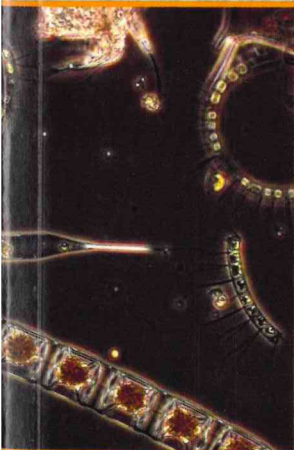
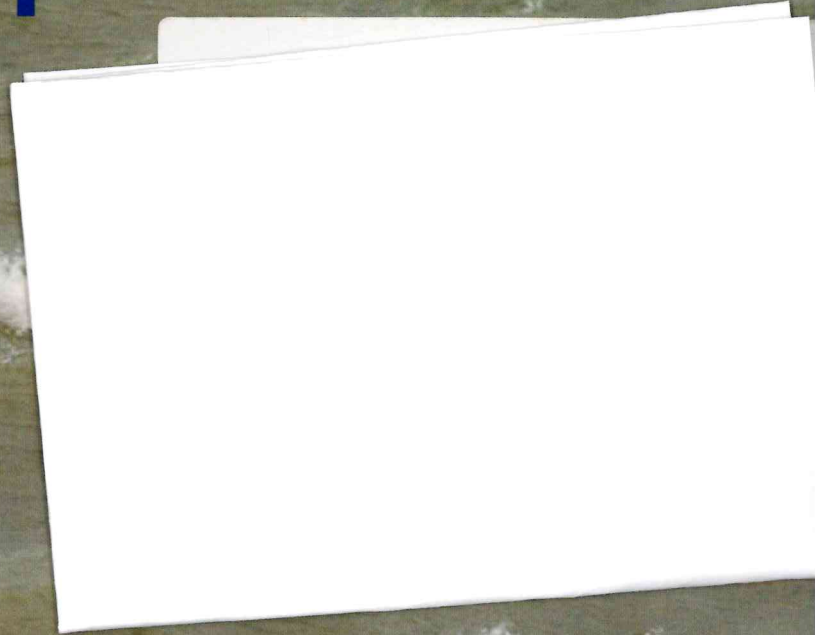


Annual Report 2007



Annual Report 2007



Texel, May 2008

NIOZ Royal Netherlands Institute for Sea Research

The annual report can be ordered free of charge,
by preference on an exchange base, from the
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Sea Research

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Introduction



NIOZ's mission is to gain the fundamental knowledge of the seas and oceans required to understand and properly manage the largest ecosystem on earth - and one of special importance to the Netherlands. This knowledge is shared with the scientific community worldwide and made available to national and international policy makers and to society at large. Marine science is increasingly needed to ensure the sustainability of our planet and to understand climate change, for the maritime economy and the sustainable use and exploitation of living and non-living resources from the sea, and for our individual wellbeing. NIOZ has expertise in all the major natural sciences related to marine ecology and oceanography and complements fundamental research with high level strategic research as part of national and international cooperation programmes. NIOZ also stands for impartial advice and assessment at the highest professional standards.

Scientific Output

A major effort was the production of the new Science Plan based on a multidisciplinary approach to marine systems with important contributions from the departments. Five themes were defined, three geographical ones (the Open Ocean, the Dynamic Sea Floor and Wadden Sea and the North Sea) and two topical ones (Climate Variability and the Oceans and Biodiversity and Ecosystem Functioning). This Science Plan will be supported by the appointment of new scientists with support from the Netherlands Organisation for Scientific Research NWO.

The scientific output of the NIOZ has been outstanding again, with over 170 published papers including six papers in *Nature* and *Science* coming from three departments and books by Hendrik van Aken on the oceanic thermohaline circulation and Kees Camphuysen on whales and dolphins in the North Sea. Scientific highlights were numerous and included the reconstruction of temperatures for tropical Central Africa for the past 25,000 years based on molecular fossils of soil bacteria in marine sediments from the Congo basin, showing that the land environment of Central Africa cooled more than the adjacent Atlantic Ocean, resulting in drier conditions. Another result was the discovery of a natural chain reaction at the base of the very rapid increase of CO₂ concentrations in the atmosphere 55 million years ago, leading to a greenhouse catastrophe.

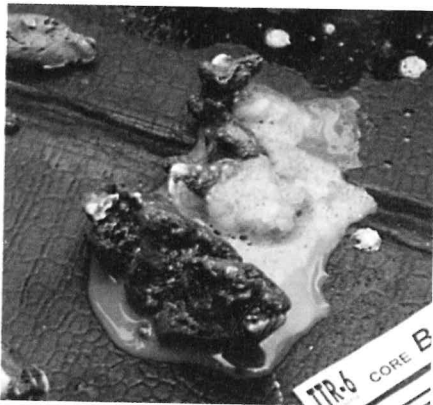
The relatively mild climate of Europe is due to the circulation in the North Atlantic and the transport of warm and salty water from the subtropics via the Gulf Stream. Because the Greenland ice cap threatens to melt this could lead to a sudden input of fresh water to the ocean. This in fact happened after the last Ice Age when Lake Agassiz, an enormous freshwater lake south of the ice cap in North America, suddenly emptied into the Hudson Bay. This changed ocean circulation and lowered temperatures by 1.5 °C in less than twenty years, a situation that lasted for about a century.

Katja Philippart coordinated an ESF Marine Board Position paper on Impacts of Climate Change on the European Marine and Coastal Environment. The paper showed that although all ecosystems have been influenced by many other factors, such as eutrophication and overfishing, every sea in Europe has shown already at least some changes which are most likely the direct or indirect result of recent cli-

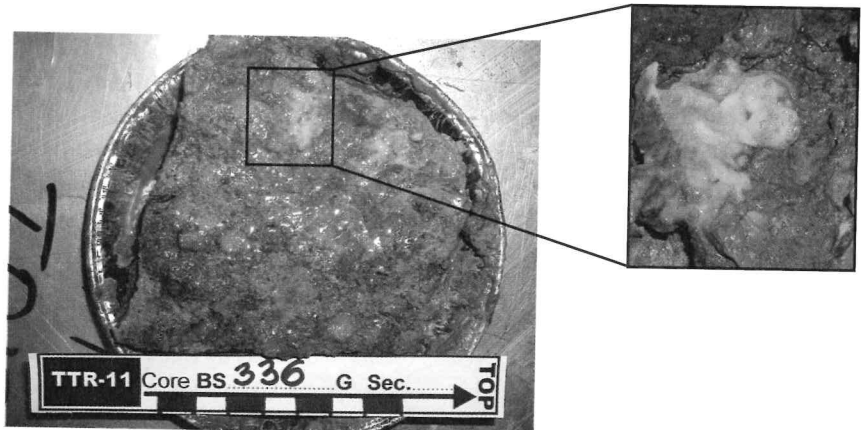
mate change. Although there can be no certainty regarding the precise nature and rate of future climate change, even the more moderate of the predicted scenarios is expected to further alter the marine environment.

Three NIOZ employees obtained a Professorship: Leo Maas (Wave Dynamics in the Oceans) and Herman Ridderinkhof (Physics of Sediment Transport in Coastal Areas) at Utrecht University and Jaap van der Meer (Population Ecology of the Marine Environment) at the Vrije Universiteit Amsterdam.

A total of eight PhD theses was defended: Frans-Peter Lam (Ocean and laboratory observations on waves over topography), Alina Stadnitskaia (See picture: Bio- and petroleum geochemistry of mud volcanoes in the Sorokin Trough (NE Black Sea) and in the Gulf of Cadiz (NE Atlantic)), Jeroen Reneerkens (Functional aspects of seasonal variation in preen wax composition of sandpipers (Scolopacidae)), Johan Weijers (Soil-derived branched tetraether membrane lipids in marine sediments: reconstruction of past continental climate and soil organic matter fluxes to the ocean) (cum laude!), Joana Cardoso (Growth and reproduction in bivalves, an energetic approach), Carme Huguet (TEX₈₆ paleothermometry: proxy validation and application in marine sediments), Isabel Smallegange (Interference competition and patch choice in foraging shore crabs), Anne-Claire Baudoux (The role of viruses in marine phytoplankton mortality) and Maarten Buijsman (Ferry-observed variability of currents and bedforms in the Marsdiep).



Burning ice. Gas hydrates are a solid ice-like formations with methane and other hydrocarbon inside. When gas hydrate decomposes, it releases methane and can be burned. Here is "ice that burns" recovered from the Kazakov mud volcano in the Sorokin Trough, NE Black Sea.



Carbonate crust and microbial mat found in the NIOZ mud volcano, NE Black Sea. The first finding of methane consuming microbial mats associated with carbonate in an environment where oxygen cannot play a role in the oxidation of methane. This methane-derived carbonate crust was formed through the anaerobic microbial process of methane consumption or anaerobic oxidation of methane (AOM). The pink microbial mats contain specific methanotrophic archaea and sulfate reducing bacteria which perform AOM and induce precipitation of such carbonates, shaping carbonate biogeo(eco) systems.

The technical departments supported several cruises of R.V. Pelagia serving the entire Dutch scientific community and built special instruments for trace metal sampling, for the establishment of microbial activities under the high-pressure and low temperature at the ocean floor and to monitor wind mill parks in the Dutch coastal zone. A major event was the construction of the new measuring pier close to the institute in the Wadden Sea that supports the long-term time series that NIOZ maintains. The fact that our supporting laboratories are of very high quality was demonstrated again in an intercalibration exercise involving 56 laboratories of marine institutes and universities worldwide: the nutrient lab of NIOZ was the only lab that succeeded in correctly analyzing all the nutrients involved.

Prices

The Netherlands Zoology Price was awarded to Jan van Gils for his work on physiological and behavioral adaptations in migrating birds. Alina Stadnitskaia obtained a Veni grant from our umbrella organization, the Netherlands Organization for Scientific Research NWO, to work on deep-sea cold seep carbonates in methane-driven ecosystems.

National and International Cooperation

Nationally, the FOKUZ cooperation with the Centre of Estuarine and Coastal Ecology of the Netherlands Institute of Ecology was strengthened through the financial support from NWO and the Netherlands Institute of Ecology. A major development has been the elaboration of a new programme in Marine and Coastal Sciences, where two calls were issued in 2007 focusing on carrying capacity of the Wadden Sea, one on new monitoring strategies and one on fundamental research. Also in 2007 the International Polar Year started with an important research effort from NIOZ. NIOZ will also contribute to the International Year of Planet Earth. The work of our scientists can be followed by the general public through weblogs on 'Noorderlicht' of the VPRO (<http://pooljaar.nl/>). The NIOZ remained active in the Darwin Institute of Biogeology, the National Centre for Coastal Research and the Netherlands Ecological Research Platform.

