

NOTIFICATION OF PROPOSED RESEARCH CRUISE

**GENERAL ORGANISATION
PART A**

01. Name of research ship : **BELGICA** Cruise N° : **2008/12a-b**
02. Dates of cruise : From **06 May** to **24 May 2008**
03. Operation authority **Belgian Navy under contract for Belgian Ministry of Science Policy Management Unit of the North Sea Mathematical Model "M.U.M.M.", 3° & 23° Linierégimentsplein, 8400 Oostende Telephone 32(0)59 70 01 31, Facsimile 32(0)59 70 49 35 Email : bmmost@mumm.ac.be**
04. Owner **Belgian state represented by Minister for Science Policy**
05. Particulars of ship
- | | |
|-----------------|------------------------------------|
| Name | Belgica |
| Nationality | Belgian |
| Overall length | 51 meters |
| Maximum draught | 4,5 meters |
| Net tonnage | 232 NRT |
| Propulsion | Diesel |
| Call sign | ORGQ |
| Telephone | INMARSAT 00870 76 218 73 27 |
| Facsimile | INMARSAT 00870 32 052 18 12 |
| E-mail | belgica@mumm.ac.be |
06. Crew
- | | |
|----------------|----------------------|
| Name of master | 1LZ R. JOOSEN |
| Number of crew | 15 |
07. Scientific personnel
- | | |
|---|---|
| Name and address of scientist in charge | Prof. Lei Chou
Université Libre de Bruxelles, Laboratoire d'Océanographie Chimique et
Géochimique des Eaux
Campus Plaine – CP 208, Boulevard du Triomphe, B-1060 Bruxelles, BELGIUM
Tel : +32-2-650 52 37, Fax : +32-2-650 5228, e-mail : lei.chou@ulb.ac.be |
|---|---|

Number of scientists : 15

(a nominal roll of all personnel other than nationals of the applicant (flag) state is required)

08. Geographical area in which ship will operate (with reference in latitude and longitude).
**French, UK and Irish continental Shelf and slope
Between 46°N – 51°N, 2°W – 12°W**
08. Brief description of purpose of cruise
The PEACE (Role of pelagic calcification and export of carbonate production in climate change) project takes place in the framework of the program "Science for a sustainable development" theme Climate and atmosphere' 1st call, of the Belgian Federal Science Policy Office.
The overall objective of the PEACE project is to evaluate the role in climate regulation of calcification, primary production and export processes during coccolithophorid blooms. We will use a transdisciplinary approach that combines process-oriented field investigations with laboratory experiments and modelling tools.
10. Port of Call, Dates, Reasons.
- | | | |
|------------------|--------------------------------|--|
| Zeebrugge | 06/05 | Start of campaign 12a |
| Cork | 15/05 (pm) – 17/05 (pm) | Relaxation of crew and scientists |
| Cork | 18/05 (am) | Start of campaign 12b |
| Brest | 24/05 (pm) | End of campaign, disembarkation of scientists |
11. Any special logistic requirements at ports of call (other than water, fuel provisions, etc.)
N.A.



NOTIFICATION OF PROPOSED RESEARCH CRUISE

DETAIL
PART B

01. Name of research ship : **BELGICA** Cruise N° : **2008/12a-b**

02. Dates of cruise : from **08 May** to **24 May 2008**

03. Purpose of research and general methods.
(If the research work is being taken on behalf of a research institution of a third state, it is the responsibility of that state to obtain prior permission; it is essential that written confirmation that this has been done is obtained and quoted in this application)

The overall objective of the PEACE project is to evaluate the role in climate regulation of calcification, primary production and export processes during coccolithophorid blooms. We will use a transdisciplinary approach that combines process-oriented field investigations with laboratory experiments and modelling tools. Specific objectives are

- 1) to study the net ecosystem dynamics during coccolithophorid blooms,
- 2) to unravel the link between the bacterial community, grazing, TEP dynamics, carbon export and DMS cycling during coccolithophorid blooms,
- 3) to assess the effects of ocean acidification on coccolithophorid metabolism and TEP production, and
- 4) to model coccolithophorid dynamics and their impact on ocean dissolved inorganic carbon (DIC) chemistry.

(Project Internet Site: <http://www.co2.ulg.ac.be/peace/>)

04. Attach chart(s) showing (on an appropriate scale) the geographical area of the intended work, positions of intended stations, tracks of survey lines, positions of moored / seabed equipment.

