ICES PGNSP Report 2007

ICES Oceanography Committee
ICES CM 2007/OCC:08
Ref. LRC, RMC, MHC, ACE, ACFM, ACME

Report of the ICES - EuroGOOS Planning Group on the North Sea Pilot Project NORSEPP (PGNSP)

23-24 April 2007

Gìjon, Spain

ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

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Recommended format for purposes of citation:

ICES. 2007. Report of the ICES - EuroGOOS Planning Group on the North Sea Pilot Project NORSEPP (PGNSP), 23–24 April 2007, Gìjon, Spain. ICES CM 2007/OCC:08. 20 pp.

Contents

Executive summary

PGNSP produced four quarterly reports on oceanographic conditions in the North Sea in 2006. The reports are made available at the ICES web-page.

PGNSP will continue to produce quarterly reports also in 2007 with Hein Rune Skjoldal as editor.

Availability of data (observations and modelled) and time-series are wanted from users. There is a plan to prepare a browser-based presentation of results and data within the project ECOOP supported by the EU FP6.

1 The meeting

The ICES/EuroGOOS Planning Group for the North Sea Pilot Project (PGNSP – NORSEPP) met at IEO in Gijon, Spain, alongside the meeting of SGGOOS. The meeting was opened at 10:00 on 23 April and closed at 13:00 on 23 April and was jointly chaired by the EuroGOOS Co-Chair Martin Holt and the ICES Co-Chair Hein Rune Skjoldal.

The agenda for the meeting was structured according to the given Terms of Reference for the meeting (Annex 2). The meeting was attended by 3 members from 2 countries (Norway and UK, with apologies from Belgium, Norway, Sweden, and UK). The list of participants is included as Annex 1.

The rest of the meeting was held jointly with SGGOOS, in particular to address TOR (e) and (h). These sessions were held in the afternoon on 23rd April and on 24th April.

2 Agenda and report

The agenda was discussed. It was agreed to deal with the NORSEPP-specific matters in the first morning, and then the WG-OOPS matters in plenary with SGGOOS in the remaining time. The arrangements for preparing the meeting report were agreed.

3 Experiences with producing the 2006 NORSEPP Quarterly update reports (ToR a)

The quarterly production of reports initiated during 2005 was continued in 2006. Four reports were prepared; for the first, second, third and fourth quarters of 2006. These reports are available from the ICES webpage: http://www.ices.dk/marineworld/norsepp.asp

As in 2005, the reports were prepared by Hein Rune Skjoldal as editor, based on input of model results and observational data from NORSEPP partners. These included modelled fluxes (monthly means) of water across sections of the North Sea; distributions of hydrographic properties from 1st quarter IBTS and from models, including a collocation between model and observations; monthly mean sea surface temperature distributions in the North Sea; detailed time-series of temperature from selected sites (Southern Bight, German Bight and Skagerrak); observations on seasonal development of phytoplankton from coastal stations in Norway and ferry box and satellite data from the southern North Sea and the Channel, and some additional data on hydrography, nutrients and chlorophyll from parts of the North Sea area.

The experience from producing the reports is overall good as it focus our attention to becoming more operational with physical information for biological applications. It also serve to demonstrate the types of results that can be made available from modelling and observations. The work involved in compiling end editing the reports has been reduced as sections have become more standardised. This can still be improved by having clearer reporting schedules for the contributions by the different NORSEPP partners.

PGNSP agreed that the production of the quarterly reports should continue, providing updated information on North Sea conditions aimed at users both within and outside the ICES community. The reports could be further developed and improved, by including more products as they become available.

4 NORSEPP 2006 Summary contribution to the ICES Ocean Climate Status Report (ToR a)

It was noted that the information contained in the 4th Quarter report covered all 12 months of 2006 and this should form a useful contribution to the 2006 WGOH ocean climate status report.

5 Use of NORSEPP products by other ICES WG

The experiences of the Herring Assessment WG (HAWG) were reported. Although the WG were aware of the NORSEPP reports, in practice the information had not yet been used. A longer time-series presentation is required, to place the conditions of recent years into context. Access to the data is also an issue, and it was suggested that placing the information and data on a web page could be useful, in addition to preparing also the paper (pdf) reports as at present. Such a web page needed to be linked to from the ICES website. Also it was suggested that the present gridded data are too detailed. Some spatial averaging, for example over the ICES rectangles, would be useful in preparing the time-series.