NIOZ has been very active in international collaboration. In particular we mention the membership of POGO (the Partnership on Global Ocean Observation) and MARS (the European Network of Marine Research Institutes and Stations), the participation in important EU programmes such as the networks of excellence MarBEF (Marine Biodiversity and Ecosystem Functioning), Euroceans (European Network of Excellence of Ocean Ecosystems Analysis) and ESONET (The European Seafloor Observatory Network), several large integrated EU projects such as Carbo-Ocean and HERMES (Hot-spot ecosystem research on the margins of European seas) and the ESF Eurocores projects Eurodiversity and Eurodeep.

- ✓ NIOZ was an active partner in the cooperation with other European research vessel managers at the European level.

NIOZ signed a cooperation agreement with the National Park of the Banc d'Arguin in Mauritania where an important cooperative programme funded by WOTRO is currently running.

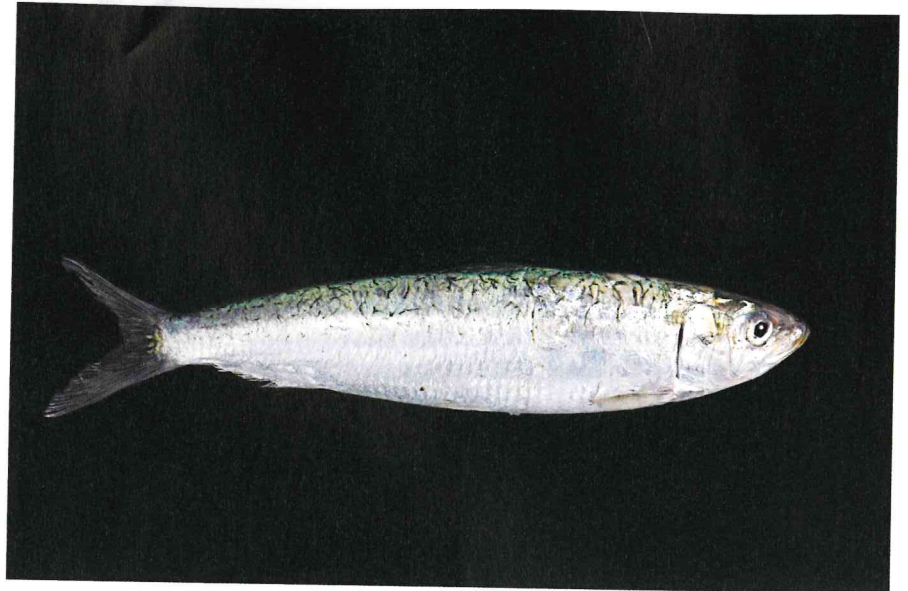
Management and Organization

A major new position of deputy director was created, and was occupied by Prof. Dr. Ir. Herman Ridderinkhof as from July 2007. After the somewhat turbulent events of 2006, 2007 has been a year of consolidation and building toward the future. The institute has gone through a visual transformation with the new house style and the Dutch name change to 'NIOZ Koninklijk Nederlands Instituut voor Zeeonderzoek'. This is also illustrated by the new look of this year's annual report, which is split for the first time into a main annual report and a supplement which will be available on request. The number of scientific departments has been consolidated to five covering the major disciplines (Physics, Geology, Biogeochemistry, Biological Oceanography and Marine Ecology) and the heads of departments have nearly all been appointed for new four year mandates.

There were no new appointments of tenured scientists, but a system of tenure tracks will start in 2008 and the search for new personnel in the departments of Physics and Marine Chemistry and Geology has continued.

Another development was the start of establishing a series of supporting laboratories between the departments. The Molecular Laboratory and the Plankton Laboratory are the first ones in which this process was initiated. Several others will follow in 2008. The renovation of the buildings proceeded in parallel and at a steady pace.

European pilchard
(*Sardina pilchardus*)



European pilchard (*Sardina pilchardus*).



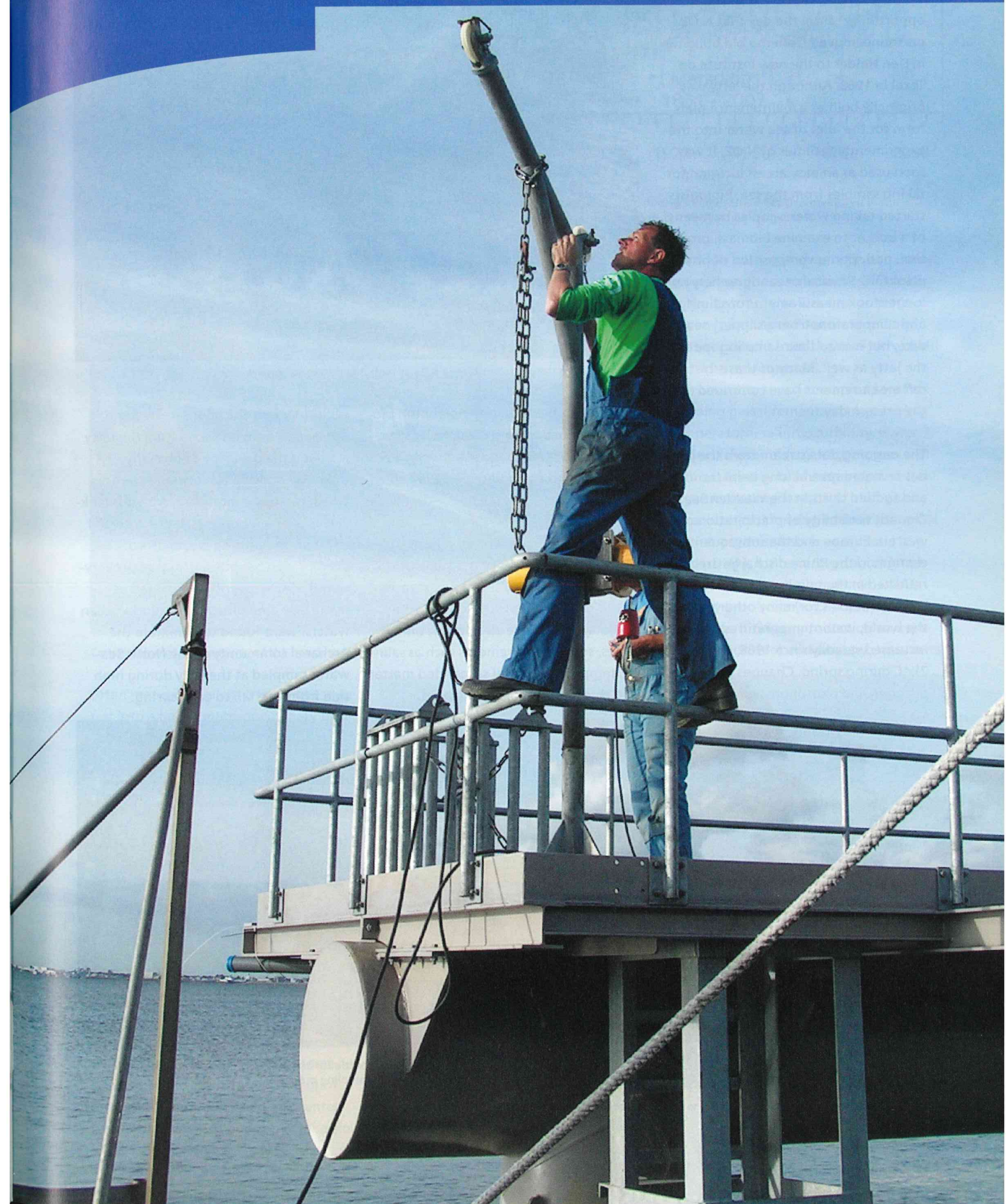
Gilthead seabreams (*Sparus aurata*)

Epilogue

During a few days in May 2007 an adult 15m long humpback whale resided in the Marsdiep, apparently feeling happy feeding on sprat and herring. A new tourist attraction? In the research fyke of NIOZ, two southern fish species were caught; an extremely high number of European pilchards (*Sardina pilchardus*) in April and several tens of gilthead seabreams (*Sparus aurata*) for a prolonged period in August and September. Climate change or natural fluctuations? Only the sustained observation of our marine environment will tell. Sustained observation is one of the missions of NIOZ and will be a main goal of the national research programme 'Sea and Coastal Research (ZKO)' of NWO, which will start in 2008.

Carlo Heip, general director
Herman Ridderinhof, deputy director

Multidisciplinary Programme



Upgrading at the seaside:

from a maintenance jetty to the JetSET sampling station

The NIOZ jetty has been “a ship of opportunity” from the day that NIOZ personnel moved from the old building in Den Helder to the new institute on Texel in 1969. Although the jetty was originally built as a maintenance platform for the inlet of sea water into the experimental facilities of NIOZ, it was soon used as an easy access location for taking samples from the sea. Biologists started taking water samples by means of a bucket to examine biomass, production, and species composition of phytoplankton. Physical oceanographers no longer took measurements of salinity and temperature from a slippery sea dike, but moved their sampling spot to the jetty as well. Many of these ‘historical’ measurements have continued until the present day.

The ongoing data stream from the jetty has revealed several long-term trends and sudden shifts in the Wadden Sea. Climatic variability of precipitation over western Europe and the subsequent changes in the Rhine discharge are reflected in the salinity of the western Wadden Sea. As for many other parts of the world, water temperatures have increased steadily since 1988, by up to 2½°C during spring. Changes in riverine nitrogen and phosphorus loads were



Sampling from the old maintenance jetty at high tide during stormy weather.

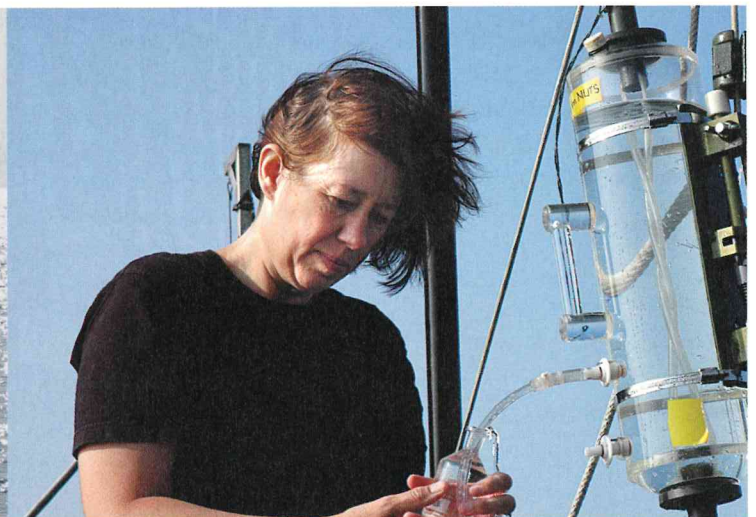
reflected in the total phytoplankton biomass, production, and community structure, with drastic changes between 1977 and 1978 and again between 1987 and 1988.

These long-term field observations called for in-depth research of mechanistic relationships which resulted in an extension of the measurements performed from the jetty. To capture all relevant time scales, some measurements such as salinity, temperature, total suspended matter, and chlorophyll were automated.

