

Evaluation 2005-2010

NIOZ Royal Netherlands Institute for Sea Research

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1 Introduction

1.1 Scope and context of this review

This assessment concerns the research carried out at the Royal Netherlands Institute for Sea Research (NIOZ) during 2005 – 2010. The evaluation was commissioned and organised by the Netherlands Organisation for Scientific Research (NWO).

The external evaluation follows the Standard Evaluation Protocol 2009-2015 (SEP). This is the protocol for research assessment in the Netherlands as agreed by NWO, the Royal Netherlands Academy of Arts and Sciences (KNAW) and the Association of Universities in the Netherlands (VSNU).

The aims of the assessment procedure with regard to research and research management are:

- Improvement of research quality, including the scientific and societal relevance of research, research policy and research management, based on an external peer review;
- Accountability to the board of the research organisation, and to funding agencies, government and society at large.

To the evaluation criteria in the SEP, NWO added some supplementary questions addressed to the Evaluation Committee and to the institute itself; some questions were to be raised in all evaluations of the NWO institutes in 2011, and two were specifically designed for NIOZ.

An Evaluation Committee was appointed and asked to produce a reasoned judgement of the institute and its research programmes in accordance with the SEP. The Committee evaluated NIOZ on Texel and also visited the Centre for Estuarine and Marine Ecology (CEME) in Yerseke. It did not formally evaluate the latter since CEME was still part of the Netherlands Institute of Ecology (a KNAW-institute) at the time of the evaluation.

Prior to the external evaluation, NIOZ submitted a self-evaluation document covering the period 2005-2010. This report was approved by the Governing Board of NWO in July 2011. The self-evaluation report was drafted in accordance with the SEP guidelines and provided information both at the institute level and at the level of the NIOZ research departments. In view of the intended merger between NIOZ and the Centre for Estuarine and Marine Ecology (CEME), it was decided to include data on CEME in the self-evaluation document to inform the Evaluation Committee and enable it to comment on the future of 'NIOZ+' (the merged institute).

The self-evaluation report therefore offered a concise picture of both NIOZ and CEME, including the research departments' work, ambitions, output and resources. In addition, a separate chapter of the self-evaluation report reflected on the future prospects and strategy of the merged institute.

Site visits form an important part of evaluations. In this case, they included interviews with the management of the institute, the programme coordinators, other levels of staff, and site visits to laboratories and facilities.

1.2 Evaluation Committee

The Evaluation Committee was installed on 30 August 2011 by the Governing Board of NWO. The members are:

Prof. dr. Dick Kroon, chair	University of Edinburgh (UK)
Prof. dr. Hans Burchard	Leibniz Institute for Baltic Sea Research Warnemünde (D)
Prof. dr. Christiane Lancelot	Université Libre de Bruxelles (B)
Prof. dr. Gerald Haug	ETH Zürich (CH)
Prof. dr. Karin Lochte	Alfred Wegener Institute for Polar and Marine Research (D)
Prof. dr. Simon Jennings	Centre for Environment, Fisheries and Aquaculture Science (UK)

A short curriculum vitae of each of the members is provided in Annex 1. The Committee was supported by NWO staff (Raymond Schorno and Isabel van der Heiden).

Before the site visit, all members of the Committee signed the NWO Code of Conduct, declaring that their assessment would be free of bias and without regard to personal interest, and that they had no personal, professional or managerial involvement with the institute or its research programmes. It was concluded that the Committee had no conflicts of interest.

1.3 Data supplied to the Committee

The Evaluation Committee received not only the self-evaluation report from NIOZ, but also a bibliometric study and a USB Flash drive containing key publications by NIOZ, a document on the intended merger between NIOZ and CEME, and a document on the NIOZ Science Plan for the 2008-2012 period. The Committee was also provided with an explanatory letter, accompanied by the site visit programme (included as Annex 2), and the SEP.

The self-evaluation report dealt with NIOZ's objectives, composition, links with academia and other networks, quality and scientific relevance, scientific output, earning capacity, academic reputation, societal relevance, viability and future strategy. At the institute level, a separate chapter was included concerning future prospects and the strategy for the intended merger with CEME to create 'NIOZ+'. This included answers to the additional questions raised by NWO. The report also provided SWOT analyses both of the institute and of all its research departments. At the level of the five NIOZ scientific departments, the presentation of the information was based on the institute's departmental structure, which is organised around the disciplines of biological oceanography (BIO department), marine ecology (MEE department), marine geology (GEO department), marine organic biochemistry (BGC department) and physical oceanography (FYS department).

To enable the Committee to assess the future of the merged institute (NIOZ+), data on CEME was also provided. The past performance of CEME was not formally evaluated. At the level of CEME's three scientific departments and one taskforce, the presentation of the information was based on the institute's research structure, which is organised around the topics of ecosystem studies (ES department), marine microbiology (MM department), spatial ecology (SE department), and benthic communities (Monitor Taskforce).

The Appendix to the self-evaluation report contained information concerning the NIOZ Board and Science Advisory Board, as well as a response to the recommendations of the evaluation of 2005. It also contained tables – statistics presented at the level both of the institute and of the research departments – on NIOZ and CEME staff (tenured, non-tenured, PhD students, support staff and visiting fellows), on research output from NIOZ and CEME researchers (refereed and non-refereed articles, books, book chapters, conference papers, professional publications, publications aimed at the general public, and other research output), on the progress of PhD students (gender, year of

enrolment and success rates per year), on the output of the NIOZ Marine Research Facilities (MRF) department and marine technology development.

In addition to the documentation supplied to the Committee prior to the site visits, as required by the SEP, the Committee received further documentation during the site visits, such as a list of all PhDs and postdocs at both Texel and Yerseke.

1.4 Procedures followed by the Committee

The Committee's reflections on the current CEME and assessment of the current NIOZ were based not only on the self-evaluation documents and other information provided by the institutes, but also on the interviews with directors, board members, staff members, postdocs and PhD candidates. The interviews took place during the site visits made on 31 August and 1 and 2 September 2011. The programme of the site visits is included in Annex 2. Because of the large number of PhD students and postdocs at NIOZ, the Committee conducted these interviews in three parallel sessions. Likewise, on 2 September the Committee split into two separate groups to attend parallel group presentations and conduct parallel interviews with the heads of the MRF group and FYS department (both at NIOZ).

The Committee met on the afternoon preceding the site visits (30 August) to discuss and plan the interviews with the NIOZ Management Team, the NIOZ Governing Board, the research department heads of NIOZ and CEME, researchers, PhDs, postdocs, and support staff. First, the Committee discussed the Standard Evaluation Protocol 2009-2015 in order to remind all members of the purpose and remit of the present evaluation. Secondly, the Committee discussed first impressions of the self-evaluation reports, with the aim of formulating questions which would be useful during the site visits. Thirdly, the Committee discussed the final programme of the site visits and agreed on procedural matters and aspects of the assessment. Specifically concerning the programme, the Committee agreed the selection of PhDs and postdocs for interview, ensuring that both genders were represented.

At a formal dinner in Bergen op Zoom, the Committee was installed by Professor B. de Kruijff, a member of the NWO Governing Board.

After completing the interviews at current CEME on 31 August, the Committee reflected on its findings. These are presented in this report as reflections on, rather than as a full quantitative assessment of, the current CEME institute as a whole and its individual departments. Thus, the Committee did not provide scores for CEME as the institute was not within the formal scope of this evaluation.

After completing the interviews at current NIOZ on 2 September, the Committee discussed the scores and comments with regard to the institute and its research departments. The Committee determined the overall NIOZ scores for the four main SEP criteria, the NIOZ research departments' scores, and also the main preliminary findings and recommendations to be reported.

The reflections on current CEME and assessment of current NIOZ helped the Committee to identify issues that may be important in relation to the future strategy and directions of NIOZ+.

At the end of the site visit on 2 September, a meeting was held with the directors and management of NIOZ and CEME to report the Committee's main preliminary findings. Finally, there was a plenary meeting at which the Evaluation Committee reported the main preliminary findings to NIOZ and CEME personnel.

In October 2011 a draft version of this report was sent to the NIOZ and NIOO directors for factual correction and comments. The report was subsequently submitted to the Governing Board of NWO.

1.5 Aspects and assessment scale

The Standard Evaluation Protocol 2009-2015 requires the Evaluation Committee to assess four main aspects of the institute and its research. These are:

Quality (sub-criteria: quality and scientific relevance of the research, leadership, academic reputation, organisation, resources, and PhD training);

Productivity (productivity strategy and the actual productivity);

Societal relevance (such as societal quality, societal impact, valorisation);

Vitality and feasibility (strategy such as strategic planning, SWOT analysis, robustness and stability).

These four main assessment criteria are rated according to a five point scale, specified in the SEP. The verdict can be given in qualitative form, though a quantitative figure may be added. The scale is as follows:

5. Excellent

Research is world leading. Researchers are working at the forefront of their field internationally and their research has an important and substantial impact in the field.

4. Very good

Research is internationally competitive and makes a significant contribution to the field. Research is considered nationally leading.

3. Good

Work is competitive at the national level and makes a valuable contribution in the international field. Research is considered internationally visible.

2. Satisfactory

Work adds to our understanding and is solid, but not exciting. Research is nationally visible.

1. Unsatisfactory

Work is neither solid nor exciting, flawed in the scientific and/or technical approach, includes repetition of other work, etc.

2 Institutional framework

2.1 Institutional framework of Centre for Estuarine and Marine Ecology (CEME)

CEME is part of the Netherlands Institute of Ecology (NIOO-KNAW), which belongs to the Royal Netherlands Academy of Arts and Sciences (KNAW). The Centre started life as the Delta Institute for Hydrobiological Research in 1957. It is situated in the village of Yerseke on the borders of the Eastern Scheldt estuary.

2.1.1 CEME: Mission

The Netherlands Institute of Ecology (NIOO-KNAW) conducts marine, terrestrial and freshwater ecological research, with the aim of elucidating how living organisms interact with each other and with their surroundings. Within NIOO-KNAW, CEME focuses on estuarine and marine ecology.