See chart in annex

05. Types of samples required, e.g. Geological / Water / Plankton / Fish / Radioactivity / Isotope
water ; sediment ; suspended matter ; plankton

and methods by which samples will be obtained (including dredging/coreing/drilling).

Niskin & Go-FLO bottles, in situ measurements (SCTD, ...); Van Veen grab, Reineck corer, multicorer B&C, NIOZ box corer; non-toxic sea water circuit and on board centrifuge; plankton net; underway measurements

06. Details of moored equipment : **N.A.**

Laying	Dates		Description	Latitude	Longitude
	Recovery				

07. Explosives : **N.A.**

(a) Type and Trade Name
(c) Depth of trade class and stowage
(e) Depth of detonation
(g) Position in longitude and latitude

(b) chemical content
(d) Size
(f) Frequency of detonation
(h) Dates of detonation

NOTIFICATION OF PROPOSED RESEARCH CRUISE

DETAIL
PART B01. Name of research ship : **BELGICA** Cruise N° : **2008/12a-b**02. Dates of cruise : from **06 May** to **24 May 2008**

03. Purpose of research and general methods.

(If the research work is being taken on behalf of a research institution of a third state, it is the responsibility of that state to obtain prior permission; it is essential that written confirmation that this has been done is obtained and quoted in this application)

The overall objective of the PEACE project is to evaluate the role in climate regulation of calcification, primary production and export processes during coccolithophorid blooms.

We will use a transdisciplinary approach that combines process-oriented field investigations with laboratory experiments and modelling tools. Specific objectives are

1) to study the net ecosystem dynamics during coccolithophorid blooms,

2) to unravel the link between the bacterial community, grazing, TEP dynamics, carbon export and DMS cycling during coccolithophorid blooms,

3) to assess the effects of ocean acidification on coccolithophorid metabolism and TEP production, and

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05. Types of samples required, e.g. Geological / Water / Plankton / Fish / Radioactivity / Isotope

water ; sediment ; suspended matter ; plankton

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Niskin & Go-FLO bottles, in situ measurements (SCTD, ...); Van Veen grab, Reineck corer, multicorer B&C, NIOZ box corer; non-toxic sea water circuit and on board centrifuge; plankton net; underway measurements

06. Details of moored equipment : **N.A.**

Laying	Dates		Description	Latitude	Longitude
		Recovery			

07. Explosives : **N.A.**

(a) Type and Trade Name

(c) Depth of trade class and stowage

(e) Depth of detonation

(g) Position in longitude and latitude

(b) chemical content

(d) Size

(f) Frequency of detonation

(h) Dates of detonation

08. Details and reference of

(a) any relevant previous/future cruises

CCCC BELGICA 2002/11 : 22.04.2002 - 11.05.2002

CCCC BELGICA 2003/12 : 28.04.2003 - 18.05.2003

CCCC BELGICA 2004/13 : 01.06.2004 - 17.06.2004

PEACE BELGICA 2006/11 : 29.05.2006 - 10.05.2006

PEACE BELGICA 2007/12 : 07.05.2007 - 25.05.2007

(b) any previous published research data relating to the proposed cruise (attach separate sheet if necessary)

Sea Annex 1

09. Names and addresses of scientist of the coastal state in whose waters the proposed cruise takes place with whom previous contact has been made.

Prof. Patrick Buat-Ménard, University de Bordeaux I Département de Géologie et d'Océanographie, Av. des Facultés, F-33405 Talence Cédex, France

Prof. Peter Liss, University of East Anglia, School of Environmental Sciences Norwich NR4 7TJ UK

Dr. Daniel Cossa, Laboratoire de Biogéochimie des Contaminants Métalliques, Département Biogéochimie et Ecotoxicologie, IFREMER, Centre de Méditerranée, BP 330, Zone Portuaire de Brégailhon, F.83507 La Seyne-sur-mer, France

10. State :

(a) whether visits to the ship in port by scientists of the coastal state concerned will be acceptable

YES

(b) whether it will be acceptable to carry on board an observer from the coastal state for any part of the cruise and dates and ports of embarkation / disembarkation

YES, cfr. part A § 10

(c) when research data from intended cruise is likely to be made available to the coastal state and if so by what means. (If the final report is likely to be delayed beyond 12 months, interim progress reports are required.