Molecular identifications, tested and applied on samples taken from the jetty, revealed the presence of formerly unknown species. Novel marine viruses, which can cause mortality of phytoplankton as the result of lyses, were detected to be present during most parts of the year. Crenarchaeota, a group of prokaryotes that was recently discovered as important ammonium oxidizers in ocean waters, were found to dominate the Archaeal community of the North Sea water sampled at the jetty during high tide from late fall to early spring.

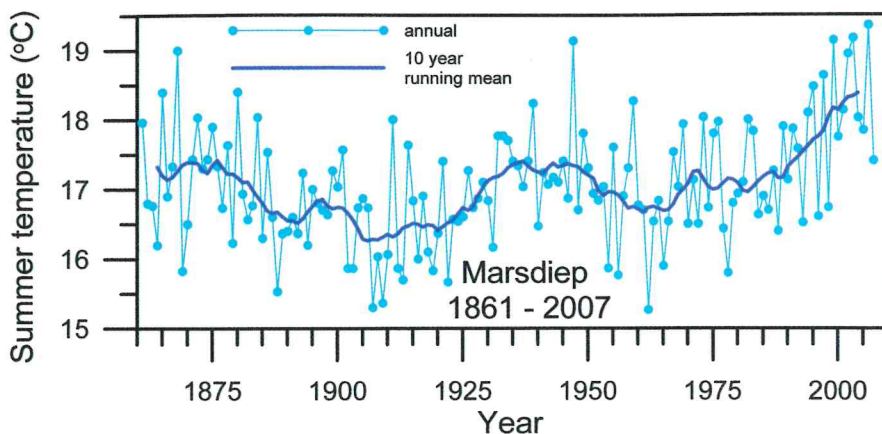


Sampling at the old jetty.



Taking subsamples from a Niskin bottle for analyses of pH and carbondioxide concentrations as part of the JetSET sampling program..

The growing interest in the physics, chemistry and ecology of coastal waters resulted in more and more people visiting the jetty at regular intervals. When people started meeting each other doing similar analyses in the laboratory it was soon decided to combine individual efforts as much as possible as the JetSET (Jetty Sampling Experiments and Time series) group. From 2005 onwards, all involved in sampling from the jetty meet once at the beginning of the year to present recent results, discuss future plans and come up with a joint sampling schedule. In this way, superfluous sampling is prevented and independent,



Long-term variation in sea surface temperature during summer (June-Sept) as measured in the Marsdiep tidal inlet. The thick black line represents the 10 years running mean. Source: Hendrik van Aken, unpublished data.



Construction of the gangway of the new jetty.

often mono-disciplinary, findings can be put into a larger multi-disciplinary framework.

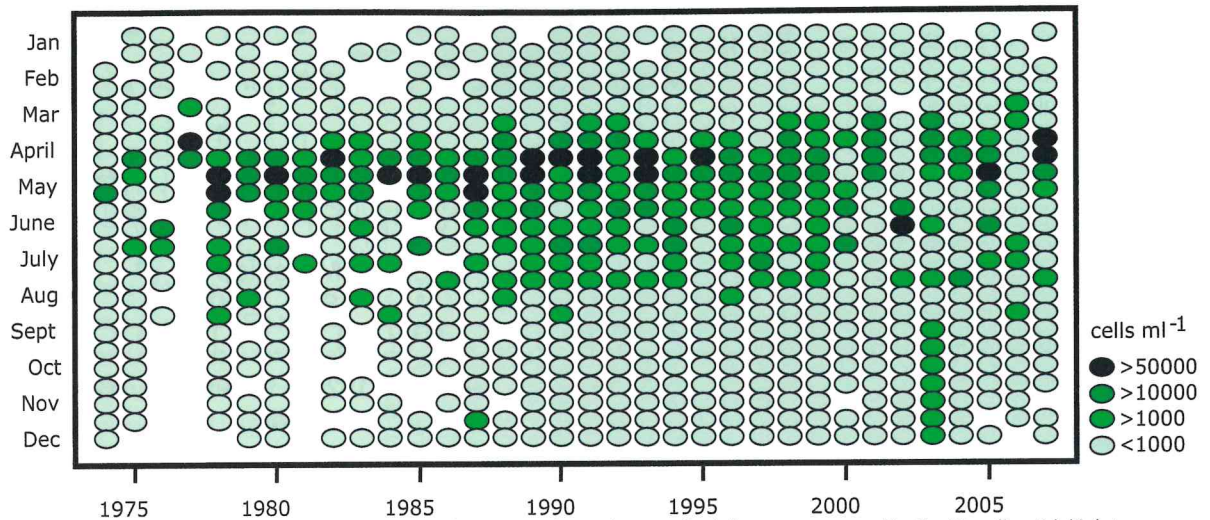
The jetty not only became flooded with people and instruments, but also by water. Increasing westerly winds pushed the water to higher levels resulting in increasingly unsafe sampling conditions. Renovation was inevitable. When the JetSET group was consulted, it became clear that the platform of the new jetty should not only be higher but also larger to provide enough space for present and future activities. Other improvements, such as wide duckboard and small cabins with electricity and freshwater, were wished for as well. By means of some adaptations of the original blue print most of the requests could be granted within the available budget. After a slow

start due to long and complicated license procedures the renovation itself took only a few months. The first pole was driven into the seafloor on May 7 and the first sample from the new jetty could be taken on August 28.

The new jetty supplies ample space for ongoing measurements of physical (e.g., temperature, salinity, turbidity, water colour), chemical (e.g., organic and inorganic nutrients, total suspended matter, organic contaminants) and biological parameters addressing various groups of marine organisms such as Archaea (e.g., lipids, DNA), bacteria (e.g., abundance, DNA), viruses (e.g., abundance, DNA), primary producers (e.g., phytoplankton pigments, biomass, production and species composition) and primary consumers



The last sampling event on the old jetty. Note the difference in height of the platform of the new jetty compared to the old one. Photo: Josje Snoek /NIOZ.



Long-term variation in seasonality in blooming of the microalgae *Phaeocystis globosa* as measured in the Marsdiep tidal inlet.
 Source: Katja Philippart, Gerhard Cadée & Jolanda van Iperen, unpublished data.

(e.g., microflagellates, microzooplankton, bivalve larvae, crustacea). The sampling efforts are distributed among various disciplines, covering all of the scientific departments (Physical Oceanography, Marine Geology, Marine Biogeochemistry, Biological Oceanography and Marine Ecology) at Royal NIOZ.

To understand and predict the effects of, for example, climate change on marine ecosystems, it is important to understand how such changes will affect the exchange of dead and living matter

between Wadden and North Sea, the chemical composition of seawater influencing food web dynamics (e.g., nutrients), and the structure (e.g., species composition, size distribution) and functioning (e.g., biomass, production and decomposition processes, predator-prey interactions) of marine ecosystems. Research is needed to predict if, when, and under what conditions, climate-induced regime shifts of the ecosystem will occur, if such changes will be reversible, and if so, what are the recovery dynamics. To fulfill these requirements, the new ways and/or types of data collec-

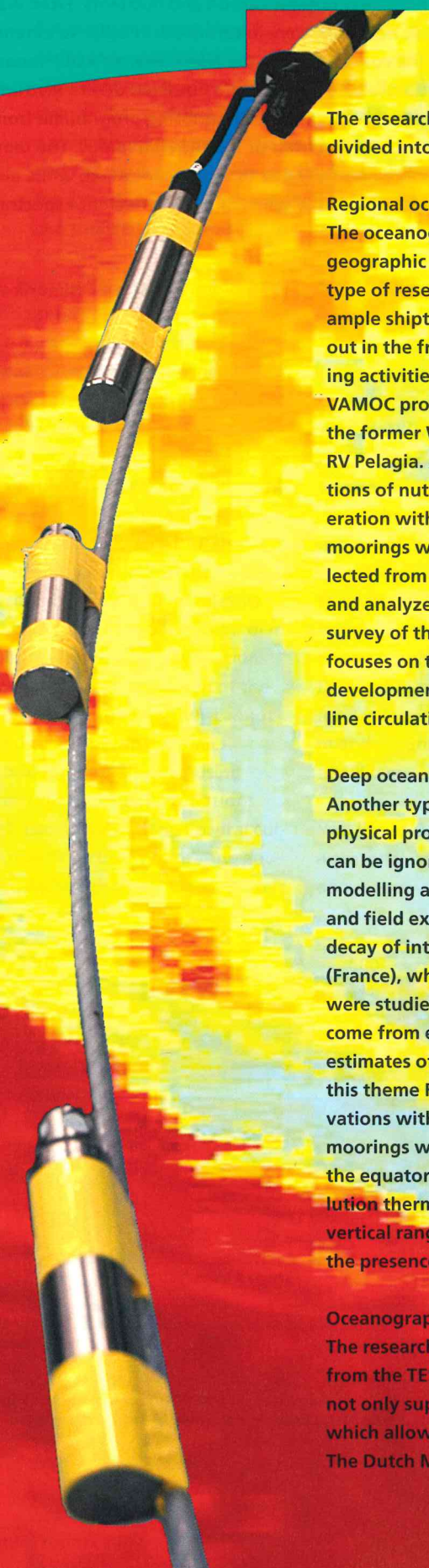
tion from the jetty will be implemented to measure flows of energy and matter such as transport rates, primary production, primary consumption, mineralization and mortality.

Katja Philippart



The new jetty provides safe and easy access to the waters of the Marsdiep tidal inlet.
 Photo: Josje Snoek /NIOZ.

Physical Oceanography



The research of the Department of Physical Oceanography (FYS) can be roughly divided into three sub-themes:

Regional oceanography of the oceans

The oceanography of the ocean basins, focused on the oceanography in a regional geographic context, mainly deals with large-scale hydrography and circulation. This type of research has a strong emphasis on climate related research, and requires ample shiptime to collect observations. Presently, research programmes are carried out in the framework of the international WCRP-programme CLIVAR. In 2007 seagoing activities were carried out as a NIOZ contribution to the NWO funded LOCO and VAMOC programmes as well as to the BSIK CS1 programme. In the summer of 2007 the former WOCE AR7E section between Ireland and Greenland was resurveyed with RV Pelagia. Additional to the standard physical observations (ADCP, CTD) observations of nutrients, oxygen, CO₂ and alkalinity observations were carried out in cooperation with the departments BIO and MCG. In the Irminger Sea the profiling CTD moorings were recovered, serviced and re-deployed. The current observations, collected from the LOCO mooring array in the Mozambique Channel, were processed and analyzed. Scientists and technicians of FYS also participated in the ARCHIMEDES survey of the tropical Atlantic with RV Pelagia. This multi-disciplinary programme focuses on the relation between the aging of the water mass and the downstream development of the deep microbial ecosystem in the cold branch of the thermohaline circulation.