Reference was also made to relevant comments in the 2006 reports of both WGNSSK and WGMHSA, as copied below:

WGMHSA06 (Section 1.9) includes the following paragraph:

Nevertheless, despite the increasing pressure on working groups to consider their allocated stocks within the context of the ecosystem and the effort of the different ecosystem description groups; the impact of ecosystem change and ecosystem vulnerability on the assessments of WGMHSA is still minimal. This is primarily due to the lack of an interaction between the general ecological and oceanographic groups and the assessment groups, which still tend to work in isolation. ***The provision of the data by the ecosystem groups and the summaries they provide are still largely unsuitable for consideration and adoption by assessment working groups. Assessment working groups need information on vulnerabilities and sensitivities of ecoregions to exploitation and indices and mechanisms of changes in productivity.*** *Also it appears that scale is a problem, with oceanographic groups studying changes in the ecosystem at scales larger than the ones useful for assessment. This is the case with main oceanic indices such as NAO that operate on a larger scale then the response of fish behaviour to environmental change.*

and

The working group thus recommends improved coordination between assessment working groups and the ecological/oceanographic working groups, with clearly defined deliverables. In particular, with the development of tools and the analysis for

i) *the detection and enumeration of environmental variability and changes in productivity*

ii) *highlighting vulnerabilities of ecosystems to overexploitation and impact on trophic diversity.*

And WGNSSK06 states (Section 1.1)

Of the additional ToRs to be addressed by all assessment WGs, ToR 1 was not covered due ***to a current lack of knowledge of causal relationships*** *between the environment and marine fish stocks. For this reason, no quantitative modifications were made to assessments or forecasts to account for environmental information and the report is limited to comments on potentially-important ecosystem impacts.*

Accordingly, as at least three of the ICES ACFM working groups in 2006 PGNSP recommends that NORSEPP continues to work in close collaboration with the HAWG.

Reference list

ICES 2006. Report of the Working Group on the Assessment of demersal stocks in the North Sea and Skagerrak (WGNSSK). ICES CM 2006/ACFM:35

ICES 2007. Report of the Herring Assessment Working Group south of 62 N (HAWG). ICES CM 2007/ACFM: 11

ICES 2006. Report of the Working Group on the Assessment of Mackerel, Horse Mackerel, Sardine and Anchovy (WGMHSA). ICES CM 2006/ACFM:36

6 Plan the further production of quarterly update reports for 2007 (ToR b)

PGNSP will produce quarterly update reports for 2007. Hein Rune Skjoldal agreed to continue as editor for another year. The production will follow the same format as in 2006 with contributions of model results and observations from NORSEPP partners. It was agreed that a schedule should be established, for contributions to the report to reach the editor within 4 weeks after the end of each quarter. With further streamlining of the production, the editor hopes to prepare each quarterly report within 6 weeks of the end of the quarter.

The importance of timely delivery of the IBTS Q1 and Q3 hydrography was stressed. Noting the difficulties with this arising in 2007, it was suggested that for NORSEPP, ICES should provide whatever datasets have been submitted, by the 16th April for Q1, and by 1st September for Q3. This should allow for collocation with model data in time for the Q1 and Q3 reports respectively. It was noted that if further datasets became available after this date, the collocation and report content would be updated in due course. However timely production of the Q1 report, including the collocation of model with IBTS Q1 observations, is seen as a priority.

7 Possible future development of NORSEPP products (ToR d)

Noting the comments from the HAWG, the existing opportunity to prepare a browser-based presentation, with support from the ECOOP FP6 project was discussed.

The FP6 project ECOOP (European Coastal Operational observing and forecasting system) started in February 2007, and runs for three years. A small task in work package 9 will provide some capacity for development of the presentation of NORSEPP datasets.

