint meeting technique should be adopted by ICES on a regular basis to promote cooperation between disciplines.

### 3.2 Plan and propose field experiments and modelling work on dynamics of algal blooms

Plans for field experiments were mainly discussed during the joint session with SGDAB,

which is reported in C.M. 1993:L7.
The discussions continued during the WGSSO meeting and it was suggested that workshops on well-defined subjects should be organized. During at least 5 to 6 international symposia on harmful algal blooms (HAB) presentations and discussions on modelling have been almost absent. Hence, one possibility to improve the understanding of the dynamics of harmful algal blooms is to arrange a workshop on modelling of DAB/HAB with the intention to generate a dialogue between oceanographers and marine biologists and to develop diagnostic model tools. This workshop can be connected to pilot projects proposed by SGDAB. It was proposed that a workshop on Modelling of Population on HAB should be planned and arranged under the umbrella of ICES and IOC. A group to prepare the recommendation for a workshop was formed, including the following members: Wolfgang Fennel, Tim Wyatt and Fransiscus Colijn.

### 3.3 Mesocosm

The SGDAB had asked for opinions on mesocosm from WGSSO. However, the working group found that it was not competent enough to comment on this matter.

### 3.4 Propose terms of reference for the first meeting of the Working Group on Harmful Algal Bloom Dynamics (WGHABD)

In addition to the recommendations already made during the joint session, the WGSSO discussed the need of making the WGHABD more multidisciplinary in itself and proposed that the working group to its next meeting should prepare informal presentations on

- the biological oceanography of harmful algal blooms
- nutrient flux through pycnocline, upwelling, convergence of frontal motions and monitoring strategies for HAB.

The ICES' delegates should be asked to appoint both biologists and oceanographers as members of the working group.

## 4. CONSIDER OBSERVATIONAL STRATEGIES LEADING TO IMPROVED DATA EVALUATION AND MODELLING VALIDATION IN SHELF SEAS RESEARCH

The working group member who was assigned to prepare this item was not able to attend the

meeting. This led to a more general discussion of the subject than planned. Experiences from the North Sea and the Chesapeake Bay area were presented. The Netherlands are running a mooring station in the North Sea measuring biological/chemical/physical parameters. Data are used for model validation and development of a monitoring strategy. An interesting point was addressed by Tom Osborne regarding the monitoring programme in Chesapeake Bay. Here it was found that the recycling of nutrients was faster than expected. The load of nutrients to the area was of less importance compared to the recycling, regarding the deep water oxygen deficit. This result is probably a peculiarity of the area in question, but had the consequence of a 40 % cut in the nutrient monitoring programme.

It was mentioned and agreed upon that within monitoring work an important strategy is to run measurements on nutrients and local physical oceanography together. In order to make progress within this item a literature review is recommended. The work of other organisations e.g. the EC/MAST-programme should also be included in future considerations on observational strategies. The group also felt that the relevant ICES working group for these questions ought to be the Working Group on Environmental Assessment and Monitoring Strategies, which for this case should be strengthened with physical oceanographers or a joint work with WGSSO.

## 5. PRESENTATIONS OF CURRENT SSO RELATED RESEARCH

Short presentations on ongoing research activities were given. In Norway a project for studies on coastal and open sea water exchange is running. The project is linked to other programmes such as Nordic WOCE, Cod and Climate and GLOBEC. One specific question concerns the transport of cod larvae by water exchange processes and large scale circulation in the area.

In May 1993 the MORENA programme will start at the Iberian coast. The aim is to develop combined biological and physical models. Extensive measurement projects will take place to increase the understanding of key processes and to obtain data for modelling validations.

From the Iberian Atlantic coast a study was presented regarding physically influenced biological dynamics such as the occurrence shelf waves.

In January 1993 a large salt water inflow to the Baltic Sea took place. The last event occured almost 17 years ago. However, it is still to early to evaluate the importance of the inflow, regarding for example the evolution in time of cod stock or the reduction in deep water anoxic

conditions in the Baltic. The chairman suggested that a special session on the water exchange between the Baltic and the North Sea should be included in the agenda for the ICES meeting in Dublin 1993.

## 6. FUTURE TASKS OF THE WORKING GROUP

The working group continued its discussion from earlier meetings on its future task. It was stated that shelf seas oceanography in itself could not be the motive of an ICES working group. But at the same time shelf seas oceanography is a basis for a majority of problems dealt with within ICES.

It was the opinion of the group that it should continue as a part of the multidisciplinary work which characterize ICES. For the coming year this meant that the WGSSO shall :

- continue the work on HAB related activities;
- continue the work on fluxes of properties;
- and respond on contacts from other working groups.

## 7. RECOMMENDATIONS

**The Working Group on Shelf Seas Oceanography recommends that:**

1. The working Group on Shelf Seas Oceanography will meet in Vigo, Spain from 9 - 12 May 1994 to:

a) continue the development of an understanding of the dynamics of harmful algal blooms, including experimental aspects;

b) review progress in the implementation and/or execution of physical-biological interaction investigations in the pilot study areas (Gulf of Main, Skagerrak-Kattegat, Iberia);

c) review the workshop on Modelling the Population Dynamics of Harmful Algal Blooms and propose further steps to improve the dialogue between physicists and biologists;

d) consider fluxes within the ICES area, concentrating on shelf seas/ocean exchange and riverine/coastal exchange

A joint session with the Working Group on Harmful Algal Bloom Dynamics will be held on 11-12 May 1994 to consider agenda items a, b and c.