- Cruise report available within 2 months by request to the chief scientist
- see 8b above

NOTIFICATION OF PROPOSED RESEARCH CRUISE

SCIENTIFIC EQUIPMENT
 PART C

COASTAL STATE : UNITED KINGDOM

Complete the following table - separate page for each coastal state

Indicate "Yes or No"

LIST SCIENTIFIC WORK BY FUNCTION	Water column including sediment sampling of the seabed	Fisheries research within fishing limits	Research concerning the natural resources of the continental shelf or its physical characteristics	Distance from coast		
				WITHIN 12 NMS	BETWEEN 12-200 NMS	(CONTINENTAL SHELF WORK ONLY) BEYOND 200 NM BUT WITHIN THE CONTINENTAL MARGIN
e.g. Magnetometry : Gravity Diving : Seismics: Bathymetry seabed sampling Trawling Echo sounding : Water sampling U/V TV : Moored instruments: towed instruments:						
Niskin and Go Flo bottles	Yes	No	No	Yes	Yes	Yes
In situ measurements (CTD- system, ... and optical properties)	Yes	No	No	Yes	Yes	Yes
Plankton net	Yes	No	No	Yes	Yes	Yes
Van Veen grab	Yes	No	No	Yes	Yes	Yes
Reineck corer	Yes	No	No	Yes	Yes	Yes
Multicorer B & C	Yes	No	No	Yes	Yes	Yes
NIOZ box corer	Yes	No	No	Yes	Yes	Yes
vessel's non toxic sea water intake and on board centrifuge	Yes	No	No	Yes	Yes	Yes
continuous measurements	Yes	No	No	Yes	Yes	Yes

NOTIFICATION OF PROPOSED RESEARCH CRUISE

**SCIENTIFIC EQUIPMENT
 PART C**

COASTAL STATE :

FRANCE

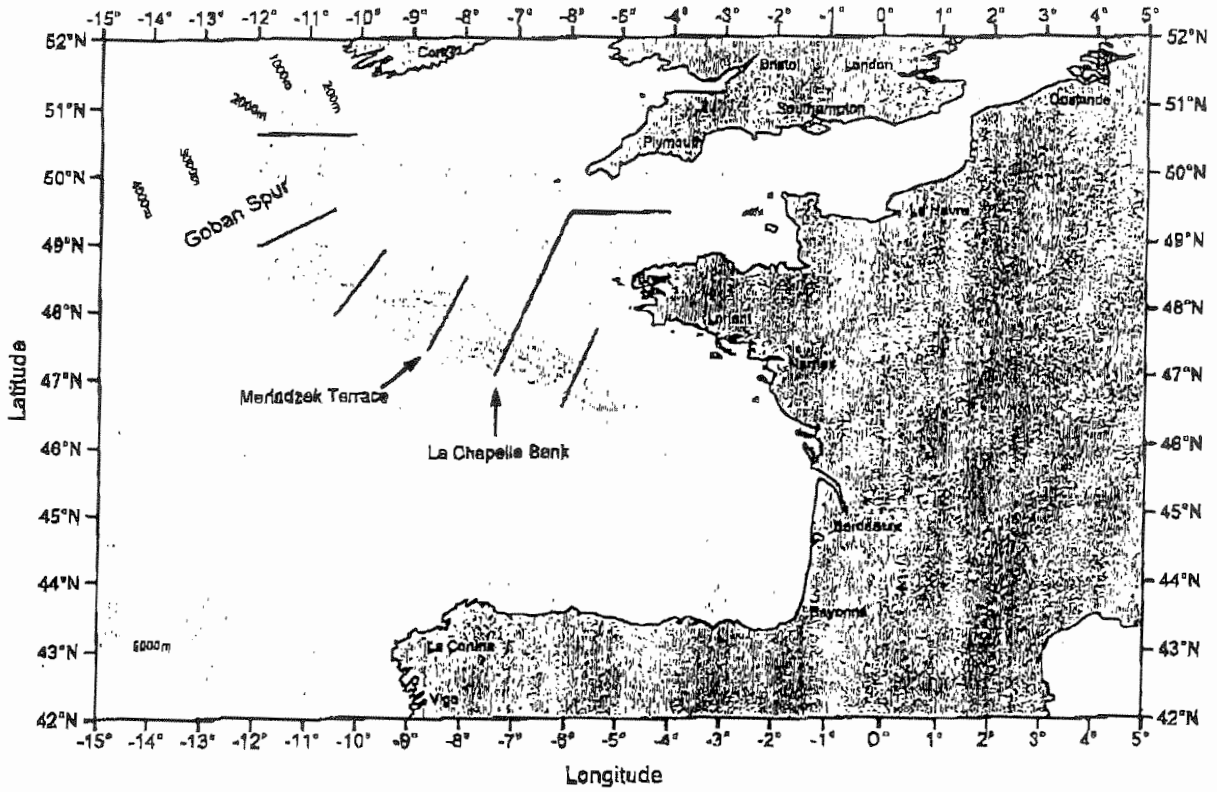
Complete the following table - separate page for each coastal state