Deep ocean processes

Another type of physical research in the deep ocean basins focuses more on the physical processes and less on the geographical context, although the latter never can be ignored completely. In this field of research, FYS combines mathematical modelling and numerical modelling with laboratory experiments on fluid motion and field experiments in the ocean. Laboratory experiments on the saturation and decay of internal wave attractors were carried out in Cambridge (UK) and Grenoble (France), while also the effects of scattering on irregularities on the topography were studied. In cooperation with French colleagues, a significant step was made to come from estimates of internal wave generation, based on model calculations to estimates of spatially varying turbulent exchange coefficients in the ocean. Also in this theme FYS received funding from NWO-LOCO and BSIK to carry out field observations with moored instrumentation. During a cruise with RV Pelagia internal wave moorings were recovered from the subtropical Atlantic, serviced and re-deployed in the equatorial Atlantic. One of the recovered moorings was fitted with a high resolution thermistor string, which had recorded the temperature during 1.5 year over a vertical range of 130 m with a sampling frequency of 1Hz. A first analysis has shown the presence of vertically coherent high-frequency internal waves (period < 1hour).

Oceanography of shelf seas and coastal zones

The research of FYS in the shallow Wadden Sea focuses on the ADCP-observations from the TESO ferries between ferry ports in Den Helder and Texel. The ADCP data not only supply velocity estimates, but also estimates of the silt concentration, which allow the study of the silt transport from the North Sea into the Wadden Sea. The Dutch Ministry of Transport (Rijkswaterstaat) finances this study because there

is great interest in determining the effect of planned changes in the Dutch coastline, like the seaward extension of the port of Rotterdam. For calibration purposes anchor stations with RV Navicula regularly supply 13 hours of ADCP and silt data, sampled every 20 minutes. The silt analysis not only supplies data on total suspended matter, but also on particular organic carbon and nutrients. From water samples organic and inorganic nutrients were determined. In order to extend the silt transport measurements to the coastal zone in the North Sea, an ADCP mooring was deployed off Bergen. Unfortunately no results were obtained due to instrument malfunction and loss. FYS is also involved in the monitoring programme from the new Jetty, built on the Texel sea dyke in front of the NIOZ buildings. The temperature and salinity time series, already started in 1860, are continued, while also estimates of chlorophyll-a are obtained in daylight, from the reflectance spectral properties.

Hendrik van Aken

Moonstruck in the deep ocean

Hans van Haren*

For centuries it has been known that near the sea surface plankton migrates vertically with sun and lunar rhythms, in order to avoid predation. A recent, 1.5 years long record of acoustic Doppler current profiler (ADCP)-data from the Canary Basin (North-Atlantic Ocean) reflects vertical zooplankton migration between 800 and 1400 m. This record clearly distinguishes 3 major periodicities of down- and up-going motions: a daily, a seasonal and, most intriguingly, a monthly cycle. Largest daily excursions occur during full moon, but they are observed at depths well below the zone of moon- (and only very weak sun-) light penetration. As no physical (internal wave), geochemical or sinking food mechanism can trigger the deep daily and monthly cycles, it may be that an entrained biorhythm running precise internal biochemical clocks controls the vertical migration.

Acoustic backscattering is a well-developed and useful tool to qualitatively detect, e.g., suspended material and fish in the ocean. Acoustic scattering off suspended material has been successfully exploited for estimation of 3-D ocean currents, resulting in acoustic Doppler current profilers (ADCPs) now commonly used by physical oceanographers. However, occasionally an ADCP shows (daily) periodic variations in the vertical current component w and in 'relative acoustic backscatter echo intensity' dl in the upper ocean. Such daily variations are considered a contamination of the ADCP's [physics] signals, as they cannot be related to any ocean dynamics. Marine biologists established using towed nets that such daily variations were not associated with horizontal currents, but with vertically migrating zooplankton. Although the obvious reasons

for such daily near-surface migration were food and [avoiding of] predation, the real trigger seemed variation of light.

A new 1.5 years long hourly record sampled by NIOZ-oceanographers shows that ADCP data can be useful to study such vertical motions deep below the photic zone. The record was obtained so deep, around 1000 m, that sunlight is more than 10 million times smaller than near the surface. This already demands extremely sensitive photo-receptors in zooplankton to trigger its migration. During full-moon, the same low light level is found at even shallower 100-150 m and moonlight is impossible to detect at 1000 m.

Yet, the present time-series clearly show a seasonal cycle with values 10 times above the winter minimum observed

during late summer/autumn (Fig. 1a). This cycle has no correspondence with temperature and, therefore, cannot be associated with possible variations in suspended matter due to water mass changes. Superposed on the seasonal cycle are monthly and daily (Fig. 1b) period variations, persistent throughout the year but most visible in late winter/spring (Fig. 2a). Minimum daily variations occur during new moon when, in general, echo intensity has large value. However, a spring-neap cycle, the fortnightly beat of dominant lunar and solar semidiurnal tides, is not observed. These daily and monthly cycles are also observed in vertical current data (Fig. 2b), with directly observed hourly mean vertical velocity amplitudes of $|w| = 0.025 \pm 0.01 \text{ m s}^{-1}$ ($\sim 2000 \text{ m day}^{-1}$). As the migrations last about 2-3 hours one-way, it typically covers several 100 m in the

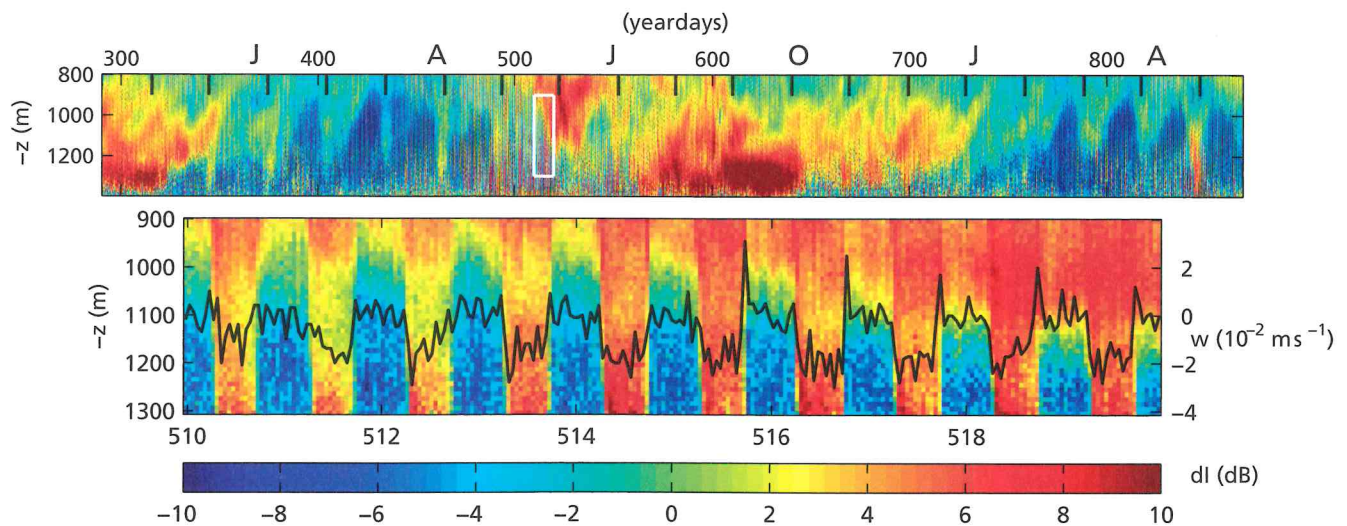


Fig. 1. (top) Entire 19 months ADCP time series of relative echo intensity. The heavy vertical ticks indicate times of new moon. (bottom) Detail from rectangle in top-panel, with w from 1250 m superimposed (black graph, scale to the right).

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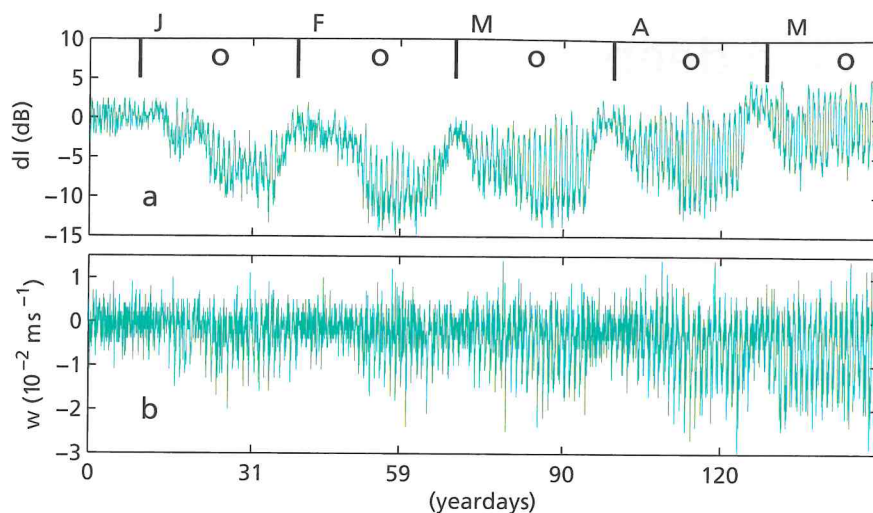


Fig. 2. Winter-spring detail at 1100 m. a. Relative echo intensity. The heavy vertical ticks indicate times of new moon, the circles full moon. b. Vertical current.

vertical, as observed. It is also observed that the variation in length of day between winter and summer is precisely followed by the periodic plankton motions at great depth.

The observed variations in vertical current and echo intensity cannot be triggered by internal waves. Under the assumption that the present observations do describe vertical zooplankton migration, we speculate how this plankton is

capable of following the sun's periodicity, daily and seasonal, and especially also the moon's periodicity, at such great resting depths of 1300 m or more, where (moon)light intensity is just too not present. Are the zooplankton moon-struck?

It seems that the deep daily-monthly migrations are most likely related with a biorhythm that is perhaps originally induced by [sun and moon] light variations on species living higher up in the

water column prior to moving to greater depths at later life stages, as, e.g., occurs for the copepod *Calanus cristatus*. One could argue, using the observation of precise seasonal variation of the daily cycle, that the gene-controlled internal clocks are reset daily, as in many terrestrial organisms, when reaching relatively shallow depths where sunlight just barely penetrates. However, the observed 'zooplankton' are at their greatest depth during daytime and their clocks definitely cannot be reset to follow the moonlight cycle, which suggests large memory persistence in time. Some memory persistence of such biorhythms has been established in laboratory experiments for shallow (tidal) water species and for day-night rhythms. The present data suggest such precise persistence at much larger depths, where life occurs in the dark and yet triggered by light variations far above.

The 'instant' mooring in the Lifamatola passage

Hendrik M. van Aken

During the international INSTANT programme the strength of the Indonesian through-flow was determined with an array of current meter moorings in the main sea straits of the Indonesian seas. NIOZ was responsible for the measurement of the deep throughflow of cold deep water through the Lifamatola Passage.

The flow of water masses from the Pacific Ocean towards the Indian Ocean through the waters of the Indonesian Archipelago has important effects on the climate of Indonesia and the Indian ocean. The Indonesian throughflow is also assumed to contribute to the warm return flow of the oceanic thermohaline circulation. From 2004 until 2006 an international research programme INSTANT (International Nusantara Stratification and Transport) was organized to measure the Indonesian throughflow at several sea straits, covering both the main inflow paths into the Indonesian Seas and the main outflow paths towards the Indian Ocean (Fig. 1). In this programme scientists from Indonesia, the USA, Australia, France, and the Netherlands were involved.