The ECOOP Description of work states:

> ***S9.2.8 - Environmental status support to North Sea fisheries assessment***
> *Holt Martin (METO) - IMR*
> *The existing service (V0) for this application is a demonstration paper-based amalgamation of material from a wide and disparate range of contributors, prepared by the ICES-EuroGOOS Planning Group for a North Sea Pilot Project.*
>
> *For V1, the presentation will be consolidated and harmonised across the contributions, and a service web page will be established. This will allow a standard presentation of modelled monthly mean seabed temperatures and transports, and provide for a collocation with available fisheries research cruise physical observations.*
> *Particular focus shall be given to assessment of the mean sea bed temperature and to assessment of transports across various sections.*

For service demonstration during the TOP, the service webpage information shall be updated with model data and observation inputs from the North Sea system. Note that this is not a "real-time" service with daily update, but rather provides a retrospective summary (seasonal, quarterly, and possibly monthly) of the recent past status of the North Sea physical oceanography.

For V2, the lessons learned during the TOP application will be applied into developing an upgraded webpage, and a more efficient method for generating the model-observation collocations and the monthly or quarterly mean values, making use of the EuroMISS capability as much as possible. This will allow ready application of the Status Summary service to other regional seas.

For the first 18 months of the project, the following activities will be carried out:

- *Quarterly model and observation-based assessments of the North Sea temperature and salinity conditions (including transports across various sections) for evaluation by ICES fisheries assessment working groups shall be defined and demonstrated.*
- *A web-based dissemination of the status assessment will be developed. Particular focus shall be given to assessment of the mean sea bed temperature and to assessment of transports across various sections.*

In months 18-36 the assessments of North Sea quarterly status will continue, with development following feedback from the ICES working groups using the summary. The present and recent years values shall be placed into historical context with the outputs of WP10. For evaluation, the North Sea status of additional parameters developed in ECOOP WP6 and in task 9.2.2 will be added to the summary.

The proposed development was welcomed by the group, and it was felt that this would go some way to address the issues raised in 2006/2007 by HAWG.

However in particular the ECOOP development should note the following points:

1) Future sustained capacity for this web presentation is important.

   This should be addressed satisfactorily, since the developments will be made by the operational agencies of IMR and UK Met Office, both of whom contribute to NORSEPP

2) Integration of quarterly updates with presentation of the long timeseries of model hindcast outputs (prepared in ECOOP WP10) is important.

3) The reference climatology used should be reviewed, in the light of developments in ECOOP WP10.

4) Spatial averaging of the gridded data over the ICES rectangles was requested, for time-series presentations.

It was noted that a further call for proposals, from FP7 Space, anticipated in late 2008, for development of downstream services following the introduction of the GMES Marine Core Service, could possibly provide resources for further development

8 New Expert Group in ICES related to operational products and services (ToR h)

Plenary discussion with SG GOOS agreed the following, in review of the preliminary document and suggestions for implementing WGOOP already prepared by PGOOP.

- For the reasons already stated in the PGOOP report, the establishment of a group promoting the collaboration between producers and users of oceanographic operational products and services is supported by both SGGOOS & PGNSP. The

planning process should include development of a roadmap where the role of regional alliances and the products from existing groups are taken into account.

- A first step could be the organisation of a workshop aimed at the demonstration of working examples. The outcome of the workshop should include a roadmap and ToRs for the continuation of the collaboration between producers and users within ICES of oceanographic operational products and services. Another outcome of the workshop would be the identification of the chairs of the new group. The workshop should be held before the first meeting of WGOOP.

- The ToRs for the first meeting of WGOOP proposed in the PGOOP report should be replaced by the planning of the demonstration workshop. Therefore action on the items suggested, although important for the group, should be postponed until after the workshop. The reason is to increase the participation of users in the process of creation of the new group.

- The composition of the new group should aim at a balanced participation of producers of operational products and users.

- Examples of ToRs than can be proposed for the new group:
  - to develop and continue the dialog between producers of operational products and users
  - to extend the use of operational products to other regions, in cooperation with GOOS Regional Operational Oceanographic Systems.

- NORSEPP should meet in 2008 to plan for transition to routine assessment and further develop the content and delivery of the reports in response to user requirements. NORSEP should also prepare to broaden the experience to other regions through the process of developing the new group through the proposed workshop.

9 Joint session with SG-GOOS to review the coupled physical-biological models running in nowcast-forecast mode, with data available for generation of the NORSEPP products and identify what is ready for application in the NORSEPP reports (ToR e and h)

The NW Shelf Operational Oceanographic System (NOOS) has recently prepared a table of information describing the various physical-ecosystem models that are in use at agencies around the North Sea. A copy of the draft table (April 2007) is included at Annex 6 of this report.