2.1.2 CEME: Research

The research tradition at the Centre has a focus on ecosystem dynamics and system organisation, as well as on the behaviour and performance of individual microorganisms. Mathematical modelling, long-term observation series, field experimentation, use of advanced biogeochemical analyses and the application of molecular ecological methodologies are major components of the approach. Specialized fields are physical-biological interactions and ecological engineering in the self-organisation of estuarine landscapes, functional diversity of marine microorganisms, the use of biomarkers and stable isotopes in food web research, and ecological and biogeochemical modelling. A special effort is being made to obtain long-term time series via monitoring programmes that are largely externally funded. CEME is organised around three departments and one taskforce.

Ecosystem Studies (ES): The department works at the interface of ecology and biogeochemistry in marine and estuarine environments. It studies how ecology influences biogeochemical cycles (the ecological perspective on marine biogeochemistry) and how organisms and ecological interactions are affected by the biogeochemistry of their environment (the biogeochemical perspective on marine ecosystem functioning). The overall goal is to arrive at a mechanistic understanding of the functioning of marine ecosystems. Such mechanistic insights into ecosystem and food web functioning are particularly relevant at a time when various aspects of global change (climate change, ocean acidification and coastal hypoxia) are interacting and having an increasing impact on marine ecosystems.

Marine Microbiology (MM): The department investigates the diversity of marine microorganisms and its role in the functioning of marine pelagic and benthic ecosystems, and focuses primarily on the carbon and nitrogen cycles (the two quantitatively most important elements for life). A significant amount of its research deals with photosynthesis and photosynthetic CO₂ fixation in Cyanobacteria and micro-algae, but more recently also with chemosynthetic CO₂ fixation in marine sediments.

Spatial Ecology (SE): The research of the department focuses on the spatial organisation of estuarine ecosystems and landscapes as a consequence of interactions between biological, physical, geological, and anthropogenic forces. It investigates the conditions under which these interactions may generate self-organised spatial structures, and how such spatial structures determine, at different scales, the spatial complexity, functioning and stability of estuarine ecosystems. 'Ecosystem engineering', defined as the modification of the abiotic environment by organisms, is a central concept in the effort to gain a mechanistic understanding of the driving interactions. The research is conceptual and abstract in nature, but has important implications for nature conservation and for the study of human impacts on the structure and functioning of natural

ecosystems. For this reason, the context of the research varies from fundamental to applied. Projects of the latter type focus on, e.g., better conservation of saltmarshes, restoration of mussel beds, or influence of dredging works.

Monitor Taskforce (MT): The taskforce is CEME's basic unit for applied research commissioned by third parties. It specializes in the monitoring and sustained observation of benthic communities as indicators of environmental health. In 2005, MT became a separate unit under the direct responsibility of the Centre Director. Thus, MT specializes in strategic (applied) research. This makes it different from the other departments at CEME, in the following ways:

1. it has no obligation to conduct fundamental research, but is dedicated to strategic, applied research;
2. there is no basic funding from KNAW: all income is from contracts;
3. it has no obligation to publish in peer-reviewed journals.

The added value of MT lies in its specific tasks and expertise, which allow it to fulfil a valuable function as an interface between fundamental and applied marine sciences. The long-term data series obtained by MT are available to, and extensively used by, scientists not only within CEME (the ES and SE departments), but also increasingly employed by parties outside the institute (e.g., MarBEF).

2.1.3 CEME: Organisational structure

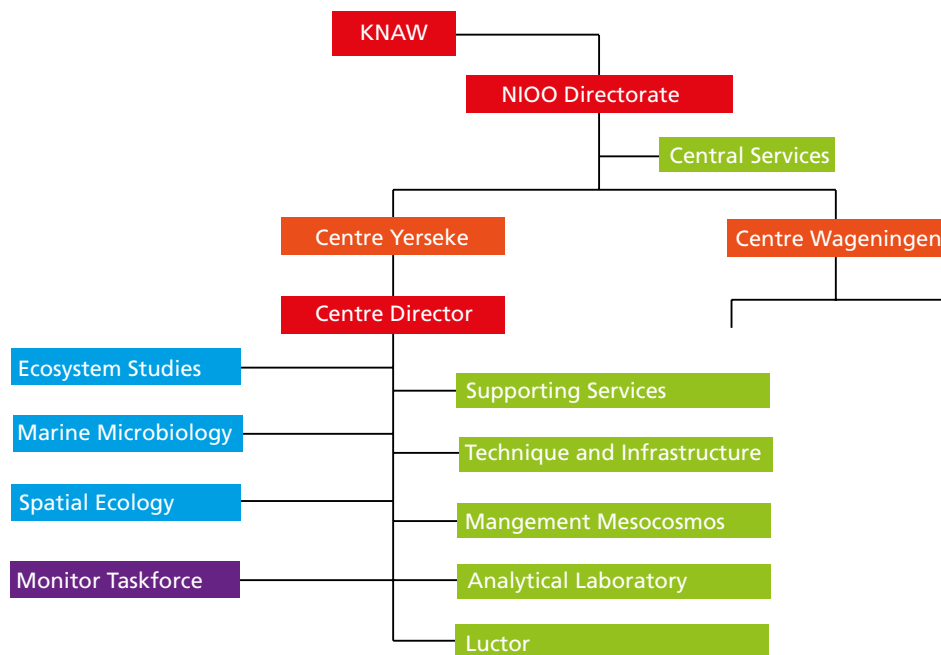


Figure 1 | KNAW-NIOO-CEME Organisation chart

CEME has on average between 40 and 45 scientists, with a somewhat smaller number in 2007 and 2008. Apart from the absence of physicists and geologists at CEME, the composition of CEME scientific staff is in general similar to that of NIOZ scientific staff, albeit with a somewhat higher percentage of PhD students. There are 13 FTE technical research assistants, five of whom work in the central analytical lab facility. The Monitor Taskforce employs 8 FTE technical assistants, in addition to the three scientists. 11 FTE are employed in support services (management assistant, secretary, housekeeper, receptionist, technical department, manager of mesocosmos and boat crew). The Management Team of CEME is composed of the four heads of departments, and the head of the central analytical lab. Formally, CEME still has a Centre Director, but the position has been vacant since Professor Carlo Heip moved to NIOZ in December 2009. Since that time the

Management Team is chaired by the NIOO directorate, and CEME is operationally managed by the NIOO managing director with assistance of an interim location manager.

2.2 Institutional framework of NIOZ

The Royal Netherlands Institute for Sea Research (NIOZ) is the national oceanographic institute of the Netherlands. NIOZ was established in 1876 and became part of the Netherlands Organisation for Scientific Research (NWO) in 1990. The institute is currently located on Texel.

2.2.1 NIOZ: Mission

NIOZ's mission is to gain and communicate scientific knowledge on seas and oceans for the understanding and sustainability of the planet, and to facilitate and support marine research and education in the Netherlands and Europe. This includes managing the national marine facilities of the Netherlands.

The primary objective of NIOZ is to produce world-class science in fields relevant to the understanding of marine systems in the past, present and future. To achieve this, NIOZ covers the main disciplines in the marine sciences (biology, geology, chemistry and physics) required to understand natural processes and human impacts in the Wadden and North Sea, and in the open ocean (which is a common heritage of mankind and therefore a common responsibility). Importantly, NIOZ also provides logistic support for the entire marine scientific community of the Netherlands (and via OFEG also to Europe) by making its Research Vessel Pelagia and a number of specialized technical laboratory facilities and personnel available for their use.

The ambition of NIOZ is to be a key player in marine research in Europe and worldwide. Internally, the institute aims to achieve scientific coherence within and between departments by building and implementing a common Science Plan and a flexible, dynamic organisation. The Science Plan for the 2008-2012 period is based on five multidisciplinary themes. These themes are: Open Ocean Processes, Sea Floor Dynamics, Wadden and Shelf Sea Systems, Climate Variability and the Sea, and Biodiversity and Ecosystem Functioning. As NIOZ is only a medium-sized institute, it cannot achieve its goals without a large number of scientific and strategic alliances and scientific cooperations at national and international level.

2.2.2 NIOZ: Research

Research at NIOZ is carried out within scientific departments based on the classic disciplines of physics, chemistry, geology and biology. However, cross-disciplinary input is required to address many of the important questions in marine research today. At NIOZ this has resulted in a growing collaboration between different disciplines. Each of the five scientific departments is led by a department head and consists of scientists, postdocs and PhDs.

Biological Oceanography Department (BIO): The BIO department is actively pursuing the study of the chemical and physical controls and fate (grazing, mortality) of primary producers in contrasting marine environments (Antarctic, temperate and tropical regions). The overarching goal is to arrive at a mechanistic understanding of the lower trophic levels of the food web and their interaction with cycles of carbon, major nutrients and trace elements. To achieve this goal, the BIO department investigates the biological regulating physiochemical forcing factors and underlying processes of microbial dynamics and interactions.

Marine Ecology Department (MEE): The MEE department focuses on the functioning of intertidal, coastal zone, shelf and open ocean ecosystems with the aim of gaining a mechanistic understanding of the structure and dynamic behaviour of marine populations and communities ranging from plankton, benthos, fish and birds to marine mammals. The department aims

to understand the properties of populations and communities on the basis of characteristics of individual organisms, focusing on the role of bottom-up as well as top-down processes in structuring communities. Within the department, there are three research clusters: intertidal systems, benthic continental shelf and open ocean systems, and global shorebird migrations and comparative mudflat ecology.

Marine Geology Department (GEO): Research in the GEO department focuses on seabed systems involving interaction between the geo-, bio- and hydrosphere. The department has three main objectives: to study present-day sedimentological processes and environmental conditions in order to better understand the geological record and calibrate proxies e.g., sea surface temperature, rainfall, and dust emissions; to learn about paleoclimatic and environmental conditions by investigating sediment and coral records; and to use paleo and present-day studies to make predictions about future climate / environmental changes.

Marine Organic Biogeochemistry Department (BGC): The BGC department focuses its main research on organic matter in the ocean and its sediments at the molecular level. The department studies both natural and anthropogenic organic components using advanced analytical techniques. Natural organic components are used as biomarkers for specific organisms (phytoplankton, bacteria and archaea) and applied to unravel present-day microbial marine processes and to read the sedimentary archives of the sea to reconstruct past climatic and environmental conditions.