The Lifamatola Passage (Fig. 1c) is the only deep entrance (>1000 m) of the Indonesian seas. It is therefore the only deep source of the cold deep water encountered in the Ceram Sea and Banda Sea. Already in 1985, during the Snellius II Expedition, NIOZ was involved in current measurements in the Lifamatola Passage to determine the throughflow of cold water. Then the result of the measurements was a throughflow of cold water of 1.5 Sverdrup (1 Sv = $10^6 \text{ m}^3/\text{s}$). However, the observational period in 1985 lasted only 3 months, and did not cover a complete annual cycle, nor an El Niño cycle. When invited to participate in the INSTANT programme, it was realized that here was an opportunity to redress the weaker points of the mooring setup from 1985. A current meter mooring was deployed from the Indonesian RV Baruna

Jaya I at 2000 m near the sill in the Lifamatola Passage from January 2004 until December 2006. Halfway the measuring period, in July 2005, the mooring was recovered, serviced and re-deployed. Then it was discovered that because of unexpected strong currents the mooring suffered serious blow downs. Therefore it was shortened in mid-term with about 300 m. After recovery the velocity data were interpolated at regular vertical and time intervals for further analysis.

The mean current in the lowest 500 m of the water column followed the direction of the deep channel in the Lifamatola Passage (128°). This agrees with the direction of the deep passage. The current in that direction appeared to be quite variable in a large range of time scales. The dominant spectral peaks were

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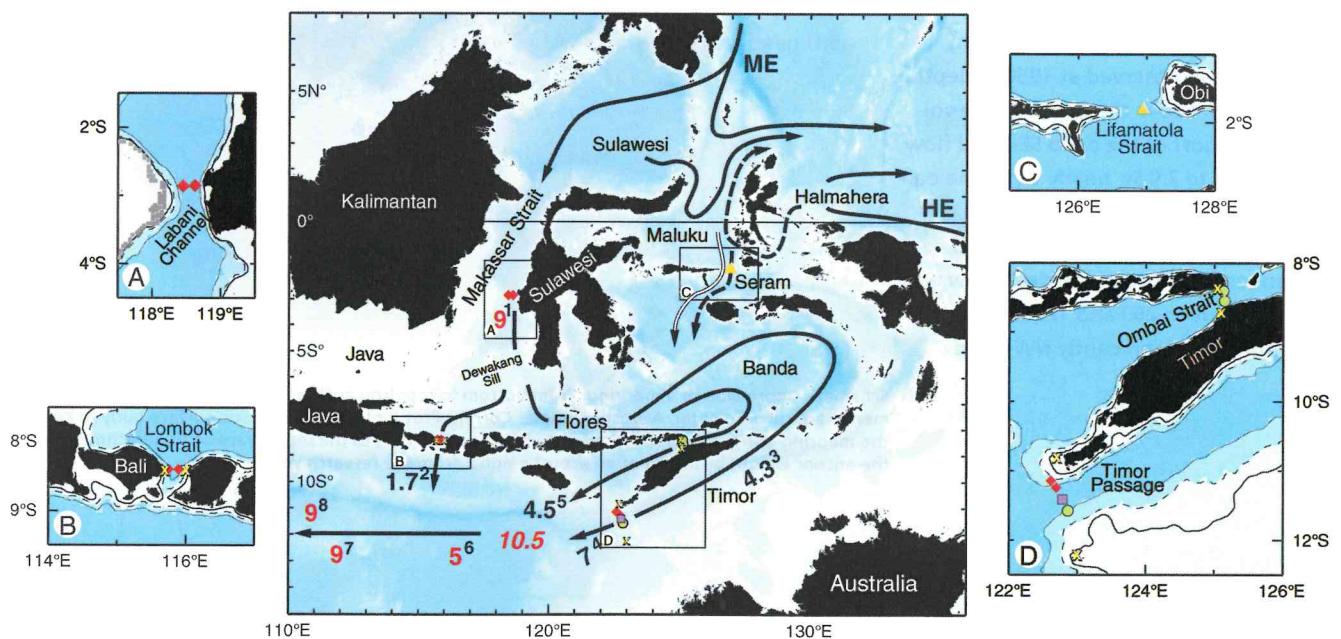


Fig. 1. Schematic of the Indonesian throughflow. The blue arrows represent North Pacific thermocline water; the red arrows represent South Pacific lower thermocline water and the deeper overflow of dense Pacific water across the Lifamatola Passage into the deep Banda Sea. Transport values in Sv (1 Sv = $10^6 \text{ m}^3/\text{s}$) are given in black. Inserts A-D [with 100, 500, and 1000 m isobaths] show positions of INSTANT moorings.

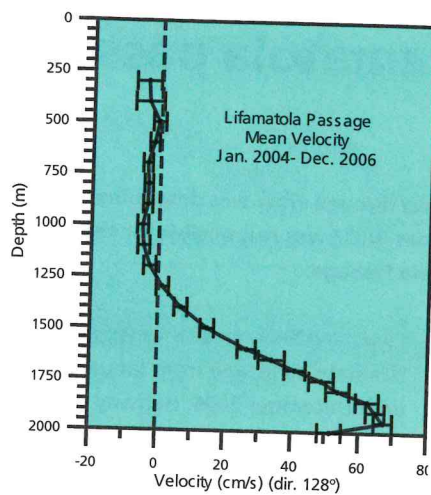


Fig. 2. Mean velocity profile in the Lifamatola Passage in the S-E direction (128°). The local depth was 2010 m.

at the diurnal and semi-diurnal frequencies tidal frequencies, while also at the lunar fortnightly frequency a significant peak was observed. Vertical changes of the amplitude and phase lag at these frequencies suggest that these tides have a strong baroclinic character, probably generated by the barotropic tidal flow over the Lifamatola sill. Additionally irregular velocity variations at a large range of frequencies were observed. However no significant annual cycle was observed between 300 and 2000 m depth, despite the strong monsoonal wind forcing of the sea surface. The 3 years averaged current profile (Fig. 2) showed a strong SE ward flow below 1250 m. The strongest mean velocity (67 cm/s) was observed at 1950 m depth, about 60 m above the bottom. The volume transport of the deep SE-ward flow amounted to 2.9 Sv, nearly twice the earlier estimate from the Snellius II Expedition. The transport weighted mean temperature of the deep flow was 3.1°C. Between 250 and 1250 m depth the flow was significantly NW-ward



Schematic impression of a mooring. From bottom to top: Iron anchor weight, acoustic release, sediment trap, current meter, Acoustic Doppler Current Profiler (ADCP), and a sub-surface buoy to keep the mooring upright during the measurements and to lift it to the sea-surface after detachment from the anchor weight by means of an acoustic signal from the research vessel.

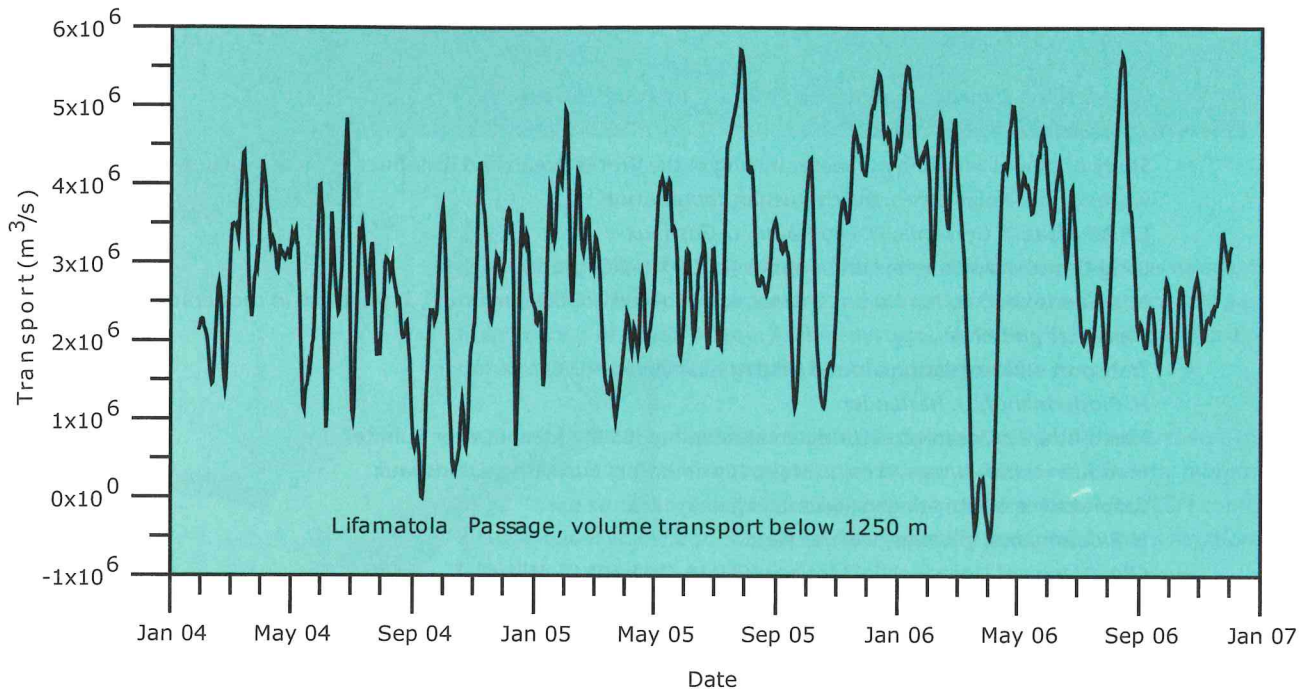


Fig. 3. Time series of the SE-ward (128°) volume transport through Lifamatola Passage below 1250 m. The data are low-pass-filtered, suppressing the semi-diurnal and diurnal tides.