Justification:
a-c) Because harmful algal blooms present problems quite distinct from those of normal blooms due to their potentially serious economic and social impacts, they require special attention. It is an important international problem, and ICES needs to play a major role because of its importance to member countries and ICES' unique interdisciplinary capabilities. IOC-FAO are developing an international programme that features ICES participation as a major regional player for the North Atlantic area, as well as involvement in a world wide educational programme.

The problem requires focused efforts on harmful algal bloom dynamics (including the effects of the population dynamics of harmful algal bloom events, and the role of physical-biological interactions), and should not be submerged into a general study of plankton ecology.

d) Information on the fluxes of properties plays an important but often neglected role in many fields of ICES' work, e.g. the role of advection in productivity and recruitment studies, the utility of concentration measurements in monitoring programmes, and the vital importation of material into any sea area. A compilation of known quantifications of fluxes, and their variability both on seasonal and interannual timescales, within and into the shelf seas of the ICES area may reveal significant gaps in our knowledge and hence stimulate further work and research programmes.

2. A workshop on "Modelling the Population Dynamics of Harmful Algal Blooms" should be held at Vigo, Spain, from 4-7 May 1994 under the co-chairmanship of Dr. P. Tett (UK) and Dr. W. Fennel (Germany) to:

a) investigate the use of numerical models in improving understanding of the dynamics of HABs;

b) use the above models to assist in the design of sampling strategies, interpretation, and the forecasting of HABs;

c) develop a dialogue between physical and biological oceanographers with respect to

HABs, including the role of physical inputs and temporal and spatial scales.

Justification:

Many biologists working on HAB problems are insufficiently aware of the role which modelling can play in advancing their work and achieving results, in design of sampling strategies, interpretation of data, and forecasting. It was suggested that this situation could be improved by creating a dialogue between students of algal, and existing groups of biological and physical oceanographers. A workshop will provide a suitable occasion for such a dialogue, with emphasis on population dynamics including the importance of physical inputs, and temporal and spatial scales.

## Annex I

## MEETING OF THE ICES WORKING GROUP ON SHELF SEAS OCEANOGRAPHY (WGSSO)

12 - 13 February 1993

Southeast Fisheries Science Centre, Charleston, SC, U.S.A.

Agenda

1. Opening of the meeting
1.1 Approval of agenda
1.2 Appointment of a rapporteur

2. Terms of reference
2.1 Terms of reference and what we are expected to achieve
2.2 Short discussion on what we want to achieve

3. Harmful Algal Blooms
3.1 Short evaluation of joint session
3.2 Plan and propose field experiments and modelling to increase understanding of the physical and chemical factors that influence the development of algal blooms
3.3 Discuss mesocosm experiments
3.4 Propose terms of reference for the first meeting of the WG on Harmful Algal Bloom Dynamics

4. Consider observational strategies leading to improved data evaluation and modelling evaluation in shelf seas research

5. Short presentation of current shelf seas research in relation to environment protection and living resources

6. Continuation of discussion on future tasks of the working group

7. Adoption of recommendations

## Annex II

## LIST OF PARTICIPANTS

Dr. José Cabanas
IEO/Centro Oceanográfico de Vigo
Aptdo. Correos 1552
36280 Vigo - SPAIN
Tel: 34 86 492111
Fax: 34 86 492351

Dr. Fransiscus Colijn
Tidal Waters Division
P.O. Box 20907
2500 EX The Hague - THE NETHERLANDS
Tel: 31 70 3745208
Fax: 31 70 3282059

Dr. Hans Dahlin
Swedish Meteorological and Hydrological Institute
S-60176 Norrkoping - SWEDEN
Tel: 46 11 158305
Fax: 46 11 158350

Dr.Harry Dooley
ICES
Palaegade, 2-4
DK-1261 Copenhagen K - DENMARK
Tel: 33 154225
Fax: 33 934215

Dr. Bernt Dybern
Institute of Marine Research
P.O. Box 4
S-453 00 Lysekil - SWEDEN
Tel: 46 523 14180
Fax: 46 523 13977

Dr. Malt Elbrächter
Biologische Anstalt Helgoland
Aussenstelle
D-W-2282 List - Hafenstrasse 43 - GERMANY
Tel: 4652 1011
Fax: 4652 7544

Dr. Wolfgang Fennel
Institute Für Ostseeforschung
Seestrasse 15
0-2530 Warnemünde - GERMANY
Tel: 49 381 580
Fax: 49 381 58287/58336

Dr. Santiago Fraga
IEO/Centro Oceanográfico de Vigo
Aptdo. Correos 1552
36280 Vigo - SPAIN
Tel: 34 86 492111
Fax: 34 86 492351

Dr. Bertil Håkansson
Swedish Meteorological and Hydrological Institute
S-60176 Norrkoping - SWEDEN
Tel: 46 11 158385
Fax: 46 11 170207

Prof. Martin Mork
University of Bergen
Jahnebakken 5
N-5007 Bergen - NORWAY
Tel: 47 5 212662
Fax: 47 5 323962

Prof. Tom Osborne

The John Hopkins University
Department of Earth and Planetary Sciences
Baltimore, Maryland 21218 - U.S.A.
Tel: 410 516 7034/7039
Fax: 410 415 7933

Dr.Beatriz Reguera
IEO/Centro Oceanográfico de Vigo
Aptdo. Correos 1552
36280 Vigo - SPAIN
Tel: 34 86 492111
Fax: 34 86 492351

Dr.Antonio Jorge da Silva
Istituto Hidrográfico
Rua das Trinas, 49
1296 Lisboa Codex - PORTUGAL

Dr. Timothy Wyatt
CSIC/Istituto de Investigaciones Marinas
Eduardo Cabello, 6
36208 Vigo - SPAIN
Tel: 34 86 231930
Fax: 34 86 292762