Physical Oceanography Department (FYS): The FYS department carries out research on: ocean circulation and hydrography; internal-wave dynamics and mixing; and long-term variability and transports in the coastal zone. The department contributes to the multidisciplinary research themes of Open Ocean Processes, Wadden and Shelf Sea Systems, and Climate Variability and the Sea. The emphasis is on observational seagoing research, supplemented by numerical modelling and mathematical tools.

2.2.3 NIOZ: Organisational structure

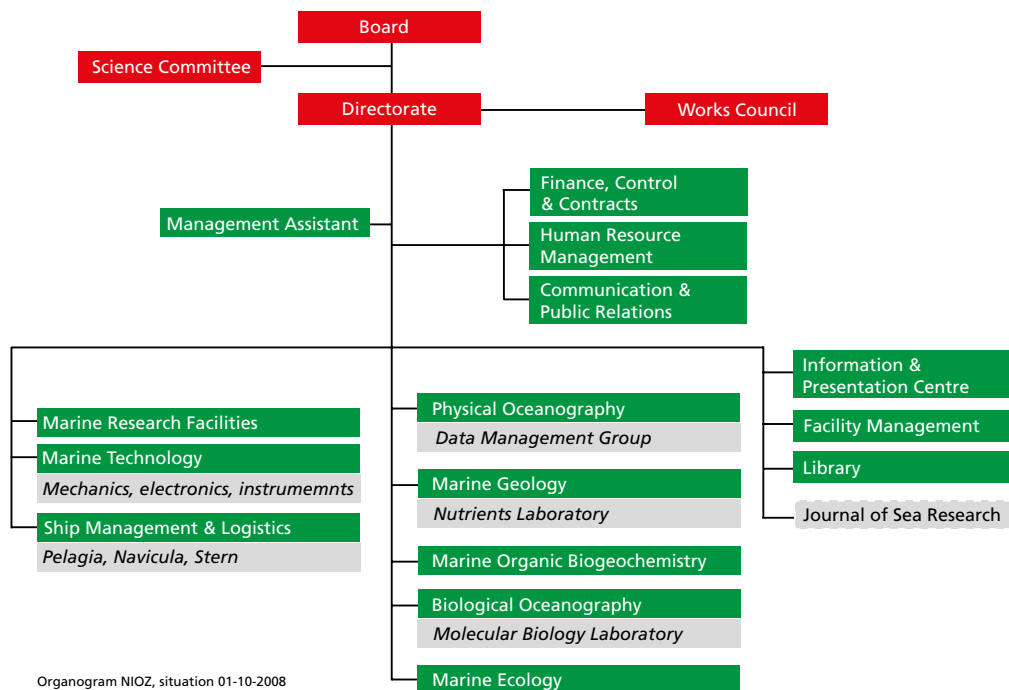


Figure 2 | NIOZ Organisation chart

NIOZ has five discipline-based scientific departments. Each department is composed of tenured and non-tenured scientists and supporting analytical and technical staff. Scientific support groups also exist at institute level. Besides these scientific support groups, NIOZ accommodates the Marine Research Facilities (MRF), Marine Technology, and the Ship Management and Logistics departments.

In the past five years, the institute has reflected on its organisation and its development as a function of its mission. A number of major decisions have been taken and implemented over that period, partly inspired by the recommendations resulting from the external evaluation in 2005.

- It has been decided to maintain the organisation along disciplinary lines, while at the same time stimulating cooperation between the departments. This was made possible by a matrix structure in which departments developed research within a Science Plan based on five multidisciplinary themes.
- The activities in the field of trace metals and carbon dioxide have been transferred from the department of Marine Chemistry and Geology to the department of Biological Oceanography. The former department of Marine Chemistry and Geology was renamed to Marine Geology (GEO).
- Four out of the five heads of department have been appointed over the past five years, with appointments on a temporary basis for five years, renewable.
- A system of Tenure-Track Appointments and Tenured Appointments on External Funding has been introduced, permitting the necessary rejuvenation of the scientific staff as well as a more flexible personnel policy in areas in which external funding is likely.
- Where necessary, support staff have been regrouped into units that are no longer linked to individual scientists or even departments, but run as a cooperative of involved scientists and analysts, available to all scientists at the institute.

Over the past five years, major efforts have also been made to improve the governance of the institute in response to the recommendations of the external evaluation committee in 2005. The Board of NIOZ has been completely renewed, with a new chair and five new members. The relationship between Board and Directorate has been the subject of recurring discussion and is now specified in an Internal Regulation. Over the past five years, the efficiency and quality of these governance mechanisms have been constantly discussed and improved. The Board has stimulated the development of risk assessment, efficient auditing and valorisation, and has promoted links with industry.

The director of NIOZ obtains advice from an external Science Advisory Board (SAB), which plays an important role in discussing progress in the departments and the institute as a whole. Since 2007, the SAB has visited the institute each year and has commented favourably on the development of NIOZ following the changes made in 2006.

2.2.4 NIOZ: Financial matters

The financial resources of the institute consist of basic funding, research grants and contract research payments. Basic funding is obtained from NWO. Research grants are obtained via the Open Competition programme run by NWO's ALW (Earth and Life Sciences) division, projects from WOTRO (Tropical Research) and ZKO (Marine and Coastal Research), personal grants (Veni, Vidi, Vici) from NWO and ERC, funds from the Darwin Institute of Biogeosciences, the ESF, and the Wadden Fund, and a series of stimulation grants from NWO. Contract research comprises projects from the EU, the BSIK programme, and contracts with industry clients, or ministries.

Table 1 | NIOZ funding 2005-2010 in k€

	2005	2006	2007	2008	2009	2010
Funding						
Direct funding from NWO	11.805	11.350	11.666	14.037	14.332	20.675
Research grants	4.381	5.566	5.606	4.509	5.615	6.480
Contract research	2.472	1.825	1.863	2.196	3.586	2.936
Other	1.723	497	1.269	929	507	1.012
Total funding	20.381	19.238	20.404	21.671	24.040	31.103

2.2.5 NIOZ: Staff

Table 2 | NIOZ staff 2005-2010 (in FTE-years)

	2005	2006	2007	2008	2009	2010
Directorate	6.7	6.0	5.7	5.3	4.9	5.7
Tenured scientists	30.7	28.6	27.4	27.8	27.0	26.2
Tenure-track scientists	0	0	0.5	0.8	1.3	3.7
TTS on external funding	1.0	1.0	1.0	2.3	3.0	4.3
Postdocs	17.5	23.9	28.5	24.5	21.5	23.0
PhD students	26.3	29.2	29.1	31.2	31.0	33.9
Total research staff	75.5	82.7	86.5	86.6	83.8	91.1
General Support staff	26.8	27.8	27.9	27.6	27.1	26.5
Technical Support staff	43.9	44.0	41.4	39.5	40.2	43.1
Support staff in departments	43.7	42.0	41.5	42.7	49.0	51.1
Visiting fellows	7.4	12.3	10.1	12.5	12.0	13.1
Total	204.0	214.8	213.1	214.2	217.0	230.6

3 Reflections on the current Centre for Estuarine and Marine Ecology (CEME) after the site visit

In view of the intended merger between NIOZ and CEME, NWO proposed and KNAW agreed that CEME should be included in the peer review of the current NIOZ. The Evaluation Committee was therefore asked to make observations both on CEME as a whole and on the individual departments of CEME, but not to evaluate the institute. These observations could then be used by the Committee to comment on the future of the merged institute, NIOZ+. The current CEME institute was asked to write a self-evaluation report to assist the committee, but without including details of finances, personnel, and investments at institute level. Consequently there was more emphasis on the individual departments in the current CEME report than in that of the current NIOZ.

3.1 Reflections on the current institute

The Committee visited the CEME institute to observe some of the facilities and talk to support staff. It found a centre with advanced equipment and enthusiastic support staff. The analytical laboratory is of outstanding quality; it has advanced instruments and is developing new techniques. The microalgal culture collection is impressive and of use to scientists around the world. The flume tank is one of the few available in Europe. Unfortunately, the Committee did not see the Research Vessel Luctor, but it is obviously a valuable tool for research in the waters off the SW corner of the Netherlands and in the North Sea. The Committee discussed the outcomes of the visit and unanimously agreed that these facilities are of national and international importance. It felt that the facilities are essential for CEME scientists to conduct their research and further concluded that they put CEME scientists in a strong position to participate in nationally and EU-funded projects, or to take the lead role in such projects. Indeed, the Committee was impressed with this central aspect of usage of facilities in their research, and particularly at the international level, implying many visitors from abroad visit the CEME.

The Committee interviewed heads and members of the four disciplinary departments. It became clear that there is a positive working atmosphere at the current CEME institute and that important science is being done, supported by the technicians and impressive facilities. At the same time, colleagues from the individual departments regularly work across disciplinary boundaries in integrated projects. Such contributions from different departments enhance the institute's ability to act flexibly in setting up and working on large-scale scientific themes.

The only issue that came up several times during the interviews, with insights from the various departments, was a lack of leadership due to the absence of a Centre director since the departure of Professor Carlo Heip in 2009. CEME needs a figurehead, or spokesman, to maintain links with NWO and other organisational bodies. However, this lack of leadership does not seem to have been detrimental to the scientific work of the departments, since they have been producing excellent results over the last few years.

The embedded PhD students and post-docs were very content with the support given to them within the departments. In addition, they were highly complementary about the support staff. PhDs tend to finish on time. But the Committee discovered that in many cases students themselves are not permitted to run the samples through the instruments; this is not an ideal situation for learning and for the interpretation of the results. Overall, the students gave excellent presentations and it is clear that CEME can be proud of its student cohort. It is interesting to note that most of the CEME students had visited the NIOZ institute or even collaborated with NIOZ scientists as part of their research.

The output of the current CEME institute as a whole is impressive; the bibliometric analysis shows that its performance is well above world average. Considering the number of active scientists, this is an excellent achievement. To maintain this level of output, the current number of scientists should be at least maintained, if not increased.

The societal relevance of the research is concentrated around the ecosystem functioning of coastal waters in relation to anthropogenic inputs, large-scale changes because of climate change, and infrastructure (e.g., extension of Mainport Rotterdam).