(average velocity 3.3 cm/s). If this flow is representative for the whole width of the Lifamatola Passage, it maintains a transport of 1.4 Sv from the Ceram Sea towards the Molucca Sea. From the interpolated current meter data, a time series was obtained of the deep volume transport through the Lifamatola Passage (Fig. 3). It appears

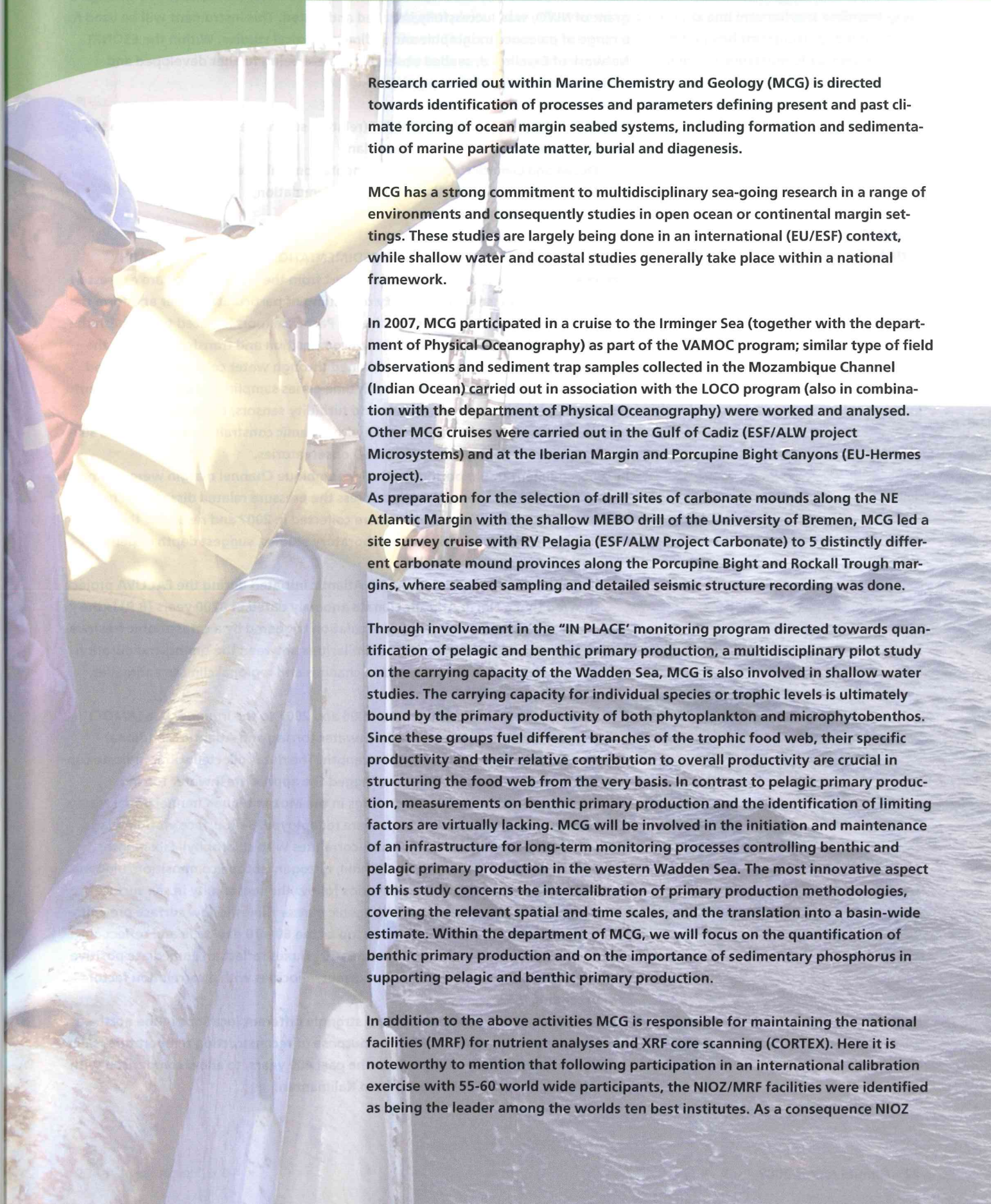
that the presence of the Mf tide causes a significant transport variation at fortnightly time scales. Apart from these tidal variations, "eddy" variability of the transport was observed at all lower frequencies. A first analysis of these variations has shown that the transport minimum during March-April 2006 coincided with the passage of a deep ther-

mostad through the passage. No clear annual nor ENSO variability could be observed in the transport rate. Apparently the deep density structure which maintains the driving pressure gradients, is not strongly influenced by such dominant air-sea interaction frequencies.

External Projects Physical Oceanography

- FOM & NWO-Dynamics of Patterns Program: Internal Waves in 3D.
J. Hazewinkel, L.R.M. Maas
- Study of global variability of water mixing in the World Ocean and its influence on convection and internal waves in Sub-Polar zones. Dutch-Russian cooperation.
L.R.M. Maas, T. Gerkema, H. van Haren, L. Gostiaux
- Long-term Ocean Climate Observations (LOCO) (NWO-groot).
H. Ridderinkhof, H. van Haren, L. Maas, H. van Aken, J.T.F. Zimmerman, T. Gerkema in cooperation with Utrecht University and KNMI
- Transport and circulation around Madagascar (NWO-ALW).
H. Ridderinkhof, U. Harlander
- North Atlantic Ocean Monitoring and Modelling (BSIK – Klimaat voor Ruimte).
H. Ridderinkhof, H. van Aken, L. Maas, H. van Haren, F. de Jong, L. Gostiaux
- Calibratie veerbootmetingen (Rijkswaterstaat).
H. Ridderinkhof, J. Nauw - van der Vegt
- Climatology of Deep Inertial Motions (CLIMA-DIM; NWO). (NWO)
H. van Haren, T. Gerkema
- Long-term Ocean Climate Observations (LOCO) (NWO-groot).
H. Ridderinkhof, H. van Haren, L.R.M. Maas, H. van Aken, J.T.F. Zimmerman, T. Gerkema, C. Veth, in cooperation with Utrecht University and KNMI
- Transport and circulation around Madagascar (NWO-ALW).
H. Ridderinkhof, H.M. van Aken, U. Harlander
- North Atlantic Ocean Monitoring and Modelling (BSIK – Klimaat voor Ruimte).
H. Ridderinkhof, H. van Aken, L.R.M. Maas, H. van Haren, F. de Jong, 1 post-doc to be appointed
- Veerbootmetingen slibtransport (Rijkswaterstaat).
H. Ridderinkhof, J. Nauw
- Internal wave patterns in 3D (NWO-EW, Nonlinear dynamics of Patterns).
J. Hazewinkel, L.R.M. Maas, in cooperation with CWI
- Variability of Atlantic Meridional Overturning Circulation (VAMOC; NWO-NERC-RCN trilateral programme RAPID2).
L.P. Jonkers (MCG), G.J.A. Brummer (MCG), H.M. van Aken, T.C.E. van Weering (MCG), in cooperation with VUA, CAM (UK), NOC (UK), Bergen University (Norway)
- Activity, rates, carbon use and high-pressure microbial ecology of the deep sea (ARCHIMEDES, ALW-NWO).
T. Reinthaler (BIO), G.J. Herndl (BIO), H.M. van Aken
- Study of global variability of water mixing in the World Ocean and its influence on convection and internal waves in Sub-Polar zones: Dutch-Russian cooperation.
L.R.M. Maas, T. Gerkema, H. van Haren, L. Gostiaux
- GYROSCOP; NWO (CNRS funded).
H. van Haren
- Climatology of Deep Inertial Motions (CLIMA-DIM); (NWO funded).
H. van Haren, T. Gerkema
- Slope-Mixing; NERC (NWO funded).
H. van Haren
- Observations on the internal wave climatology in the North Atlantic Ocean; BSIK funded.
H. van Haren, L. Gostiaux

Marine Chemistry and Geology



Research carried out within Marine Chemistry and Geology (MCG) is directed towards identification of processes and parameters defining present and past climate forcing of ocean margin seabed systems, including formation and sedimentation of marine particulate matter, burial and diagenesis.

MCG has a strong commitment to multidisciplinary sea-going research in a range of environments and consequently studies in open ocean or continental margin settings. These studies are largely being done in an international (EU/ESF) context, while shallow water and coastal studies generally take place within a national framework.

In 2007, MCG participated in a cruise to the Irminger Sea (together with the department of Physical Oceanography) as part of the VAMOC program; similar type of field observations and sediment trap samples collected in the Mozambique Channel (Indian Ocean) carried out in association with the LOCO program (also in combination with the department of Physical Oceanography) were worked and analysed. Other MCG cruises were carried out in the Gulf of Cadiz (ESF/ALW project Microsystems) and at the Iberian Margin and Porcupine Bight Canyons (EU-Hermes project).

As preparation for the selection of drill sites of carbonate mounds along the NE Atlantic Margin with the shallow MEBO drill of the University of Bremen, MCG led a site survey cruise with RV Pelagia (ESF/ALW Project Carbonate) to 5 distinctly different carbonate mound provinces along the Porcupine Bight and Rockall Trough margins, where seabed sampling and detailed seismic structure recording was done.

Through involvement in the "IN PLACE" monitoring program directed towards quantification of pelagic and benthic primary production, a multidisciplinary pilot study on the carrying capacity of the Wadden Sea, MCG is also involved in shallow water studies. The carrying capacity for individual species or trophic levels is ultimately bound by the primary productivity of both phytoplankton and microphytobenthos. Since these groups fuel different branches of the trophic food web, their specific productivity and their relative contribution to overall productivity are crucial in structuring the food web from the very basis. In contrast to pelagic primary production, measurements on benthic primary production and the identification of limiting factors are virtually lacking. MCG will be involved in the initiation and maintenance of an infrastructure for long-term monitoring processes controlling benthic and pelagic primary production in the western Wadden Sea. The most innovative aspect of this study concerns the intercalibration of primary production methodologies, covering the relevant spatial and time scales, and the translation into a basin-wide estimate. Within the department of MCG, we will focus on the quantification of benthic primary production and on the importance of sedimentary phosphorus in supporting pelagic and benthic primary production.

In addition to the above activities MCG is responsible for maintaining the national facilities (MRF) for nutrient analyses and XRF core scanning (CORTEX). Here it is noteworthy to mention that following participation in an international calibration exercise with 55-60 world wide participants, the NIOZ/MRF facilities were identified as being the leader among the worlds ten best institutes. As a consequence NIOZ

was invited to participate in the preparation and further definition of a reference standard for nutrient analysis, which will be presented and used in the futures as "the" international reference standard.

A state-of-the-art stable isotope ratio mass spectrometer (IRMS) acquired through a grant of NWO, was successfully installed and tested. This instrument will be used for a range of paleoceanographic and sedimentological studies. Within the ESONET Network of Excellence, seabed observatories are being further developed and designs and functionalities upgraded.

Research in MCG is carried out in three (related) subthemes as contribution to the recently defined overall NIOZ Science Plan:

- Ocean and climate controls on sedimentation, paleoceanography
- Sedimentary processes and sediment accumulation,
- Diagenesis and burial

OCEAN AND CLIMATE CONTROLS ON SEDIMENTATION, PALEOCEANOGRAPHY

Ocean and climate controls on particle export from the water column are expressed in the temporal and spatial variability of settling of particulate matter and form the main aim of studies done under this theme. Particle export is traced to establish the magnitude and rate of transformation, decomposition and transfer, to define the forcing processes. Primary data are obtained through water column profiling and sediment sampling, in combination with time-series sampling by moored sediment traps equipped with current profilers and turbidity sensors, complemented with measurements of near bed fluxes and hydrodynamic constraints just above the seabed by long term deployed seabed BOBO observatories.

In 2006, sediment trap moorings at the Mozambique Channel margin were equipped with experimental cages to directly address the pressure related dissolution behaviour of biogenic silica. Trap samples were collected in 2007 and results of these measurements, in combination with laboratory studies, suggest depth dependent dissolution of silica.

