PADD II - Global change, Ecosystèmes et Biodiversité
EV-19

AMORE

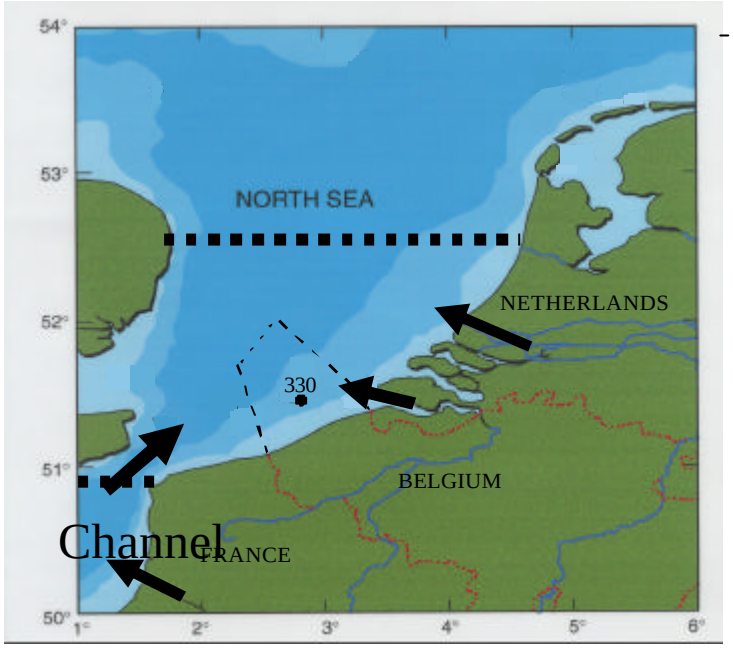
Advanced **MO**delling and **R**esearch on **E**utrophication

Linking eutrophication and biological resources

Coordinator: C. Lancelot

Eutrophication status of Belgian coastal waters

Current knowledge

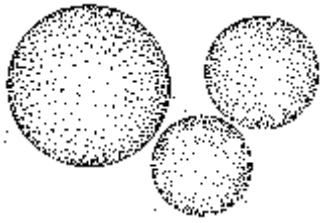


Nutrient status

N, P enriched over Si:
local & transboundary inputs

Response

Phaeocystis colony blooms



Visual damage

foam
clogging of fishing nets

AMORE-II is the follow-up of AMORE-I

Achievements

Nutrient enrichment:

- NO3 excess, PO_4 and Si limitation
- Scheldt, Seine, Rhine under control of human activities & NAO

Phaeocystis colony blooms

- Sustained by "new sources" of NO_3 but regenerated PO_4
- No grazed by copepods but gelatinous
- Remineralization processes which maintain nutrients in the area

Further needs

- Extend domain to Baie de Seine
- Consider real weather forcing
- Identify the origin of Phaeocystis colonies
- Focuss on P & Si cycling (benthic vs planktonic)
- Explore the role of gelatinous

AMORE-II : General objectives

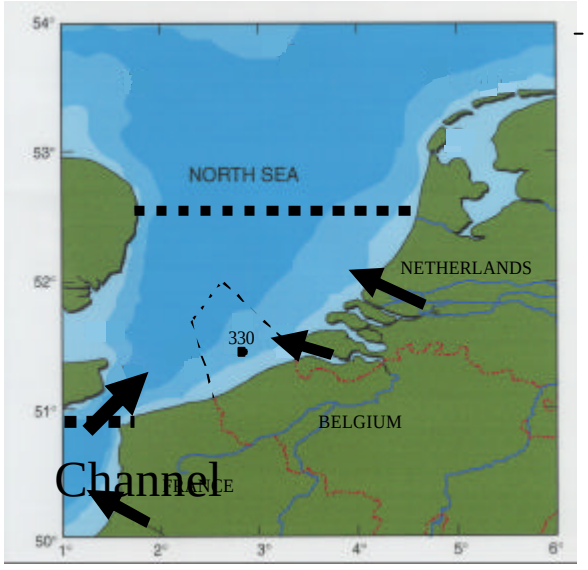
• Predict the magnitude and geographical extent of Phaeocystis blooms in the Southern Bight of the North Sea in response to varying climate conditions and nutrient loads