The Committee noted that CEME personnel are unanimously very much in favour of becoming part of NIOZ and see many new opportunities, benefits in terms of sharing facilities and technical support, and potential prospects for new collaborations. Some groups have already anticipated the merger by engaging in ongoing joint research activities. CEME staff saw the fusion with NIOZ as a positive step. They mentioned opportunities for further collaboration with NIOZ, in particular with the Physical Oceanography and Marine Geology Departments (disciplines that are not represented at CEME).

3.2 Reflections on the current research departments

Ecosystem Studies Department: The department of Ecosystem Studies aims to achieve understanding of the functioning of marine ecosystems in relation to biogeochemical cycles, in particular the role of the food web. Members of the department combine extensive field sampling, lab experiments, and mathematical modelling. The latter technique is important. Development of numerical modelling techniques for the understanding of ecosystems is at the forefront of aquatic ecosystem research. The number of tenured scientists is small (basically two) and they support a large contingent of externally funded staff. The departure of one of the senior scientists last year has created the need for strategic rethinking within the group, but has so far not been detrimental to scientific results (summarized in an important set of papers in solid journals). The department is active and productive, as well as proactive with respect to NIOZ+, in which its modelling and biogeochemistry skills equip it to play a key role.

Marine Microbiology Department: The department of Marine Microbiology investigates marine microorganisms (mainly cyanobacteria) and their role in marine ecosystems (in particular, molecular and evolutionary ecology). The department is active and internationally well-known in its field of research – an impressive achievement considering the small number of permanent staff. The department has been involved in many national and important international projects, a fact reflected in its impressive output in excellent journals. Interestingly, work on photosynthesis is highly relevant to the design of photobioreactors, and such work is of direct relevance to society.

Spatial Ecology Department: The Spatial Ecology department studies the spatial organisation of estuarine ecosystems. This work is important to nature conservation and to understanding human impacts on these systems. The members of the department use mathematical models to understand interactions between organisms and their environment. The model outputs are tested in the field, particularly in coastal waters. The department is small, with only three tenured staff, but supports several students and postdocs. Its output is significant and will probably increase, due to the growing number of PhD students. One of the PhD students gave an excellent presentation on self-organisation of mussel beds (work that has been published in *Science*). The Committee considered this to be one of the highlights of the day. The department is active in government committees that advise on mussel preservation/conservation and environmental problems in the Scheldt estuary.

Monitor Taskforce: The Monitor Taskforce is different from the other departments in that it conducts applied research commissioned by third parties. The group is instrumental in making observations of benthic communities as indicators of environmental health. Despite its more applied approach, the group manages to publish research papers, because its long-term experiments provide unique insights into the behaviour of such benthic communities under changing conditions. It performs long-term monitoring programmes important to most of the estuaries in the SW corner of the Netherlands and in other places. The societal relevance of this research is self-evident, since estuaries and coastal areas are of great economic importance, but are now under pressure from pollution, climate change and sea level rise. It is noteworthy that this group's funding is 100% external and provides a major source of income for the maintenance of the local research vessel, RV Luctor.

4 Assessment of the current Royal Netherlands Institute for Sea Research (NIOZ)

4.1 General comments

The Committee visited the current NIOZ on Texel and was very much impressed by the dedication of the staff and the excellent research carried out at the institute. The facilities – including the refitted research vessel, RV Pelagia – are impressive: on a par with those at the best institutes in Europe.

4.2 Overall assessment

For the assessment of the institute as a whole, the Evaluation Committee considered all the criteria and subcriteria listed in the Standard Evaluation Protocol 2009-2015 (SEP, pp. 11-12).

Institute level	
Quality	5
A2 Leadership	5
A3 Academic reputation	5
A4 Organisation	4-5
A5 Resources	4-5
A6 PhD training	4-5
Productivity	4-5
B1 Productivity strategy	4-5
B2 Productivity	4-5
Relevance	5
C1 Societal relevance	5
Vitality and Feasibility	4
D1 Strategy	4
D2 SWOT analysis	4
D3 Robustness and stability	4
Overall	5

4.2.1 Quality

A2 Leadership

The Committee felt that there have been tremendous improvements since the last evaluation. Professor Carlo Heip as general director and Professor Herman Ridderinkhof as deputy director have shown strong leadership; they have created a stable and pleasant working environment at NIOZ, resulting in increased productivity in all departments, refurbished facilities, and – last but not least – the refitting of RV Pelagia.

A3 Academic reputation

All the departments have improved their scientific output over the evaluation period. A number of them have become really world-class, with publications in high-ranking journals. The impressive list of publications testifies directly to the outstanding academic reputation of NIOZ scientists, who are active in international organisations, participate in scientific networks, and in many cases act as part-time or guest professors at one or other of the Dutch universities.

A4 Organisation

The tenure-track system has proved a successful way to attract and reward talented staff and secure continuity in the longer term. In some departments, the opportunity presented by forthcoming retirements should be used to increase focus and improve cross-disciplinary cooperation.

A5 Resources

NIOZ maintains the Netherlands' national facilities for fundamental research at sea and in the open ocean. Technical support and facilities are at a very high level, with (in some cases) unique and world-leading technologies. Some concern was expressed concerning the future availability of ship time for research, due to NWO financial constraints.

A6 PhD training

The PhDs were positive about their support and working environment, although they mentioned that small improvements could still be made in terms of more systematic supervision and joint institute-wide PhD seminars.

4.2.2 Productivity

The overall publications list of NIOZ is impressive (see also remarks under A3). The publications output benchmarking study by CWTS showed that NIOZ ranks amongst the best Oceanography centres in Europe, with several departments reaching top international level.

4.2.3 Societal relevance

Public and private sector demand for interdisciplinary research in the marine realm is high, especially as regards research clarifying the implications of climate change. NIOZ provides expertise for cross-disciplinary climate change research that directly improves business and government strategies around the world. This knowledge is the key to making progress in a series of wide-ranging research areas, such as the influence of global warming on coupled ocean circulation-atmosphere patterns, sea level, biodiversity and biogeochemical cycles of the ocean. Such knowledge will be extremely important to society in the coming years and decades. NIOZ also has the potential to provide new knowledge (especially at a fundamental level) in research areas of more direct relevance to society, such as research on the effects of pollution in coastal waters, the ecosystem functioning of coastal waters, deep sea mining, geo-hazards, energy production and living resources (biofuels). These areas could be developed further in the next phase of NIOZ+.

4.2.4 Vitality and feasibility

Considering the relatively small number of permanent scientists, the current NIOZ has delivered important and integrated science at the highest level. But, because the number of permanent scientists in some departments is now approaching critical levels, there is the potential for some research areas to be placed at risk by the departure of key scientists. The Committee considered this issue and agreed that, while the vitality and feasibility of NIOZ are reasonably robust, careful planning is necessary to maintain current strengths. In this regard, the merger between NIOZ and CEME comes at the right time. Management and scientists within the larger NIOZ+ organisation will have a unique opportunity to work together to discuss the central themes, re-engineer or merge departments as necessary, and design clear messages to be conveyed to the outside world, supported by an integrated vision for the future.

5 Assessment of the NIOZ research departments

Research Group or Programme level	BGC	GEO	MEE	BIO	FYS	MRP
Quality	5	4	4	5	4	5
A1 Quality and scientific relevance	5	4	4	4-5	4	
A2 Leadership	5	3	4	5	4	
A3 Academic reputation	5	4	4	5	4	
A4 Organisation	5	4	4	4	4	
A5 Resources	5	3-4	4-5	5	3	
Productivity	5	4	4-5	4	4	5
B1 Productivity strategy	5	4	4	4	4	
B2 Productivity	5	4	4-5	4	4	
Relevance	5	5	5	5	4	5
C1 Societal relevance	5	5	5	5	4	
Vitality and Feasibility	4-5	3-4	4	4	3-4	4
D1 Strategy	5	3	4	4	3-4	
D3 Robustness and stability	4	4	4	4	3-4	
Overall	5	4	4	4-5	4	5

5.1 Marine Organic Biogeochemistry Department (BGC)

Quality and relevance of the research: **Excellent**

The BGC Department is a world-leading group led by Professors Jaap Sinninghe Damste and Stefan Schouten. It is by far the strongest group at NIOZ and truly outstanding. Indeed, it is the most productive group doing organic biogeochemistry research anywhere in the world. The metrics are nothing short of spectacular: Jaap Sinninghe Damste is the most highly cited Earth Scientist of his generation ($h=68$, > 16,500 citations, something like 40 *Nature/Science* publications!) and the best scientist at NIOZ. The new proxies developed for paleoclimate research, such as the TEX86- and BIT-Indices, are used in most organic geochemistry labs these days and have revolutionised this area. The BGC group is a rare pearl in the crown of European science, a fact recognised by the Netherlands in awarding the Spinoza Prize to Jaap Sinninghe Damste.

Leadership: **Excellent**

The group is under strong leadership by Professors Jaap Sinninghe Damste and Stefan Schouten. They have created a wonderful team spirit and highly efficient labs led by the professors and by Dr Ellen Hopmans. The group invites international partners to collaborate and they produce first-class PhDs.

Reputation: The group is at the top of their field worldwide and has very good international collaborations.

Organisation and Resources: **Excellent**

The group has a somewhat low level of base funding, but is highly successful in obtaining third party grants from all sources (national and European). The award of the Spinoza Prize and the ERC advanced research grant to Professor Jaap Sinninghe Damste should be noted. An institutional financial reward for the success of the group is recommended.

Productivity strategy/Productivity: Excellent

The group's productivity is remarkable and hard to beat (one paper per week!). However, this is not mass production – it is top quality science, as is also reflected in 17 high-impact papers over the past six years.

Societal relevance: Excellent

Climate matters. Amplified global warming since the 1970s, a rising sea level, regional climate shifts, and extreme climate events have the potential to impact severely on our planet. We have an obligation to conduct research that provides a mechanistic understanding of present and past variations in regional and global climate, and to use this knowledge to optimize strategies to mitigate dangerous anthropogenic interference with the climate system. The BGC group is one of the leading groups worldwide in the development of novel proxies to reconstruct such changes and is therefore highly relevant.