Following the planned developments noted above to the presentation of modelled monthly mean near-bed temperatures, it is considered that fortnightly or monthly mean modelled chlorophyll maps could also be provided for assessment. Additional biogeochemical parameters such as maps of nutrients (N, P Si) both surface and at depth, dissolved oxygen, phytoplankton biomass, and eventually zooplankton biomass, could start to be provided.

10 Observation data available for NORSEPP products (ToR f)

Timely access to IBTS cruise data has been discussed under Agenda Items 4 and 5.

11 Improvements and services from the ICES data Centre (ToR g)

Timely delivery of IBTS cruise data from ICES to NORSEPP partners has been discussed under agenda item 6.

12 Other related activities

None were raised.

Annex 1: List of participants

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Annex 2: Agenda

DRAFT AGENDA PGNSP 2007

Monday 23 April

09:00–13:00

1) Opening (welcome, practical information)
2) Agenda and report
3) ToR (a) Experiences with production of 2006 NORSEPP Q reports
4) ToR (a) NORSEPP Summary 2006 Report
5) ToR (c) Use of NORSEPP products by other ICES WGs

13:00–14:00 Lunch

14:30–18:00

6) ToR (b) Plan the production of Q update reports for 2007
7) ToR (d) Possible future development of NORSEPP products
8) ToR (h) New expert group in ICES related to operational products and services

Tuesday 24 April

09:00-13:30

9) ToRs (e and h) Joint session with SGGOOS. Discussion of plans and recommendations for the new WG on Operational Products and Service – WGOOP. Review of coupled physical-biological models in relation **to NORSEPP products.**

13:30 –14:30 Lunch

13:30–18:00

10) ToR (f) Observation data available for NORSEPP products
11) ToR (g) Improvements and services from the ICES Data Center
12) Other related activities
13) The PGNSP 2007 Report
14) Closure of the meeting

Annex 3: PGNSP terms of reference 2006

2006/2/OCC08 The **Planning Group for the North Sea Pilot Project NORSEPP** [PGNSP] (Co-Chairs: Martin Holt, UK, and Hein Rune Skjoldal, Norway) will meet jointly with SGGOOS in Gijón, Spain from 23–24 April 2007 to:

a) summarise the experiences with producing the quarterly update reports on the North Sea for 2006 and their consolidation into a description of conditions in 2006 as a contribution to the ICES Ocean Climate Status Report;

b) plan the further production of quarterly update reports for 2007;

c) review the use of NORSEPP products by other ICES WGs and propose ways to improve working relationships with relevant groups;

d) on the basis of experiences with production of the quarterly reports and the inputs to REGNS, review and plan possible future development of the NORSEPP products;

e) jointly with SGGOOS, review the coupled physical-biological models running in nowcast-forecast mode, with data available for generation of the NORSEPP products and identify what is ready for application in the NORSEPP reports;

f) review the observational data available for generation of the NORSEPP products;

g) identify gaps, and make recommendations for future improvements and services from the ICES Data Centre;

h) take part in the intersessional work led by PGOOP in developing the mission and draft resolutions for a new Expert Group related to operational oceanographic products and services.

PGNSP will report by 14 May 2007 for the attention of the Oceanography, Living Resources, Resource Management, Marine Habitat, and Advisory Committees (ACE, ACFM, ACME).

Supporting information

PRIORITY:	This represents an important initiative for ICES to actively engage itself in GOOS activities. Thus priority is high.
SCIENTIFIC JUSTIFICATION AND RELATION TO ACTION PLAN:	Action Plan Numbers: 1.2, 1.3, 1.5, 1.6, 1.7, 1.8, 2.2, 2.9, 4.11, 5.13 The ICES/IOC Steering Group for the Global Ocean Observing System (SGGOOS) organized a Workshop Towards a North Sea ecosystem component of GOOS for assessment and management in Bergen 5–7 September 2001 as a follow-up activity of its Implementation Plan. This Workshop produced an agreed IOC/EUROGOOS/ICES/ OSPAR/NSC Statement of Conclusions which was submitted to the 5th NSC in March 2002. Following this, ICES established this Planning Group which in 2002 prepared an implementation plan for NORSEPP. It is intended that the Project should be, if possible, supported by external funding (e.g., FP6) but should not be dependent on that. Consequently EuroGOOS and ICES have agreed that the principles laid down by NORSEPP (PGNSP) should be pursued actively as far as possible from institute sources, but clearly with limited objectives. Against this background and uncertainty, PGNSP will seek to initiate as many elements as possible to further its basic goal of encouraging the use of operational oceanographic products into stock assessment considerations. NORSEPP is now attempting to move into an operational phase by producing quarterly update reports on North Sea conditions and input to the REGNS North Sea assessments. **Tor h)** The work of the proposed Expert Group will be relevant for PGNSP.