1. Paleoceanographic studies in the NE Atlantic initiated during the PACLIVA project showed that a North Atlantic climate anomaly dated at 8200 years (B.P.) is the result of weakened overturning circulation triggered by a catastrophic freshwater outburst of Lake Agassiz. The similarities between the timing and duration of the pronounced deep circulation changes and regional climate anomalies support a causal link.
2. Initial results of the VAMOC cruises 2006 and 2007 to the Irminger Sea (AMOC) suggest a strong link between freshwater forcing and Atlantic Meridional Overturning Circulation (AMOC) strength. The data collected so far indicate consistently that the ocean response lagged the applied freshwater forcing.
3. In conjunction with the LOCO moorings in the Mozambique Channel initial results have been worked out and traps were redeployed. Sea surface warming lags precipitation by 1-2 weeks and anti-correlates with chlorophyll (six months' lag). In the deep Mozambique Channel, nitrogen isotope composition, biogenic silica content and molar Corg /N ratios follow the seasonality in sea surface temperature and chlorophyll. Lithogenic matter fluxes follow surface precipitation with a lag of about 40 days on top of the 60 – 70 day cycle and reflect an anti-correlation with deep currents. CaCO₃ fluxes reflect an immediate positive response to an increase in surface current velocities with a correlation factor exceeding 0.47.
4. Scleractinian coral colonies from two strongly different locations in the north east of Madagascar were cored for the purpose of reconstructing temperature, salinity and productivity changes over the past 400 years, to allow comparison with a HR (high resolution) data set from Kalimantan.

SEDIMENTARY PROCESSES AND SEDIMENT ACCUMULATION

1. Processes, pathways and fluxes of sediment transport and deposition in the Nazaré submarine canyon (the Portuguese continental margin), were defined and show that fine-grained suspended sediment from the adjacent shelf is captured in the upper canyon and actively transported through the canyon to the abyssal plain under influence of tidal currents and intermittent sediment gravity flows. Tidal currents are actively resuspending and transporting sediment in the upper to middle canyon as reflected by high concentration of suspended particles in bottom waters, high horizontal and vertical sediment fluxes in the bottom water layer and high sedimentation rates measured in traps.
2. Studies dealing with carbonate mound development and cold coral growth indicated that near-bed currents, and downward transport of (seasonal induced fresh phytodetritus) particles by internal tidal waves, strongly enhance the growth and development of the cold corals and associated biota covering the tops and upper flanks of mounds.
3. A 3-D seismic survey with RV Pelagia of Royal NIOZ to the Gulf of Cadiz in the framework of the ESF MICROSYSTEMS allowed definition of the detailed 3D structure of the Pen Duick mud mound area. This revealed the presence of an extensive zone of gas saturated sediments with local carbonate ridges.

SEDIMENTATION AND DIAGENESIS

Studies in this theme are further being developed to establish temporal and spatial scales of (recent) sediment transport, resuspension and burial of settling particulate matter, by combining field observations with shipboard laboratory analyses.

Tjeerd van Weering

Moundforce

Tjeerd van Weering, Furu Mienis, Henko de Stigter, Henk de Haas and Cees van der Land.

The department MCG was coordinator of the ESF/ALW "Moundforce" project, which finished in 2007.

The main objectives of the Moundforce studies were:

to define the geological, geochemical and oceanographical conditions and processes forcing the development of carbonate mounds, and thus, to test the two existing hypotheses of (a) a linkage between cold seeps and carbonate mound formation, and (b) a relation between external controls, i.e. oceanic and climate, on mound development.

The project results (based on seismic, side-scan sonar, remotely operated vehicle surveys, seabed imagery by video and hoppercamera as well as on watercolumn and bottom sampling and long term deployed seabed lander observations) show that the control on mound formation by methane seepage from the seafloor can be excluded as driving force for carbonate lithification and mound formation, at least for the mounds in the Porcupine Sea bight and along the Rockall Trough margins. Methane seepage however, appears to play an important role in carbonate formation associated with mud mounds in the Gulf of Cadiz.

Near-bed currents, and downward transport of (fresh phytodetritus) particles by

internal tidal waves strongly enhance the growth and development of the cold water corals and associated biota covering the tops and upper flanks of the mounds. This conclusion was supported through the reconstruction of a local 3D flow-field (bottom current velocity and direction) at selected mounds, allowing to directly relate the cold-water coral distribution to the local oceanographic setting.

The (strong) currents are further suggested to strongly affect hardground formation and to control carbonate mound shaping, thus emphasizing an oceanographic control on mound formation again, at least for the mounds in the Porcupine Sea bight and margin and along the Rockall Trough margins.

Forcing of these carbonate mounds by environmental factors (e.g. currents) as indicated above can also be projected into the distant past.

IODP drilling of a carbonate mound provided evidence for the impact of strong currents in mound shaping as well as for the importance of along slope directed contour currents and associated particle transport in halting mound development and causing final burial, thus suggesting a longer term climatic control. The observations point to a dramatic variability in mound growth rate, which supports the postulated existence of a so-called booster stage in the early phases of mound development. This aspect has been picked up for definition under the new Eurocores program "CARBONATE".



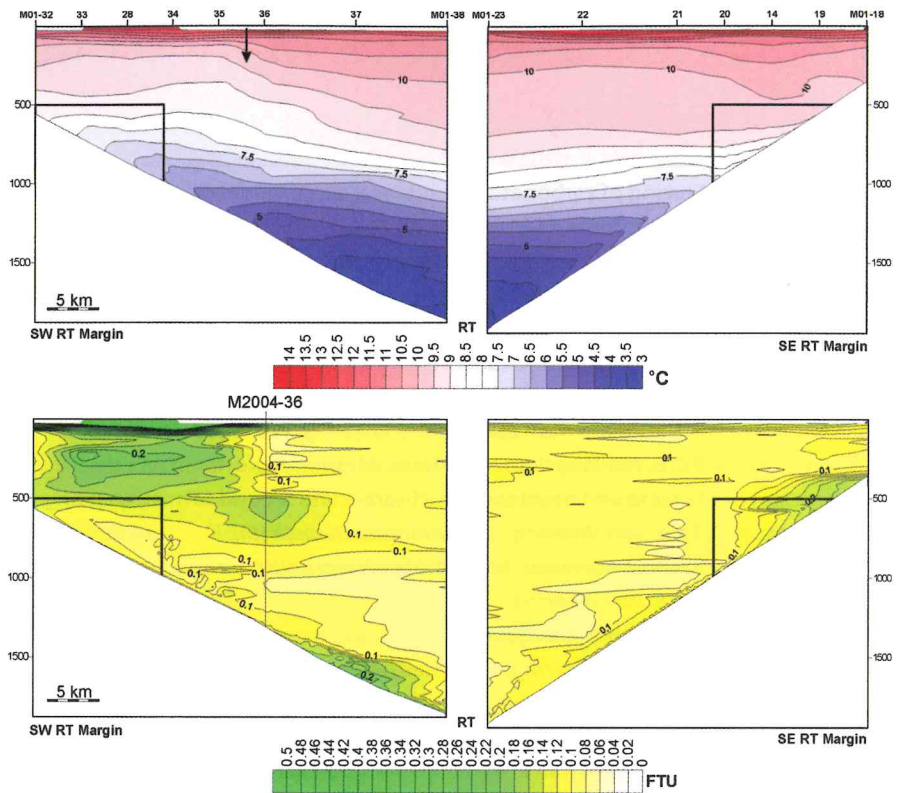
Lophelia pertusa



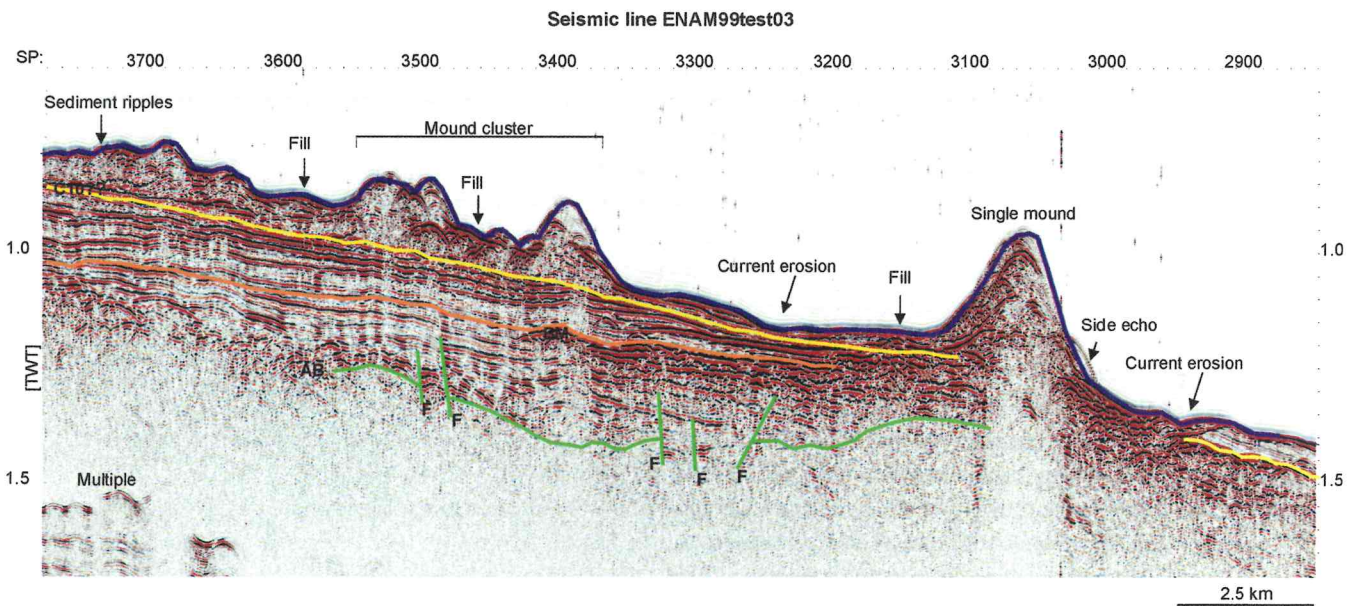
Madrepora oculata

Pictures of the most common framework building cold water coral species, *Lophelia pertusa* and *Madrepora oculata* living at the mounds in the NE Atlantic. Coral colonies were collected with boxcores on the Rockall Trough margins during several research cruises with the R.V. Pelagia.

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Contour plots of temperature and turbidity of CTD transects made at the SW and SE RT margin. The interval of mound occurrence is indicated by rectangles. At the SW RT margin a high-turbidity cloud can be observed above the mound area, the shape of which is defined by the dipping isotherms at 25 km from the Rockall Bank (indicated by the arrow). At the SE RT margin a BNL inducing an INL is found in the interval of mound occurrence (Mienis et al., 2007).



Seismic structure of cold-water coral carbonate mounds along a transect perpendicular to the SW RT margin.