Indicate "Yes or No"

LIST SCIENTIFIC WORK BY FUNCTION	Water column including sediment sampling of the seabed	Fisheries research within fishing limits	Research concerning the natural resources of the continental shelf or its physical characteristics	Distance from coast		
				WITHIN 12 NMS	BETWEEN 12-200 NMS	(CONTINENTAL SHELF WORK ONLY) BEYOND 200 NM BUT WITHIN THE CONTINENTAL MARGIN
e.g. Magnetometry : Gravity Diving : Seismics: Bathymetry seabed sampling Trawling Echo sounding : Water sampling U/W TV : Moored instruments: towed instruments:						
Niskin and Go Flo bottles	Yes	No	No	Yes	Yes	Yes
in situ measurements with SCTD-system	Yes	No	No	Yes	Yes	Yes
Plankton net	Yes	No	No	Yes	Yes	Yes
Van Veen grab	Yes	No	No	Yes	Yes	Yes
Reineck corer	Yes	No	No	Yes	Yes	Yes
Multicorer B & C	Yes	No	No	Yes	Yes	Yes
NIOZ box corer	Yes	No	No	Yes	Yes	Yes
vessel's non toxic sea water intake and on board centrifuge	Yes	No	No	Yes	Yes	Yes
continuous measurements	Yes	No	No	Yes	Yes	Yes

Belgica campaign 08/12a-b chart

The provisional transects are indicated by the blue lines. The exact positions of the stations along each transect will be determined later depending on the remote sensing data received before and during the cruise.