Vitality and Feasibility: Very good – excellent

The BGC is one of the smaller groups at NIOZ. The remarkable success of the group should be rewarded by an increase in its base funding. The group has reached peak performance with its current staff. To secure its success in the future, funding for a new tenure-track scientist on NIOZ base funding is highly recommended. This could be seen as a reward for the outstanding success of the group.

5.2 Marine Geology Department (GEO)

The GEO group conducts research in various important areas of marine geology. Its field of expertise is broad, comprising calibration of proxies, paleoceanographic records, observations on sea floor morphology and sediment dynamics, and leakage of methane from the sea bed. The group has made substantial contributions to the understanding of cold-water coral reef functioning, pelagic productivity patterns, and paleoceanography. Through its shipboard and lab-based expertise, it provides an excellent service to the wider NIOZ community. For instance, all members of the GEO department have experience as shipboard chief scientists, testifying to their general knowledge of how to run research cruises which is of benefit to the other departments.

Quality and relevance of the research: Very good

The group brings together expertise in making observations on sea floor processes, sediment trap and box and piston core technology, XRF scanning and other lab techniques to achieve research output on many aspects of marine geology.

Its published work is increasing in reputation within the wider marine geology community, and the number of peer-reviewed papers has increased since the last evaluation, and particularly in the last few years.

Leadership: Good

The group has a clear identity with clear research ambitions.

It has a young leader, who has recently started. He is developing quickly and he is fully aware of the research potential of this group. However, specific research fields need to be more realistically defined. There is no need to cover all aspects of marine geology. There is plenty of scope to focus research goals, particularly taking the merger with CEME into consideration.

Academic reputation: Very good

The group as a whole has participated in many European projects and a Marie Curie Training Network. Members of the group have organised several research cruises, and have been invited to participate in cruises organised by other institutes. The research results are largely published in discipline-led journals, and are reasonably well cited.

Organisation and Resources: **Very good**

The group is relatively small compared with those in other top European oceanographic institutes, and seems to have suffered from senior staff retiring or moving to other groups. The new tenure-track appointment was essential to ensure the functioning of the GEO department, and to increase research talent within the group. The externally funded researchers contribute greatly to the importance of the department within NIOZ, because they provide essential services to the wider NIOZ community. The GEO group provides strong support for the seagoing facilities through its knowledge of key shipboard instruments, and is essential for the success of NIOZ+ in the long term. The group needs a period of consolidation to find area(s) where it can shine at the international level and integrate with other NIOZ+ departments, with the aim of becoming an international leader in one or two key areas. There is ample evidence that it is capable of doing this. For instance, external funding is on the increase and modern lab facilities are well maintained, supported by an excellent technician pool. The key to the success of this group will be the addition of the envisaged inorganic geochemist.

Productivity strategy/Productivity: **Very good**

The number of publications is on the increase since the last evaluation, largely in discipline-specific journals. There is scope to increase output, including output in high profile journals. The necessary talent for this is present in the current group.

Societal relevance: **Excellent**

The work is highly relevant to society in the short and longer term. Relevance for the short term is potentially high, especially in areas such as understanding processes in sediment distribution patterns in coastal zones, mapping the contamination of surface sediments by specific trace metals (pollution), and making observations on gas seeps on the sea bed, and even on gas escaping from leaking commercial pipes. Relevance for the longer term is also high, especially in terms of understanding processes of climate change by making key observations in paleoclimate records. Excellent research of clear relevance to society is possible together with other research departments in NIOZ+ and, most importantly, with industry, resulting in integrated approaches to making observations on the sea bed in the Dutch semi-closed estuaries, along the North Sea coast and the Wadden Sea.

Vitality and feasibility: **Good – very good**

Although there are several good ideas for future avenues of research, these need to crystallise out over the next few years, with an emphasis on integration with other NIOZ+ departments. The group has suffered over the years from the loss of senior staff, but the newly recruited members of staff have already shown promising results. The group needs a period of consolidation and time to rethink research avenues. Such rethinking could possibly result in important new avenues of research, specifically in the applied area but based on fundamental principles. The group will hopefully grow through external rather than internal funding, but needs to increase in importance; otherwise it will be dwarfed within NIOZ+ by the relatively large contingent of biologists.

5.3 Marine Ecology Department (MEE)

The MEE group conducts research on the structure and dynamics of marine populations and communities and the functioning of ecosystems. Its approach is broad, encompassing plankton, benthic invertebrates, fish, birds and marine mammals. It has unique expertise in the study of intertidal ecosystems and its interests extend to shelf and open sea environments. The group has made very significant progress since the last evaluation, with considerable success in winning external income and increasing its publication rate.

Quality and relevance of the research: **Very good**

The group brings together methodological developments, data and models to deliver internationally competitive research on many aspects of marine ecology. Its published work is well regarded by its peers and internationally, reflecting its capability and demonstrating strong national and international links. Output of peer-reviewed papers is high and has increased since the last evaluation. The peer-reviewed output is well supported by a wide range of other published material.

Leadership: **Very good**

The group is effectively and actively managed and this has significantly contributed to its improved performance since the last audit. Its goals are well defined. The group has a clear identity and has achieved success in increasing external funding, while carefully selecting external work to ensure that it supports the delivery of fundamental science.

Academic reputation: **Very good**

Internationally leading in some areas and nationally leading in all. The research has a high impact in the field, increasing to very high for intertidal ecology. Published output, although largely concentrated in discipline-specific journals, is very well cited in relation to other work in these journals.

Organisation and Resources: **Very good – excellent**

The group is well supported by a relatively high proportion of tenured staff and has made excellent progress in winning external funding. It draws effectively on a range of expertise within NIOZ (methods, data and models) to deliver research. There is scope for identifying key research themes more clearly in the group and strengthening the external projection of these themes.

Productivity strategy/ Productivity: **Very good – excellent**

A strong focus on publication and a high publication rate in good discipline-specific journals. A wide range of additional publications (grey literature) are produced for scientific and other audiences. There is scope to increase output in generic high profile journals likely to increase the standing of the group and NIOZ.

Societal relevance: **Excellent**

The work is highly relevant to society in the short, medium and long term. Relevance is especially high in the intertidal and coastal zone, with implications for sustainability issues surrounding the Wadden Sea.

Vitality and feasibility: **Very good**

The group has a clear vision and has identified opportunities as a result of the merger with CEME. The group needs significant infrastructure (facilities, specialist technical input e.g. lander development, and taxonomy) that requires long-term support to maintain output.

5.4 Biological Oceanography Department (BIO)

Quality and relevance of the research: **Very good – excellent**

BIO faced major changes over the 2005-2010 period: in 2008 the integration of the group of Hein de Baar, a world-class scientist in marine chemistry (trace metal and CO₂), and in 2009 the departure of the group of Gerard Herndl, a world-class scientist in molecular microbiology, to the University of Vienna. Although these changes might explain the irregular trend in peer-reviewed publications over the period, overall they did not affect the high quality of the research activities and international recognition of BIO. Research is now focusing on interactions between chemistry (trace metals, CO₂) and microbes (phytoplankton, bacteria and viruses), making this research group unique and highly desired in the national and international scientific community. This is demonstrated by the leading role played by BIO in international programmes such as GEOTRACES

and by its participation in several international expeditions. It is also shown by the marked upward trend in collaborative peer-reviewed publications since 2010.

Academic reputation: Excellent

International recognition of BIO is especially strong in the fields of research on marine viruses (Corina Brussaard) and marine chemistry (Hein de Baar). Professor Hein de Baar recently received national recognition in the shape of his appointment, as a member of KNAW, to the chair of the Earth Sciences section. The academic reputation of BIO has also attracted interest from the maritime industry, especially as regards work addressing the problem of invasive species transported in ballast water.

Organisation and Resources: Very good – Excellent

At first glance, the BIO research topics might be considered over-diverse. However, the common consideration of chemical and biological interactions binds the activities of the research group together and stimulates new collaborative work. This link between chemistry and biology will be reinforced in the coming years by the very recent creation of Claire Evans's tenure-track position. In spite of constant basic funding over the period, BIO has attracted a series of successful international projects and grants, including an ERC grant obtained by Gerard Herndl – when he was still involved in NIOZ- and a very promising ERC grant application submitted by Professor Hein de Baar (which has gone through to a second evaluation round). Since 2008, BIO's external resources have amounted to 60% of its total funding.

Productivity strategy/Productivity: Very good

The publication trend is clearly increasing and many publications are in the pipeline (e.g. some 10 collaborative papers in the Deep-Sea Res. II special issue to be published in December 2011 with Hein de Baar as co-guest editor).

Societal relevance: Excellent

Relevance is very high. BIO's fundamental science may serve society in many domains both in the short term (ballast water, food and energy) and in the longer term (response and feedback of the ocean to climate, ocean acidification).

Vitality and feasibility: Very good

BIO has shown itself highly flexible and adaptable in coping with the many changes it has faced over the period. The working atmosphere is very good. BIO is very proactive and has already anticipated the merger with CEME by making plans for the future, considering new research opportunities, consolidating others and re-organising topics. These actions should be supported. The forthcoming retirement of Hein de Baar must be seriously considered and careful preparations must be made to ensure the continuation of this kind of world-class research.

The Committee also strongly recommends that BIO should take advantage of the retirement of Piet Ruardij to discuss the position of mechanistic modelling within the department. It is uncertain whether the merger with CEME will bring the expertise needed by BIO to explore their results. Overall, the position of modelling in NIOZ+ needs to be discussed between all the partners.

5.5 Physical Oceanography Department (FYS)

The FYS department carries out basic research on a wide range of scales, from coastal (Wadden Sea) to basin (Irminger Sea, Western Indian Ocean, etc.). Research is conducted by means of field experiments, laboratory experiments and numerical modelling, with a major focus on field work. The work concentrates on process studies (e.g. internal waves and turbulence), analysis of long-term data (e.g. Wadden Sea, Atlantic) and multidisciplinary studies (e.g. contribution to GEOTRACES). In general, the range of activities is wide compared to the size of the group (currently approx. six FTE). External funding is low compared to the other departments and

although the FYS department produces publications in leading physical oceanography journals, the impact compared to journal average is relatively low. The numerical modelling of coastal areas has started only recently, with no publication output yet. The FYS department is facing near-future changes due to the retirement of two scientists within the next two years, one of them being the department head.