RESOURCE REQUIREMENTS:	Costs of running a meeting at ICES. Various Secretariat resources may be required to promote inter-Working Group collaboration in the project. Secretariat support in handling oceanographic data from ICES coordinated surveys (IBTS, herring surveys).
PARTICIPANTS:	Representatives from the physical oceanography community and fish surveys and stock assessment communities are invited. EuroGOOS will also nominate participants. Participants from institutes participating in North Sea/OSPAR monitoring programmes will be essential
SECRETARIAT FACILITIES:	Relevant Secretariat staff should be directly involved in the Group
FINANCIAL:	None
LINKAGES TO ADVISORY COMMITTEES:	Very close to ACE objectives and also highly relevant to the interests of ACFM too.
LINKAGES TO OTHER COMMITTEES OR GROUPS:	LRC, MHC are closely linked. Group was created by SGGOOS. REGNS.
LINKAGES TO OTHER ORGANISATIONS:	EuroGOOS, IOC-GOOS, OSPAR, NSC, COOP

Annex 4: PGNSP proposed terms of reference 2007

The **Planning Group for the North Sea Pilot Project NORSEPP** [PGNSP] (Co-Chairs: Martin Holt, UK, and Hein Rune Skjoldal, Norway) will meet at ICES Headquarters, Copenhagen8-9 April 2008 to:

a) summarise the experiences with producing the quarterly update reports on the North Sea for 2007 and their consolidation into a description of conditions in 2007 as a contribution to the ICES Ocean Climate Status Report.

b) review progress with the developments in ECOOP 9.2.8;

c) plan the further production of quarterly update reports for 2008;

d) review the use of NORSEPP products by other ICES WGs and propose ways to improve working relationships with relevant groups;

e) on the basis of experiences with production of the quarterly reports and the inputs to REGNS, review and plan possible future development of the NORSEPP products;

f) review the observational data available for generation of the NORSEPP products;

g) identify gaps, and make recommendations for future improvements and services from the ICES Data Centre;

h) PGNSP will take part in the intersessional work proposed by SG GOOS to convene a workshop in order to develop the mission and draft resolutions for a new Expert Group related to operational oceanographic products and services for ICES users.

PGNSP will report by 21 May 2008 for the attention of the Oceanography, Living Resources, Resource Management, Marine Habitat, and Advisory Committees (ACE, ACFM, ACME).

Supporting information

PRIORITY:	This represents an important initiative for ICES to actively engage itself in GOOS activities. Thus priority is high.
SCIENTIFIC JUSTIFICATION AND RELATION TO ACTION PLAN:	Action Plan Numbers: 1.2, 1.3, 1.5, 1.6, 1.7, 1.8, 2.2, 2.9, 4.11, 5.13 The ICES/IOC Steering Group for the Global Ocean Observing System (SGGOOS) organized a Workshop Towards a North Sea ecosystem component of GOOS for assessment and management in Bergen 5–7 September 2001 as a follow-up activity of its Implementation Plan. This Workshop produced an agreed IOC/EUROGOOS/ICES/ OSPAR/NSC Statement of Conclusions which was submitted to the 5th NSC in March 2002. Following this, ICES established this Planning Group which in 2002 prepared an implementation plan for NORSEPP. It is intended that the Project should be, if possible, supported by external funding (e.g., FP6) but should not be dependent on that. Consequently EuroGOOS and ICES have agreed that the principles laid down by NORSEPP (PGNSP) should be pursued actively as far as possible from institute sources, but clearly with limited objectives. Against this background and uncertainty, PGNSP will seek to initiate as many elements as possible to further its basic goal of encouraging the use of operational oceanographic products into stock assessment considerations. NORSEPP is now attempting to move into an operational phase by producing quarterly update reports on North Sea conditions and input to the REGNS North Sea assessments. **Tor h)** The work of the proposed Expert Group will be relevant for PGNSP.