Belgica campaign 08/12a-b : Annex 1**Publications (in alphabetical order) :**

- Borges A.V. (2005) Do we have enough pieces of the jigsaw to integrate CO₂ fluxes in the Coastal Ocean ? *Estuaries*, 28(1):3-27
- Borges A.V., B. Delille & M. Frankignoulle (2005) Budgeting sinks and sources of CO₂ in the coastal ocean: Diversity of ecosystems counts, *Geophysical Research Letters*, 32, L14601, doi:10.1029/2005GL023053
- Borges A.V. & M. Frankignoulle (2003) Distribution of surface carbon dioxide and air-sea exchange in the English Channel and adjacent areas. *Journal of Geophysical Research*, 108(C5): doi: 10.1029/2000JC000571
- Chou L., J. Harlay, C. De Bodt, N. Røevros, A.V. Borges, K. Suykens, B. Delille, P. Joassin, M. Gregoire, K. Sabbe, N. Van Oostende, A. Engel, J. Piontek, S. Koch, N. Händel, PEACE first annual science report, 29p.
- Chou L., J. Harlay, C. De Bodt, N. Røevros, A.V. Borges, K. Suykens, B. Delille, P. Joassin, M. Gregoire, K. Sabbe, N. Van Oostende, A. Engel, J. Piontek, S. Koch, N. Händel, PEACE mid-term science report, 37p.
- d'Hoop, Q. (2006) Implication dans les changements climatiques de la production de particules exopolymériques transparentes (TEP) chez le coccolithophore *Emiliania huxleyi*, Mémoire de licence en sciences géographiques, Université Libre de Bruxelles, 159p.
- Delille B., J. Harlay, I. Zondervan, S. Jacquet, L. Chou, R. Wollast, R.G.J. Bellerby, M. Frankignoulle, A.V. Borges, U. Riebesell & J.-P. Gattuso (2005) Response of primary production and calcification to changes of pCO₂ during experimental blooms of the coccolithophorid *Emiliania huxleyi*, *Global Biogeochemical Cycles*, 19, GB2023, doi:10.1029/2004GB002318
- Engel A., B. Delille, S. Jacquet, U. Riebesell, E. Rochelle-Newall, A. Terbrüggen & I. Zondervan (2004) TEP and DOC production by *Emiliania huxleyi* exposed to different CO₂ concentrations: A mesocosm experiment, *Aquatic Microbial Ecology*, 34(1):93-104
- Engel A., I. Zondervan, K. Aerts, L. Beaufort, A. Benthien, L. Chou, B. Delille, J.-P. Gattuso, J. Harlay, C. Heemann, L. Hoffmann, S. Jacquet, J. Nejtgaard, M.-D. Plzay, E. Rochelle-Newall, U. Schneider, A. Terbrüggen A. & U. Riebesell (2005) Testing the direct effect of CO₂ concentration on a bloom of the coccolithophorid *Emiliania huxleyi* in mesocosm experiments, *Limnology and Oceanography*, 50(2): 493-507
- Frankignoulle M. & A.V. Borges (2001) European continental shelf as a significant sink for atmospheric carbon dioxide. *Global Biogeochemical Cycles*, 15(3): 569-576
- Gehlen, M., F. C. Bassinot, L. Chou, and D. McCorkle. (2005a). Reassessing the dissolution of marine carbonates: I. Solubility. *Deep Sea Research Part I: Oceanographic Research Papers* 52(8):1445-1460.
- Gehlen, M., F. C. Bassinot, L. Chou, and D. McCorkle. (2005b). Reassessing the dissolution of marine carbonates: II. Reaction kinetics. *Deep Sea Research Part I* 52(8):1461-1476.
- Joassin, P. (2006) A 0D coupled biochemical model developed for the study of an experimental bloom of *Emiliania Huxleyi* coccolithophorid phytoplankton, DEA thesis, University of Liège, 100p.
- Rochelle-Newall E., B. Delille, M. Frankignoulle, J.-P. Gattuso, S. Jacquet, U. Riebesell, A. Terbrüggen & I. Zondervan (2004) Chromophoric dissolved organic matter in experimental mesocosms maintained under different pCO₂ levels. *Marine Ecology Progress Series*, 272:25-31
- Sciandra A., J. Harlay, D. Lefèvre, R. Lemée, P. Rimmelin, M. Denis and J.-P. Gattuso (2003) Response of the coccolithophorid *Emiliania huxleyi* to elevated pCO₂ under nitrate limitation. *Marine Ecology Progress Series*, 261, 111-122.
- Steen, F. (2007). Microplankton diversiteit in een coccolithoforenbloei. Bachelorproef Universiteit Gent, 53p.
- Wollast, R. and L. Chou (1998) Distribution and fluxes of calcium carbonate along the continental margin in the Gulf of Biscay. *Aquatic Geochemistry* 4:369-393.
- Wollast, R. and L. Chou (2001) The carbon cycle at the ocean margin in the northern Gulf of Biscay. *Deep-Sea Research Part II* 48(14-15):3265-3293.

Abstracts submitted for presentations during international conferences since 2006 (in alphabetical order) :

- Borges A.V., L. S. Schiettecatte, G. Abril, B. Delille & F. Gazeau, Carbon dioxide in European coastal waters, Open Science Conference on the GHG Cycle in the Northern Hemisphere organised by CarboEurope-IP, CarboOcean and NitroEurope-IP, 14-18 November 2006, Sissi-Lassithi, Crete, Greece, poster presentation