• Trace the origin and fate of land-based nutrients in the Belgian coastal zone

↙ in-flowing Atlantic waters, Scheldt and Rhine river inputs

↙ local pelagic and benthic recycling

↙ the export to adjacent areas



Partnership

Université Libre de Bruxelles
Ecologie des
Systèmes Aquatiques

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S.Becquevort, N. Gypens

Vrij Universiteit Brussel
Laboratorium voor
Ekologie & Systematiek

M.-H. Daro, E. Breton,

Institut Royal des Sciences Naturelles
Management Unit of
North Sea Mathematical Models

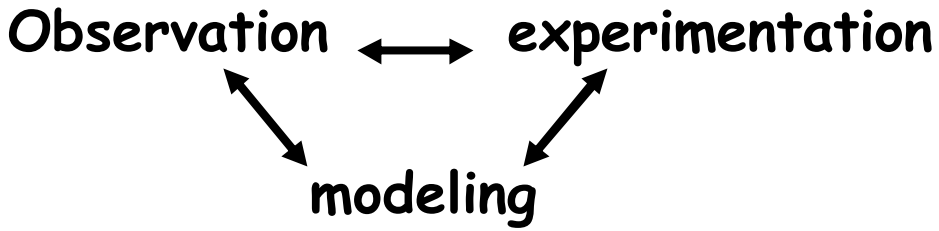
K.Ruddick, G. Lacroix

International collaborations

NIOO-CEMO, The Netherlands
Observatoire de Banyuls, France
Oregon State University, USA

K. Soetaert
M-J. Chrétiennot-Dinet
Y Spitz

Methodology & Research organization



PROCESSES

phytoplankton
zooplankton
bacteria

parameterisation

MATHEMATICAL MODELS

circulation

3D-COHERENS

ecosystem

0D-MIRO
direct & adjoint

3D MIRO&CO

MONITORING

National grid
330 (1988-2000)

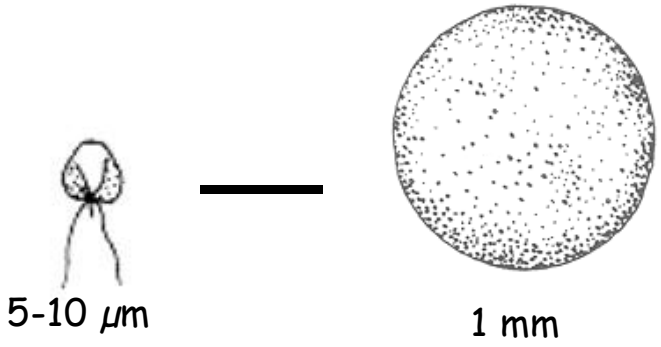
Calibration &
Optimization

STATISTICAL ANALYSIS

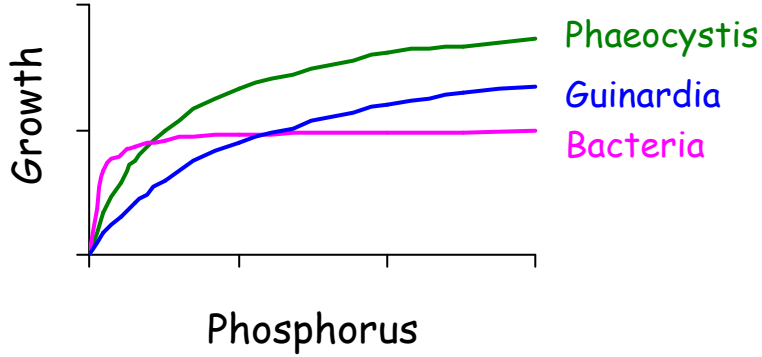
Expected results (1 of 2)

1. Origin of Phaeocystis colonies:

- Identification of colony-forming cell
- Mechanisms of colony formation



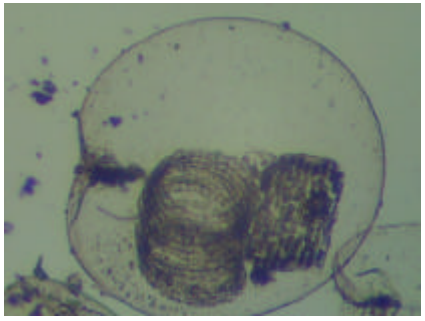
2. Nutrient competitive strategy among microorganisms