Quality and relevance of the research: *Very good*

The scientific quality of the internal wave research is excellent, and three of the scientists involved are among the world-leaders in this field. Substantial innovation has been achieved by the NIOZ-4 thermistors, developed together with MRF. Since the field of internal waves and turbulence is highly specialized and only a few scientists worldwide work in this highly relevant field, the impact on general physical oceanography is relatively low. Other internationally relevant scientific contributions from the FYS department are in the fields of regional oceanography, long-term data analysis on various spatial scales, and Wadden Sea research. For the environmentally and societally important Marsdiep and the adjacent Wadden Sea areas, the FYS department is the reference group in the Netherlands.

Leadership: *Very good*

The department has been well-managed, even after the former department head left to become deputy director. For the future, a more consistent concept would be helpful, with better integration of the various approaches within the department. In terms of leadership within NIOZ+, a more visible participation in interdisciplinary projects would increase the influence of the FYS department at institute level.

Academic reputation: *Very good*

The scientists in the department make an important contribution to the international scientific community, as regular invitations to act as session chairs and invited speakers at conferences show. In the internal wave and ocean mixing community, FYS scientists are highly welcome partners in international projects and joint field campaigns. The NIOZ-4 sensors are unique in the world.

Organisation and Resources: *Good – very good*

The external funding acquired by the FYS department is low compared to that of other departments. This may be due in part to the limited funds available for basic research in physical oceanography, and in part to the relatively small number of proposals submitted by FYS scientists. In general, more active participation in interdisciplinary project proposals and a stronger orientation towards societal aspects of basic research should help to increase external funding. In view of developments within NIOZ+, numerical coastal modelling activities should be strengthened and may provide further potential for attracting external funding for basic research in the FYS department.

Productivity strategy/Productivity: *Very good*

Measured by the standards of comparable physical oceanography groups, FYS has a very good publication output. The impact of the publications is, however, relatively low in comparison with those of other departments. This may be due in part to the high degree of specialisation in some of the work.

Societal relevance: *Very good*

Basic research in physical oceanography is of tremendous societal relevance, given the threats of global climate change and the increased human exploitation of coastal resources. In the case of some of the group's activities, this direct link to climate change and its impact is clearly visible (contributions to CLIVAR and GEOTRACES, dynamics of the Wadden Sea), while in the case of others it is less direct (internal waves and mixing research). It would strengthen the visibility of the group and increase funding opportunities if more emphasis were placed on the societal relevance of the latter. This needs to be considered in future appointments. In particular, a high-level scientist from the international scene with a broad background and the ability to synthesize in ocean

physics–climate would be a very good complement to the existing tenured staff. Such a person could act as a wonderful and much needed bridge to the other departments.

Vitality and feasibility: Good – very good

The FYS department is relatively small and two experienced staff members are due to retire over the next two years. In addition, the relatively small number of externally funded scientists makes it one of the smallest departments in NIOZ. This will be even more obvious after the merger with CEME. The Committee therefore recommends not only that the retiring staff members should be replaced, but also that at least one additional institutionally funded permanent scientist should be appointed. Of these three new positions, one should be filled by an experienced mid-career, seagoing scientist, who could become the new department head. The other two positions should be filled by tenure-track scientists. One of them should be a dedicated numerical modeller devoted full-time to the group's coastal and shelf sea modelling activities (which will be in greater demand after the merger) and able to give these activities greater international visibility. In addition, external funding should be increased by exploiting the growing Wadden Sea modeling capacity. Without these recruitment actions, the FYS department is at risk of falling below critical size.

5.6 Marine Research Facilities (MRF)

Quality and relevance to the scientific community: Excellent

The MRF department is providing an essential service of excellent quality for NIOZ. This applies both to the management of the ships (RV Pelagia and smaller vessels) and to the development and improvement of seagoing instrumentation. One of the major advantages of NIOZ is that scientists and engineers cooperate very closely in the development or optimization of scientific instrumentation. The group has been very successful in developing a number of unique sampling devices that have given NIOZ scientists an internationally leading edge in their field. For instance, the development of a trace metal free water sampler and ultra-clean container has enabled NIOZ to become world-leading in trace metal research. Many of the innovative NIOZ instruments are purchased by other research groups.

Leadership: The group is under clear leadership with well-defined aims. Its members have defined their tasks as technological partners to the scientists and are only marginally engaged in outside contracts. This ensures a clear profile and high efficiency for science.

Reputation: The group's reputation within Europe is high and it has very good international collaborations within the Ocean Facilities Exchange Group (OFEG).

Organisation and Resources: The group is adequately equipped for its tasks and very well organised. In particular, it ensures the uncomplicated use of ship time as a national facility for universities and other external partners.

Productivity strategy/Productivity: Excellent

The group's aim is to provide optimal use of ship time and seagoing facilities for NIOZ and external partners. The annual ship time for science has been kept high thanks to careful maintenance of the ships. The refit of RV Pelagia in 2009 will keep the vessel in operation for another 15 years. The other research facilities (seagoing equipment) are likewise very well maintained and the deployment of these instruments at sea is ensured by the MRG. International cooperation within OFEG has helped to save considerable amounts of money.

Societal relevance: Excellent

Ship time and well-functioning seagoing equipment are essential requirements for marine science and the MRF group is, therefore, of central relevance to NIOZ. The work of the MRF group also has an effect in the wider field, as the equipment developed by it is sold to other research institutions worldwide. Application of these instruments for monitoring purposes is also possible and may have to be expanded.

Vitality and Feasibility: Very good

The provision of ship time as a national facility is jeopardized by recent cuts in funding for the research vessels. Under these conditions, it will not be possible to maintain the present high standard of seagoing research and to make the ships available for external scientific partners from universities to the same extent as in the past. This is particularly worrisome as it endangers, among other things, the training of the next generation of researchers. Furthermore, international exchange of ship time via OFEG is only possible if the Netherlands can offer adequate ship time on RV Pelagia as part of the barter system. Since this development is no fault of the MRF group, the evaluation panel can only applaud the group for its efforts to find solutions to the problem and to support NIOZ management in its demand for increased funding for the ships. The present situation under the financial cuts is not viable.

6 Supplementary questions by NWO

6.1 General questions

- **Is the mission still appropriate? In the light of the mission of the institute, is a proper balance being struck between the institute's research, R&D and research facilities (their development and use)?**

The mission of current NIOZ is highly relevant to the Netherlands, as knowledge of coastal and open ocean zones is increasingly important to society. NIOZ concentrates on fundamental research, but also extends its research to applied areas, e.g. coastal monitoring, obviously important in relation to sustainability issues surrounding coastal ecosystems, particularly in areas where marine resources are being exploited or where large infrastructures are being implemented. The facilities of current NIOZ are unique in the Netherlands, and are essential to ensure and maintain the international strengths of the research. The same will be true in future of NIOZ+.

- **What is the national and international importance of the institute now and what will it be in the near future? Does the institute have the right policies in place to meet the new challenges?**

At present the institute is the top performer as a fundamental oceanographic institute in the Netherlands and is among the strongest internationally. The position should only be strengthened in future by the merger. It is hard to comment on policies, as these will have to be developed post-merger. But it is clear that both CEME and NIOZ have an excellent international reputation. Their merger will reinforce this excellence and make NIOZ+ the only organisation in the Netherlands that can conduct and support seagoing research in national and international marine waters. Amplifying basic knowledge as chosen by the new management and making use of a bottom-up approach to developing interdisciplinary research seem to us the right policies to establish NIOZ+ as a world-class player in oceanography and to ensure the use of new knowledge to address society-relevant problems.

- **Should NWO continue to support the institute; if so, for what reasons? Are there more effective ways for NWO to support the same type of research and/or facilities?**

There is no doubt that NIOZ should continue its excellent research, as it is a very successful institution providing highly relevant scientific knowledge concerning the coasts and the ocean. It is of prime importance that the research vessels remain adequately supported as a national research facility.

NWO should support NIOZ, and in future NIOZ+, because the scientists not only conduct world-class fundamental research, but also strengthen applied science. In addition, NIOZ, and in future NIOZ+, provides training for the next generation of Dutch oceangoing scientists. Its world-class fundamental research places the institute in a competitive position to win external income, which in turn helps it to attract and retain the best scientists and to develop and maintain the best possible facilities. NWO support is essential to the maintenance of the fundamental research base and to support the innovation that drives the other activities of the institute.

- **Is the institute doing enough to exploit its opportunities for cooperation with organisations outside the academic world?**

Perhaps NIOZ+ needs to redefine its mission slightly. It needs to strike the right balance between pure fundamental and applied research, while defending the need for excellent science to support the best decisions with regard to the marine environment and society's problems in general. Although there are already some ongoing science-based applied research activities, there is great potential for new avenues. Specifically, NIOZ+ might seek new collaborations in the industrial realm, exploit new outreach opportunities, and strengthen

collaborations with universities. By doing so, NIOZ+ could become an increasingly central pillar of ocean-going research at the national level, and add substantially to such research at the international level. The Committee felt it was encouraging that the new director clearly identified opportunities in these directions and that two members of the governing board expressed the need for similar approaches on the part of NIOZ+.

6.2 Institute-specific questions

- **What consequences will the (planned) merger of NIOZ and CEME have for the mission, organisation, facilities and resources of the resulting integrated, single institute?**

The strengths of NIOZ and CEME are complementary. The merger of these institutes is therefore expected to create the strongest fundamental oceanographic research institute in the Netherlands and to cement its role as the key provider of national facilities. There are strong expected synergies between the work conducted in CEME's departments of Ecosystem Studies, Marine Microbiology and Spatial Ecology and the work done at NIOZ; moreover, departments in both institutes were clear and positive about the benefits of the merger. We expect the merger to create an outstanding scientific institute, given these synergies and bibliometric analyses that already show the strong performance of both CEME and NIOZ in European terms and internationally. Both partners will bring strengths rather than weaknesses to the new institute.