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SECRETARIAT FACILITIES:	Relevant Secretariat staff should be directly involved in the Group
FINANCIAL:	None
LINKAGES TO ADVISORY COMMITTEES:	Very close to ACE objectives and also highly relevant to the interests of ACFM too.
LINKAGES TO OTHER COMMITTEES OR GROUPS:	LRC, MHC are closely linked. Group was created by SGGOOS. REGNS.
LINKAGES TO OTHER ORGANISATIONS:	EuroGOOS, IOC-GOOS, OSPAR, NSC, COOP

Annex 5: NW Shelf "NOOS" summary table of physical-ecosystem models in use at NOOS partners

Table summary of existing modelling tools and configurations

Biogeochemical modelling overview for NOOS

MODEL	DETAILS	NOWCAST FORECAST CONFIGURATION	HINDCAST CONFIGURATION	NOTES
Polcoms-ersem	Polcoms physical (ppm advection. MY2.5 with additions for vertical mixing) ERSEM2004 PML ecosystem 4 nutrients 4 phytoplankton 3 zooplankton 2 inorganic Spm; Organic spm & detritus DO Microbial loop Bacteria	7km Medium Resolution Continental Shelf model MRCS Covers whole NW Shelf to 200m contour between 48N and 65N, and to 13E Nested into 12km polcoms Atlantic Margin domain physical model, which nests into Mersea Atlantic model Met Office daily update 5 day forecast PML SW Coastal model	7km on Atlantic Margin domain, 50year hindcast at POL PML implementations ?	Rivers: daily climatology R&D groups pol pml met office Published literature and validation: Proctor et al Blackford 2004 Allen et al Lewis Siddorn et al Developments planned Data assimilation; use of IOPs, GOTM k-e mixing; Later: NEMO shelf model
BSHdmod-ECOHAM	Forcing: DWD(wind, radiation, waves) + BSH (BSHcmod physical) (FCT for advection) conserv. substance 3 SPM fractions ECOHAM2 (presently 14 prognostic state variables): alkalinity, bacteria,phytoplankton,zooplankton, detritus (C+N), DOC, DON, DIC, ammonium, nitrate, oxygen, benthic detritus	BSH (with GKSS and IfM HH) 5km North Sea and Baltic Sea daily update, 3 day forecast Developments (in ECOOP): 900m German Bight and western Baltic	5km North Sea and Baltic Sea Developments (in ECOOP): 900m German Bight and western Baltic	Rivers: daily climatology R&D groups: GKSS, IfM HH, IOW Published literature and validation: Gayer, et al., 2004 Moll et al. 2003 Moll & Stegert, 2006 Müller-Navarra et al., 1999 Pätsch et al. 2002 Developments: + phosphorus, silicate, 3 phytoplankton, 2 zooplankton (ECOHAM4) implementation of GOTM (incl. ERGOM) unified model for North Sea and Baltic (ECOHAM+ERGOM)