PO_4, DOP

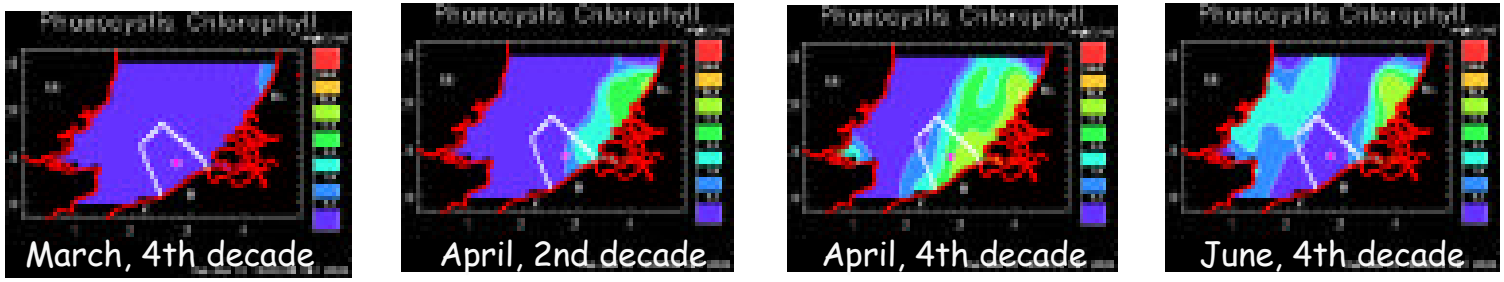
3. Trophic role of gelatinous zooplankton and associated nutrient recycling

Noctiluca, Oikopleura

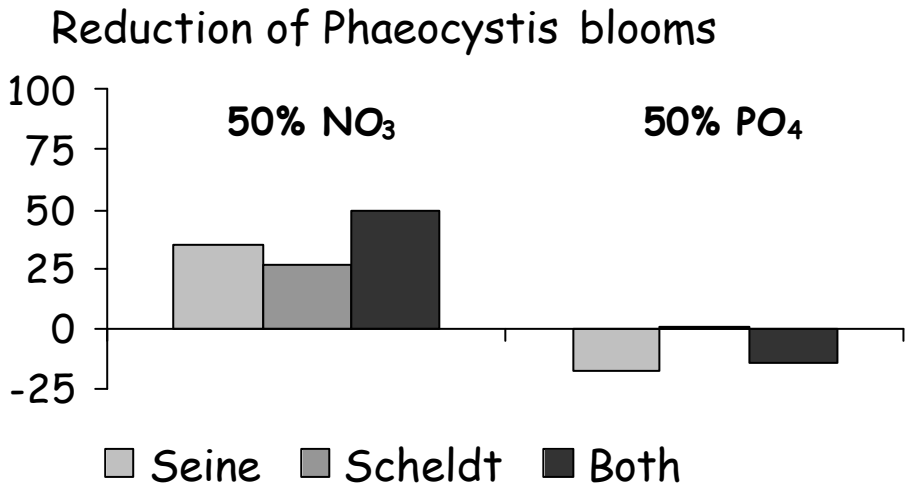


Expected results (2 of 2)

4. Modeling present-day Phaeocystis blooms spreading: improving MIRO&CO



5. MIRO&CO scenarios



Valorisation : End-user Committee

Complementary expertise:

Dr A. Ménesguen, IFREMER, France : modeling

Prof. M. Vincx, Gent University, Marine Biology : impact on benthos

Dr R. De Clerck, CLO-Department Zeevisserij: impact on fish

Coastal eutrophication management:

Dr W. Zevenboom, RWS-North Sea Directorat, The Netherlands

Dr G. Pichot, Institut Royal des Sciences Naturelles, IRSNB-UGMM

Dr J. Mees, VLaams Instituut voor de Zee, VLIZ