Answering this specific question is difficult, as the formal merger procedures are still under way. Over the next few years, the merger will be one of the main challenges for NIOZ+. This implies formulation of a common scientific mission that makes best use of the opportunities to engage in new research at the interface between disciplines, especially by building on advances made in the disciplinary fields. The redefined mission may not deviate substantially from the present mission of the two institutes, but the correct balance between pure fundamental and applied research needs to be struck. This is crucial to engage the general public and to produce substantial knowledge for the improvement of national business and government strategies.

- **What longer-term strategy does NIOZ have with regard to its own and other facilities for coastal and marine research? What strategic choices in this respect are important in the national and internal context? And what are the implications of this for the institute's national role as a support and research organisation and for its national and international position within the field?**

NIOZ+ will continue to house the national Marine Research Facilities, which support the entire Dutch marine scientific community in seagoing research. The availability of RV Pelagia, combined with the excellent expertise of the supporting technicians, is essential in this respect, since the vessel is the 'gateway' for marine scientists in the Netherlands to sea research worldwide. In particular, it is the key to the OFEG bartering mechanism, which provides access both to foreign vessels and to expensive instrumentation (e.g., ROVs).

Research at NIOZ+ will be dependent on a number of expensive instruments and facilities. The three NIOZ+ vessels will cover different geographical areas: RV Pelagia the North Sea, Mediterranean, Red Sea, Indian Ocean and Atlantic Ocean; RV Navicula the Wadden Sea; and RV Luctor the Delta Area. RV Navicula and RV Luctor can also be used in the coastal areas of the North Sea. All ships, except RV Luctor, have recently undergone extensive overhauls and can be expected to remain operational for a minimum of about fifteen more years. Investments in vessels will therefore be restricted to an upgrade or replacement of RV Luctor, which is of utmost importance for Delta research, and new instruments and gear for the next decade and even longer.

The national Marine Research Facilities at NIOZ also supply the necessary basis for student education in Marine Sciences at the universities and are therefore of great national value.

Student education cannot be provided on foreign vessels through the OFEG barter system; it therefore requires a national base. The international exchange of ship facilities is already well used by the Netherlands and close attention should be paid to new developments in European cooperation.

7 Conclusions and recommendations

Throughout the evaluation process, the Committee has been struck by the sustained enthusiasm expressed by staff and PhDs for the merger of NIOZ and CEME to form a single, distinguished institute (NIOZ+). The academic vision for the merger remains compelling and the Committee expects that NIOZ+ will realise its potential in the years ahead. We are fully confident that NIOZ+ will flourish in the Netherlands and beyond as a dynamic centre of international standing in the oceanographic realm under the leadership of its new general director Professor Henk Brinkhuis. In recent months, many members of staff throughout current CEME and current NIOZ have worked with great skill and energy on preparations for the merger. There will inevitably be further challenges during the transition period. The Evaluation Committee wishes to offer a number of specific recommendations (see section 7.2 below) to smooth the transition and to make it clear that the mission of NIOZ+ requires redefinition in order to strike a fine balance between fundamental and applied science. The political move in the Netherlands towards emphasizing the societal importance of science would be the central driver in this process. We are convinced that current CEME and current NIOZ are already producing excellent science output that could be qualified as important to society, but more clarity on just *how* this output is important to society needs to be provided for the stakeholders.

We would like to highlight that current CEME and current NIOZ are very productive and excellent research institutions with high international reputations. Although the Committee did not formally assess CEME or its individual departments, it would like to record that the institute made an excellent overall impression, with active and productive individual departments. The Committee did assess NIOZ and its individual departments and came to the conclusion that both the institute as a whole and all its individual departments have performed beyond expectation. Despite the small number of tenured staff in the departments of both CEME and NIOZ, both institutes manage to maintain large cohorts of staff based on external funding. This observation made the Committee realise that there is one main threat facing NIOZ+: that the number of tenured staff within the individual departments may dwindle further to the point that they lack the necessary critical mass of permanent staff to maintain excellent science and to further refine the balance between fundamental and applied research that is now required by society.

7.1 Conclusions on future directions and strategy for NIOZ+

The Committee sees the merger of CEME and NIOZ as a good opportunity to improve integrated research within NIOZ+. There are no weak departments in either of the current institutes, the projects within departments of both institutes are complementary, and the opportunities for integrated projects will increase in NIOZ+. However, a new Science Plan is necessary and needs to be developed within NIOZ+. The current NIOZ Science Plan is based on five multidisciplinary themes: Open Ocean Processes, Sea Floor Dynamics, Wadden and Shelf Sea Systems, Climate Variability and the Sea, and Biodiversity and Ecosystem Functioning. These are important themes, supported by research within the disciplinary departments. The Committee appreciated the new director's idea of introducing a more appealing general mission like "Future Ocean". Within this framework, more specific topics should be identified, including a number of high relevance to stakeholders, e.g. business and society; in this respect, sustainability of the coastal and open ocean zones could obviously play a role of direct relevance to the Netherlands. This requires rewording of the Science Plan to show that basic research within NIOZ+ will make a highly relevant contribution to society. This is especially important for a country with strong connections to the sea (climate change, sea level rise, many coastal issues, fisheries, sea transport, health and recreation). The applied side of research within CEME and NIOZ already exists but could, in the case of some research groups, be extended and even more strongly orientated towards collaboration with specific stakeholders. The teams within NIOZ+ should continue to base their activities on

fundamental research but applied aspects should play an increased role, so that there will be a good interaction between fundamental and applied science within NIOZ+.

As NIOZ+ will be a medium-sized institute, it will not be able to achieve its goals without a large number of scientific and strategic alliances and scientific cooperations at national and international level. In addition, cooperations with industry may need to be realised. The governing board mentioned the possibility of creating new links with industry, and the Committee would like to endorse this idea. Integrated cross-disciplinary science, for example on local sustainability issues in coastal zones, would improve business strategies not only around the world, but also more locally in the Netherlands (with the government acting, of course, as an independent stakeholder).

The Committee would like to point out the necessity of adequate support for ship time within NIOZ+. Adequate access to research vessels is the foremost requirement for marine research. NIOZ+ will be providing such access to research vessels not only for its own researchers, but also for university research groups, and to provide a proper basis for student education in the oceanic realm in the Netherlands. The Committee found it very worrying that less and less ship time is available for researchers because of lack of adequate funding by NWO. The Committee suggests that NIOZ+ should assess how much ship time can be devoted to external charters and how much is absolutely necessary to meet the scientific demand from NIOZ+ and from Dutch universities in order to maintain this sole seagoing research vessel in the Netherlands as a national facility. The opportunity for external research groups to apply for funding and use of ship time should be maintained.

7.2 Specific recommendations for NIOZ+

1. The Committee would endorse the rewriting of the Science Plan.

Perhaps under the flag of a central theme, specific topics or integrated projects could be identified for strengthening the mission within NIOZ+, with specific stakeholders in mind. These integrated projects would comprise fundamental and/or applied approaches. The integrated approaches, perhaps in some projects with industry, would lead, for example, to making observations on the sea bed in the Dutch semi-closed estuaries, along the North Sea coast, the Wadden Sea, and the open ocean, with direct relevance to society in the Netherlands and beyond.

2. The Committee would endorse strengthening interdepartmental collaboration through a bottom-up approach, leading to integrated projects within NIOZ+.

Indeed, the investigation of many emerging society-relevant questions in oceanography requires a coordinated interdisciplinary approach. The Committee recommends that the potential for integrated project funding at an institutional level within NIOZ+ should be explored. Such funding, if available through partially internal or external sources, could perhaps lead to the establishment of interdisciplinary research groups addressing large topics, such as shelf edge, sea floor, or Wadden Sea ecosystems. Thus, in order to strengthen interdepartmental collaboration, a relatively small in-house grant for joint research work is recommended.

3. The Committee anticipates that the merger will produce some operational efficiencies.

But, given that current levels of external income are close to optimal in most parts of both current institutes and that there would be benefits from increasing the numbers of permanent staff, it recommends that the benefits of efficiencies should be invested in the long-term development of the institute by rewarding excellence and providing more opportunities for permanent positions within NIOZ+. Rewarding scientific excellence is an important way to attract and retain the best scientists.

4. The Committee noted during the NIOZ site visit that heads of departments recommended an open/transparent discussion of basic funding.

In this regard, it might be interesting to further the development of the tenure-track system within NIOZ (which is seen within the institute as a big success) in order to attract excellent junior scientists and ensure more stability. The tenure system should reward excellent performance (see also recommendations 3 and 7a, e.g. BGC) and/or reflect clearly articulated strategic priorities of NIOZ+. Such a system needs to be applied in all departments and new appointments and vacancies should be taken into consideration.

5. The Committee noticed that the disciplines of physical oceanography (FYS) and geology (GEO) may underscore in output relative to biology within NIOZ+, simply as a result of the merger.

Management of NIOZ+ and FYS/GEO are advised to work together to build a strategy to strengthen their disciplines within NIOZ+. In both FYS/GEO a concept for the future work is needed that shows how these departments intend to develop a profile suitable for NIOZ+. FYS/GEO should consider how their research can make a more central and collaborative contribution to the achievement of the future institute's aims. Perhaps closer alignment with the other NIOZ+ departments could help them to play a more prominent role within the institute. It would be interesting to explore areas of work of relevance to business and society. Recruitment following forthcoming retirements in FYS and a vacancy in GEO will provide an opportunity to consider how to strengthen interdisciplinary work.

6. The Committee understood from talking to PhD students that training of PhDs would benefit from the students in the different departments being brought together in a more structured way, e.g. joint PhD seminars, joint training on overarching issues such as good scientific practice, and perhaps institute-wide agreements on standards of supervision.