MODEL	DETAILS	NOWCAST FORECAST CONFIGURATION	HINDCAST CONFIGURATION	NOTES
BSHdmod-ERGOM (under development)	Forcing: DWD(wind, radiation, waves) + BSH (BSHcmod physical) (FCT for advection) conserv. substance 3 SPM fractions ERGOM: 10 prognostic state variables: cyanobacteria, diatoms, flagellates, zoopl., P, ammonium, nitrate, oxygen, detritus, sediment	BSH (with GKSS and IOW) under development: 5km North Sea and Baltic Sea 900m German Bight and western Baltic	under development: 5km North Sea and Baltic Sea 900m German Bight and western Baltic	R&D groups: GKSS, IOW Published literature and validation: Burchard et al., 2006 Fennel Neumann, 2000 Neumann et al. 2002 Janssen et al., 2004 Developments implementation of GOTM (incl. ERGOM) unified model for North Sea and Baltic (ECOHAM+ERGOM)
MIRO&CO-3D	COHERENS hydrodynamics MIRO biogeochemical model (C, N, P, Si cycles) Nutrients (4): NO_3, NH_4, PO_4, DSi Phytoplankton (10): diatoms (3), nanoflagellates (3), *Phaeocystis* colonies (3) and mucus (1) Zooplankton (2): microzooplankton, copepeods Bacteria (1) DOM (8) POM (7)	biogeochemical model (in development, ECOOP)	5' longitude (~5.8km) by 2.5' latitude (~4.6 km) 5 σ layers English Channel & Southern North Sea (4.0°W – 5.0°E, 48.5°N-52.5°N) 1991-2004 hindcast (following years according to river inputs availability)	R&D groups: AMORE (MUMM, ULB) Inputs: weekly SST (from BSH) 6 hours met. forcing (from UKMO) Rivers: daily flow, (bi)-monthly loads Climatological seasonal TSM (from SeaWiFS) Published literature and validation: Lacroix et al., 2004 (JSR) Lancelot et al., 2005 (MEPS) Lacroix et al. 2007 (JMS) Developments (AMORE-3): Belgian coastal zone (BCZ) refined grid (nesting). 2.1°E – 4.2°E, 51°N – 51.92°N (750 m x 750 m)
BSHcmod-Ergom	Baltic-North Sea coupled physical-biochemical model Nutrients phytoplankton zooplankton spm	DMI ERGOM to be operational 2008, now in testing the coupling interface, with SST assimilation 3D T/S DA in 2008	BSHcmod 30year climate runs for the past and future (ready 2007/12); Reanalysis can be made by using 3DVAR DA	DMI/GKSS (SPM), R&D: CVS code working env.; 3DVAR/EnKF /EnOI DA; improved k-omega, validation

MODEL	DETAILS	NOWCAST FORECAST CONFIGURATION	HINDCAST CONFIGURATION	NOTES
HYCOM-BSHdmod-DMILmod	HYCOM: BSHdmod: oil drift DMILmod: larvae drift model	Rotated grid, 10km resolution in N. Atlantic shelf area (including North Sea), tides and ice included Operational currently, with simple SST assimilation		Higher resolution in N. Atlantic marginal seas (5km) and data assimilation of altimetry SSH, ARGO T/S are expected as R&D.
MIPOM / NORWECOM	MIPOM physical (MY2.5) NORWECOM IMR ecosystem 4 nutrients 2 phytoplankton 2 sediments Detritus DO	4km grid N. North Sea and Skagerrak. OBC in Kattegat from SMHI. Nested into 20km grid of greater North Sea. Nested in turn in FOAM N. Atlantic. River fluxes: daily real-time data for major Norwegian rivers, monthly climatology for others. Assimilation of SST from OSI-SAF met.no daily update 10-day forecast Forced by combined met.no and ECMWF atmospheric fluxes	Nested 20-4 km as for nowcast-forecast, but with climatology on outer boundaries.	Sea ice: model code includes coupled sea ice model. R&D groups: met.no, IMR, NERSC Published literature and validation: coming Developments Nested configuration will be replaced by single 4 km grid of North and Nordic Seas in 2007. Assimilation of physical parameters MIPOM will be replaced by ROMS in 2008.
ECO-MARS3D	MARS3D hydrodynamics Ifremer's biogeochemical model 4 nutrients: NH_4, NO_3, PO_4, $SI(OH)_4$ 3 phytoplanktons 2 zooplanktons Inorganic Spm DO	4km Resolution on the French Continental Shelf Covers French Atlantic and English Channel Shelf to 200m contour Nested into 5 km NW Atlantic MARS2D physical model, then with Mercator oceanic boundary conditions Meteo-France daily update 2 day forecast	17 years for physics All years since 2000 for biogeochemistry	Rivers: daily climatology R&D groups Ifremer/Brest/DYNECO Atlantide Published literature and validation: Huret, M., Gohin, F., Daniel, D., Michel, L., V´ronique, G., 2006. Use of the Sea- WiFS data for improving the simulation of winter to spring phytoplankton pro- duction in the Bay of Biscay Vanhoutte-Brunier A., Ménesguen A., Lefebvre A., Cugier A., submitted. Using a nitrogen-tracking technique in a 3D model of the primary production to assess the fueling sources of Phaeocystis globosa blooms in the eastern English Channel and the southern North Sea