- Borges A.V., L. S. Schiettecatte, G. Abril, B. Delille & F. Gazeau, Carbon dioxide in European coastal waters, SOLAS Open Science Conference, 6-9 March 2007, Xiamen, China, poster presentation
- Borges A.V., L.-S. Schiettecatte, G. Abril, B. Delille & F. Gazeau, Carbon dioxide in European coastal waters, EGU General Assembly, 02-07 April 2006, Vienna, Austria (Geophysical Research Abstracts, Vol. 8, 05270, 2006), poster presentation.
- De Bodt C., Q. d'Hoop, J. Harlay & L. Chou. Calcification and transparent exopolymer particles (TEP) production in batch cultures of *Emiliania huxleyi* exposed to different pCO₂, CARBOOCEAN 2nd annual meeting, 4-8 December 2006, Gran Canaria. Oral presentation
- De Bodt C., Q. d'Hoop, J. Harlay & L. Chou. Calcification and transparent exopolymer particles (TEP) production in batch cultures of *Emiliania huxleyi* exposed to different pCO₂, EGU General Assembly, 15-20 April 2007, Vienna, Austria. Poster presentation.
- De Bodt C., Q. d'Hoop, J. Harlay & L. Chou. Calcification and transparent exopolymer particles (TEP) production in batch cultures of *Emiliania huxleyi* exposed to different pCO₂, SOLAS Open Science Conference, 6-9 March 2007, Xiamen, China. Poster presentation
- Engel A., R. Bellerby, B. Delille, K. Schulz, U. Riebesell, M. Shartau, 2007. Effect of CO₂ concentration on suspended particle dynamics during a mesocosm bloom experiment (Peecell), European Geosciences Union General Assembly 15-20 April 2007, Vienna, Austria, oral presentation
- Harlay J., C. De Bodt, Q. D'Hoop, A.V. Borges, B. Delille, K. Suykens, N. Van Oostende, K. Sabbe, N. Roevros, S. Schmidt, S. Groom & L. Chou, Biogeochemistry of a late coccolithophorid bloom at the continental margin of the Bay of Biscay, International Union of Geodesy and Geophysics XXIV General Assembly, 2-13 July 2007, Perugia, Italy
- Harlay J., C. De Bodt, Q. D'Hoop, A.V. Borges, K. Suykens, N. Van Oostende, K. Sabbe, N. Roevros, S. Groom, & L. Chou, Biogeochemistry of a late marginal coccolithophorid bloom in the Bay of Biscay, 15-20 April 2007, EGU General Assembly, Vienna, Austria, oral presentation
- Harlay J., C. Koch, J.R. Young, N. Roevros, A.V. Borges, L.-S. Schiettecatte, C. van der Zee, S. Groom, L. Rebreanu, R. Godoi & L. Chou, Coccolithophorid calcium carbonate dissolution in surface waters, SOLAS Open Science Conference, 6-9 March 2007, Xiamen, China, poster presentation
- Koch S., N. Händel & A. Engel, Testing the effects of pCO₂ on the coccolithophore *Emiliania huxleyi* during different growth stages, EGU General Assembly, Vienna, April 2007
- Lunau M., S. Koch, J. Plontek, N. Händel & A. Engel, Investigating the effects of changes in CO₂ concentration on marine plankton dynamics with chemostat systems, 42nd EMBS, Kiel, August 2007
- Piontek J., N. Händel & A. Engel, Effects of rising temperature and pCO₂ on bacterial degradation processes in the future ocean, EGU General Assembly, Vienna, April 2007
- Piontek J., N. Händel, M. Lunau & A. Engel, Investigating the effects of changing CO₂ concentration on a natural marine plankton community using a chemostat system, IUGG XXIV General Assembly, Perugia, July 2007
- Suykens K., B. Delille & A. V. Borges, Biogeochemical carbon cycle in a coccolithophorid bloom, VLIZ Young Scientist Day, 2 March 2007, Brugge, Belgium, poster presentation
- Suykens K., B. Delille & A. V. Borges, Dissolved inorganic carbon dynamics in the Gulf of Biscay (June 2006), 15-20 April 2007, EGU General Assembly, Vienna, Austria, poster presentation
- Suykens K., B. Delille & A. V. Borges, Dissolved inorganic carbon dynamics in the Gulf of Biscay (June 2006), International Union of Geodesy and Geophysics XXIV General Assembly, 2-13 July 2007, Perugia, Italy
- Thomas H., F. Prowe, S. van Heuven, Y. Bozec, H.J.W. de Baar, L.-S. Schiettecatte, K. Suykens, M. Koné, A.V. Borges, I.D. Lima & S.C. Doney, Rising CO₂ conditions and ocean acidification - a severe threat to high latitude coastal ecosystems, Joint IMBER/LOICZ Continental Margins Open Science Conference, September 17-21, 2007, Shanghai, China
- Thomas, H., F. Prowe, S. van Heuven, Y. Bozec, H.J.W. de Baar, L.-S. Schiettecatte, K. Suykens, M. Koné, A.V. Borges, I.D. Lima, S.C. Doney, Rising CO₂ conditions and ocean acidification - a severe threat to high latitude coastal ecosystems, First IGBP-SCOR FTI Workshop on "Ocean Acidification - modern observations and past experiences", 28 - 30 September 2006, Lamont-Doherty Earth Observatory of Columbia University, U.S.A., oral presentation
- Van Oostende N. & K. Sabbe, 2007. Bacterial community structure during a coccolithophorid bloom in the Northern Bay of Biscay. VLIZ 7th young scientists' day, March 2nd Brugge, Belgium.