7. The Committee makes the following recommendations concerning NIOZ departments on Texel:

- a. To secure the future success of the BGC group, a new tenure-track scientist should be appointed on NIOZ base funding. This could be seen as an institutional financial reward for the outstanding success of the group (see also recommendations 3 and 4).
- b. For GEO, there is plenty of scope to focus the department's research goals, particularly taking the merger with CEME into consideration and taking advantage of the 'inorganic biogeochemistry' vacancy. The group needs a period of consolidation to find area(s) where it can shine at international level, integrate with other NIOZ+ departments, and eventually find niches in which it can become an international leader.
Excellent society-relevant research could be conducted in partnership with other research departments in NIOZ+ and – most importantly – with industry, resulting in integrated approaches to making observations on the sea bed in the Dutch semi-closed estuaries, along the North Sea coast and the Wadden Zee (see also recommendation 5).
- c. The MEE group should strengthen both its identification of key research themes and the external projection of these themes. It should also seek to boost the standing both of the group and of NIOZ+ by increasing its output in generic high profile journals.
- d. BIO is very proactive and has anticipated the merger with CEME by already making plans for the future, considering new research opportunities, consolidating others and re-organising topics. These actions should be supported. The forthcoming retirement of Hein de Baar must be seriously considered and careful preparations must be made to ensure the continuation of this kind of world-class research. The Committee also strongly recommends BIO to take advantage of the retirement of Piet Ruardij to discuss the position of mechanistic modelling within the department. It is uncertain whether the merger with CEME will bring the expertise needed by BIO to explore their results. Overall, the position of modelling in NIOZ+ needs to be discussed between all the partners.
- e. The relatively small number of externally funded scientists makes the FYS department one of the smallest in NIOZ. This will be even more obvious after the merger with CEME. The Committee therefore recommends not only that the retiring staff members should be

replaced, but also that at least one additional institutionally funded permanent scientist should be appointed. These vacancies could be used, for instance, to recruit a numerical modeller devoted full-time to coastal and shelf sea modelling activities or to recruit in the area of the coupling between ocean physics and climate. If such appointments are made, external funding should increase. In terms of leadership within NIOZ+, a more visible participation in interdisciplinary projects would increase the influence of the FYS department at institute level (see also recommendation 5). In general, a more active participation in interdisciplinary project proposals and a stronger orientation towards societal aspects of basic research should also help to increase external funding.

- f. The Committee was very impressed with the work of the MRF group, including the Marine Technology department. The barter system operated by MRF is of great benefit to the wider international oceanographic community and could be further exploited. The development of technical equipment is impressive within MTEC and could be further expanded in order to sell instruments to other research institutions worldwide. Use of these instruments for monitoring purposes may also be possible and may need to be expanded.

Annex 1 Curricula Vitae of Evaluation Committee Members

Chair

Prof. Dr Dick Kroon. Current position: Regius Professor of Geology at the University of Edinburgh, UK. He received his undergraduate education at the Vrije Universiteit Amsterdam, where he obtained also his PhD in 1988. His research interest comprises variability in global, extreme climate change as expressed in the geological record, with emphasis on improving knowledge on biotic response to such climate change. He participated in many sea-going expeditions, of which several as chief scientist. He served twice as co-chief scientist on the JOIDES RESOLUTION, the drilling vessel of the Ocean Drilling Program. He published more than 100 papers in peer review Journals and he 'delivered' 25 PhD students. He served on numerous international committees. Currently for instance, he chairs the Proposal Evaluation Panel of the Integrated Ocean Drilling Program and the British Ocean Sedimentary Core Repository (NERC). He served in several evaluation committees of British Oceanography Centres and of European universities (geology degree courses).

Members

Prof. dr. Hans Burchard. Professor at the Leibniz Institute for Baltic Research Warnemünde, Germany. He received his PhD in 1995 and his Habilitation in 2001 at the Institute for Oceanography of Hamburg, Germany. Postdoc periods were at the Danish Hydraulic Institute and the Joint Research Centre of the European Communities in Italy. Burchard's scientific interests: Coastal ocean and shelf sea processes, turbulence closure modelling, three-dimensional numerical models as well as numerical methods. Other activities: Initiator and developer of the widely used Public Domain models GOTM (General Ocean Turbulence Model) and GETM (General Estuarine Transport Model); Organiser of the PECS 2002 Conference in Hamburg and the biennial Warnemünde Turbulence Days workshop (since 2003). Burchard is familiar with modelling (both physical and ecological/biological) and with shallow water oceanography.

Prof. dr. Christiane Lancelot. Professor in Aquatic Ecology and Modelling and Director of the 'Ecologie des Systèmes Aquatiques' Laboratory at the Université Libre de Bruxelles (ULB), Brussels, Belgium. Her research activity addresses the study and modelling of the response of marine ecosystems to climate and anthropogenic changes through the understanding of the interactions between plankton organisms and marine biogeochemical cycles (C, N, P, Si, Fe). Topics include the Southern Ocean (contribution of biological processes to air-ice-sea exchanges of CO₂ and DMS) and European estuaries and coastal seas (cultural eutrophication and climate change). Since 2009, she has been a member of the Scientific Committee of the International Geosphere Biosphere Programme IGBP.

Prof. dr. Gerald Haug. Professor of 'Climate Geology' at the Swiss Federal Institute of Technology (ETH) Zurich, Switzerland and Guest Professor at the University of Potsdam, Germany. Haug received his PhD in 1995 at the University of Kiel, Germany, and his 'Habilitation' at ETH Zurich in 2002. His scientific interests are: Climate and Societies, Late Neocene climate change, and Ocean and Lake Biogeochemistry. Haug won the Albert Maucher Award for Earth Sciences in 2001, the Gottfried Wilhelm Leibniz-Preis in 2007 and the Max-Rössler-Preis (2010) for his outstanding research in the climate reconstruction field.

Prof. dr. Karin Lochte. Director of the Alfred Wegener Institute (AWI) for Polar and Marine Research, Bremerhaven, Germany. Karin Lochte is a biological oceanographer, specializing in marine microbes and climate change in the ocean. Before she became Director at AWI she was head of the Biological Oceanography Research Unit at the Leibniz Institute of Marine Sciences and Professor at the University of Kiel; she investigated nitrogen fixation and biological cycle of climatically active gases in the ocean. From 1995 to 2000 Lochte was head of the Biological Oceanography Research Department at the Leibniz Institute for Baltic Sea Research Warnemünde, and Professor at Rostock University, Germany. From 1990 to 1994 she investigated bacteria in sea ice at the Alfred Wegener Institute. Lochte was a member of NIOZ-Wetenschapscommissie from 1998 to 2004 and a member and later chair of the Senate Commission of Oceanography of the German Research Foundation (DFG) from 1995 to 2011.

Prof. dr. Simon Jennings. Simon Jennings is a Principal Research Scientist and Advisor at the Centre for Environment, Fisheries and Aquaculture Science, Lowestoft, UK and Chair of Environmental Sciences at the University of East Anglia. With colleagues, he conducts research (i) to assess the sustainability of human and environmental impacts on populations, communities and ecosystems and (ii) to develop and apply tools to support marine environmental management. Through Cefas, he advises national and international bodies on conservation, biodiversity, environmental management and fisheries issues. He formerly chaired the ICES Advisory Committee on Ecosystems.

Annex 2 Programme of Site Visits

Tuesday 30 August 2011, day of arrival:

17.00 – 19.00 hours	First closed meeting (at Stadsparkhotel Bergen op Zoom)
19.00 – 23.00 hours	Welcome dinner offered by prof.dr. B. de Kruijff, member of the NWO Governing Board, (in restaurant La Pucelle)

Wednesday 31 August 2011, first day of site visit at CEME in Yerseke:

9.00 hours	Welcome and interview with prof. dr. C. Heip and prof. dr. ir. H. Ridderinkhof
9.50 hours	Tour of the institute, facilities flume tank, mesocosm, RV Luctor
10.40 hours	Interview with senior staff MT; prof. dr. H. Hummel, drs. P. van Avesaath, dr. V. Escaravage
11.30 hours	Interview with senior research staff ES; dr. K.E.R. Soetaert, dr. F. Meysman, prof. dr. J. Middelburg
12.30 hours	Lunch with group leaders
13.00 hours	Interview with senior staff members SE; prof. dr. P. Herman, dr. J. van de Koppel, dr. T. Bouma, dr. D. van der Wal, dr. T. Ysebaert
13.00 hours	Interview senior research staff MM; prof. dr. L.J. Stal, dr. H. Bolhuis, dr. H. Boschker, dr. J. Kromkamp
14.45 hours	Short presentations/interviews with PhD students and postdocs
16.00 hours	Departure from Yerseke to Texel

Thursday 1 September 2011, second day of site visit at NIOZ in Texel:

9.00 hours	Arrival at NIOZ, welcome and tour of the institute, support staff
10.00 hours	Interview with board members prof. dr. ir. P. Vellinga and prof. dr. E. Koster and new director prof. dr. H. Brinkhuis
11.30 hours	Interview with senior staff BGC; prof. dr. ir. J.S. Sinninghe Damsté, prof. dr. ir. S. Schouten, dr. ir. E. Hopmans
13.00 hours	Closed lunch
13.45 hours	Interview with senior research staff GEO; dr. J. Greinert, dr. G.J. Brummer, dr. J.B. Stuut, dr. H. de Stigter, dr. H. de Haas
15.15 hours	Interview with senior research staff MEE; dr.ir. H. van der Veer, prof.dr. T. Piersma, dr.ir. K. Philippart, drs. G. Duineveld, prof.dr. J. van der Meer, dr. D. Thieltges, dr. P. Luttikhuizen, ir. M. Bergman, K. Camphuijsen, drs. M. Lavaleye, dr. R. Witbaard, drs. R. Dekker
16.45 hours	Short presentations/interviews with PhD students and postdocs
17.30 – 18.30 hours	Closed session committee

Friday 2 September 2011, third day of the site visit:

9.00 hours	Interview senior research staff BIO,
10.30 hours	Interview and visit MRF by committee members Kroon and Lochte; prof. dr. H. Brinkhuis, prof. dr. ir. H. Ridderinkhof, dr. E. Koning, dr. M. Smit Interview with senior research staff FYS by committee members Haug, Burchard, Lancelot and Jennings; dr. H. van Aken, dr. T. Gerkema, prof. dr. L. Maas
12.00 hours	Lunch followed by closed session
15.00 hours	Meeting with directors and management NIOZ and CEME
16.00 hours	Communication of preliminary findings to NIOZ and CEME personnel
16.45 hours	Closure and transport to airport