External Projects Marine Chemistry and Geology

- Forcing of carbonate mounds and deep water coral reefs along the NW European continental margin (Moundforce, ESF/NWO-ALW).
T.C.E. van Weering, H. de Haas, F. Mienis
- Hotspot Ecosystem Research on the Margins of European Seas (HERMES, 6th FWP EU).
T.C.E. van Weering, H.C. de Stigter, G. Duineveld (MEE)
- Lead in submarine canyons of the Portuguese margin (NWO-ALW).
T.C.E. van Weering, H.C. de Stigter, T. Richter
- A National Swath bathymetry system (NWO-Middelgroot).
T.C.E. van Weering, H. de Haas, M. Smit, B. Koster
- Forcing and development of carbonate mound formation along the NW European margin (NEBROC2, NWO).
T.C.E. van Weering, J.S. Sinninghe Damsté (MBT), C. van der Land
- ESONET European Seabed Observatories Network (N o E) (EU).
T.C.E. van Weering
- EuroCarbonate ESF/ALW.
T.C.E. van Weering, H. de Haas
- Microsystems, ESF/ALW.
T.C.E. van Weering, F. Mienis
- East Kalimantan Programme for Coastal Zone Research Netherlands-Indonesia (WOTRO/KNAW/ICOMAR).
G.J.A. Brummer, G. van den Bergh, T.C.E. van Weering, R. Bak (MEE), P. Hoekstra (UU)
- Variability of Atlantic Meridional Overturning Circulation (VAMOC; NWO-NERC-RCN trilateral programme RAPID2).
G.J.A. Brummer, L.P. Jonkers, H. van Aken (FYS), T.C.E. van Weering, G.M. Ganssen (VU), F.J.C. Peeters (VU)
- Temperature and salinity proxies of ocean thermohaline circulation and climate change: development and verification (NEBROC2, NWO).
G.J.A. Brummer, U. Fallet, J. Bijma (AWI), S. Schouten (MBT)
- Role of cyanobacteria in past biogeochemical cycling (NWO).
J.S. Sinninghe Damsté (MBT), T. Bauersachs (MBT), S. Schouten (MBT), G.J.A. Brummer, E.C. Hopmans (MBT)
- Paleosalt (NWO/ESF-EuroClimate).
S. Schouten (MBT), G.J.A. Brummer, M. v.d. Meer (MBT)
- SINDOCOM [Southern Indian Ocean/Tropical Pacific teleconnections assessed by a joint coral-in situ ocean monitoring database] (NWO-ALW/ Climate Change).
G.J.A. Brummer, PhD student, D. Kroon (VU), J. Zinke (VU)
- Impact of post-depositional processes on organic proxies. Darwin Center for Biogeology (NWO).
S. Schouten (MBT) et al. G.J.A. Brummer as co-proponent (for PhD position)
- A high-precision stable isotope mass spectrometer for marine tracer analysis (NWO-Middelgroot).
S. Schouten (MBT), G.J.A. Brummer, et al. (MEE, BIO)
- A process study on the impact of the Arabian Sea oxygen minimum zone on organic matter degradation, nutrient regeneration, trace metal cycling and foraminiferal proxies.
G.J. Reichert et al., G.J.A. Brummer as co-proponent
- MOVE! Construction of a remotely controlled vehicle for benthic research (NWO-Middelgroot/BMBF).
H.G. Epping, J.W. de Leeuw, G. Duineveld (MEE)
- Early diagenetic interactions between iron and silica and their role in the global marine cycle (NWO-ALW).
H.G. Epping, F.A. Koning, P. van Cappelen (UU)
- Dynamics of dissolved organic matter in a coastal environment (NWO-ALW).
H.G. Epping, M. Keuning, J.B.M. Middelburg (NIOO-CEME)

Marine Biogeochemistry and Toxicology

The department MBT addresses a field of research at the interface of the basic disciplines of chemistry, geology and biology. The basic questions are:

- Which organic compounds are present in the different compartments (biota, water, sediments) of the marine environment and what is their origin?
- What is their biochemical role in marine organisms?
- Which reactions (e.g. biotransformation and diagenesis) affect these components during transport in the marine environment? How are these reactions affected by environmental conditions and on which time scales? What can these components tell us on the biogeochemical cycling of carbon, nitrogen and sulfur in the ocean?
- What can be learned from organic matter deposited in marine sediments with respect to marine evolution, the functioning of past marine ecosystems, climate variability and organic carbon burial?

The research of MBT is divided into two departmental themes:

Marine Biogeochemistry and Marine Toxicology.

In 2007, fieldwork was performed in a variety of places varying from the Atlantic Ocean to obtain cores from the Madeira Abyssal Plain, to cold seeps and mud volcanoes at the seafloor of the Gulf of Cadiz and the coastal North Sea to investigate microbial communities oxidizing methane anaerobically, and to the English Channel and the entire North Sea in a cruise of the BIO department to study the distribution of intact polar lipids of algae and bacteria. A new graduate student started her project within the Darwin Centre for Biogeology where MBT collaborates with (micro)biologists at the Dutch universities and the sister institute of the NIOZ, the Netherlands Institute for Ecology (NIOO). At the same time, three graduate students obtained their PhD degree: Alina Stadnitskaia for her work on cold seeps and mud volcanoes, Carme Huguet for her further development of the TEX₈₆ palaeothermometer based on crenarchaeotal lipids, and Johan Weijers for his work on lipids from soil bacteria that are transported through rivers to the ocean and can be used to reconstruct continental climate. Johan was awarded the *cum laude* degree, indicating that his thesis belongs to the top 5%. A major scientific achievement in 2007 was the publication of two *Nature* and *Science* papers. In April at the European Geophysical Union meeting in Vienna our department head, Jaap Sinninghe Damsté, was presented the Vernadsky Medal from the European Geosciences Union for his innovative use of biomarkers to elucidate interactions between the Biosphere and Geosphere across major ecosystems and timescales. In September, Marcel Kuypers, a former PhD student of the department and now leading a group at the Max Planck Institute for Marine Microbiology in Bremen, obtained the Pieter Schenck award, a prize for the best organic geochemist under 35, from the European Association of Organic Geochemists. Our postdoc Alina Stadnitskaia obtained a prestigious VENI award from NWO. This award is the first step of the Innovational Research Incentives Scheme of NWO directed at individual researchers at various stages of their careers. It offers researchers who have only recently completed their doctorates the opportunity to develop their ideas over a further three years. Alina is the second VENI recipient in our department.

A more detailed account of the results of some of the projects that ended in 2007 is given on the following pages.

Jaap Sinninghe Damsté

Improvements and applications of the TEX₈₆ paleothermometer.

Carme Huguet, Jaap S. Sinninghe Damsté and Stefan Schouten*

The determination of past sea surface temperatures (SSTs) in oceans and coastal seas is of great importance for the reconstruction of historical changes in climate and oceans currents. For this purpose, organic compounds from microorganisms in the sediment are often used. A new paleo-thermometer to reconstruct ancient SSTs was recently developed at MBT. This TEX₈₆ index is based on temperature-induced changes in the molecular structure of the lipids from the cell wall of Crenarchaeota. In this project we made further analytical improvements and applied the method to several settings from recent geological time periods. Furthermore it was discovered that tetraether-lipids reach the seafloor in faecal pellets of zooplankton and that growth season and ocean currents appear to influence the TEX₈₆.

Real thermometers have been available only since the 17th century and for periods before this, researchers depend on climatic archives. Sediment cores from open oceans and coastal areas provide such archives as they contain a variety of geochemical signatures from the past. The TEX₈₆ has recently been developed at the MBT department and is based on temperature-dependent changes in the lipid composition of the cell walls of Crenarchaeota, a branch of the Archaea. Together with the bacteria and the eukaryotes, Archaea form the three domains of the tree of life. Their cell membranes are composed of tetraether lipids (Fig. 1) of which the number of car-

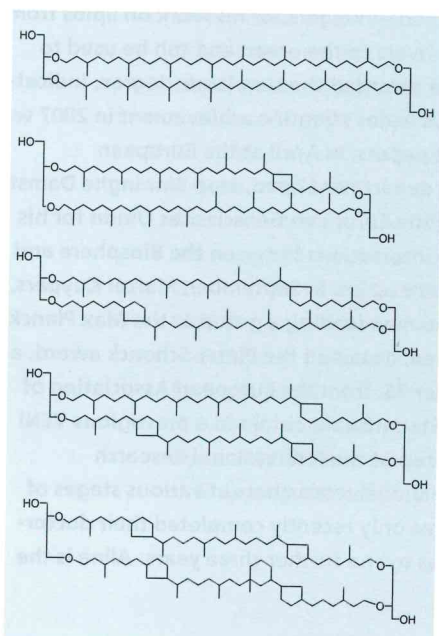


Fig. 1. Structures of tetraether membrane lipids of Crenarchaeota.

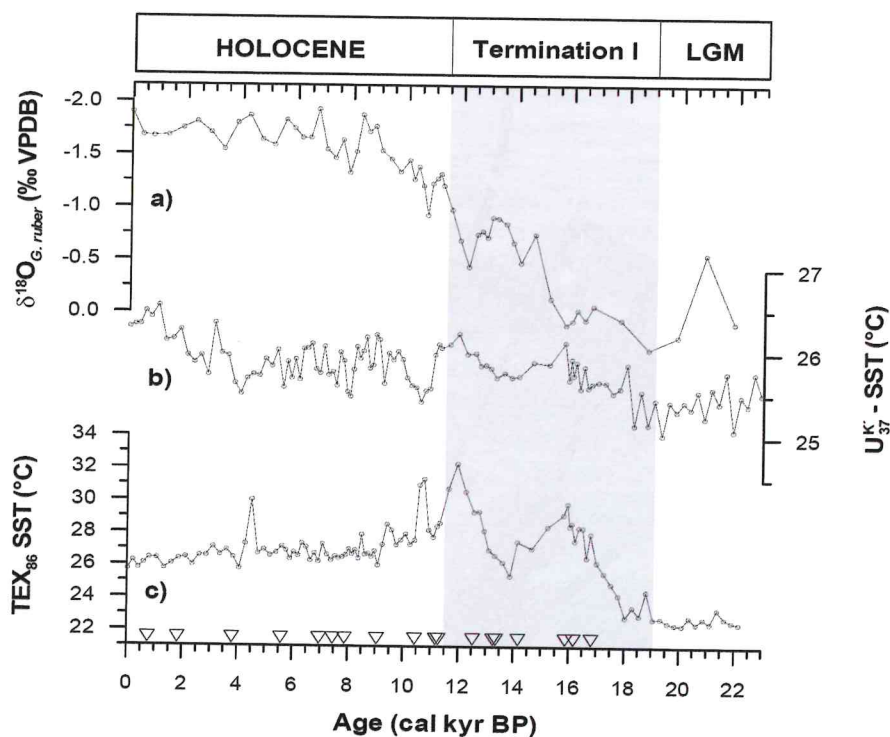


Fig. 2. Temperature evolution in the Arabian Sea by a) $\delta^{18}\text{O}$ of foraminifera, b) U^k_{37} of alkenones and c) TEX₈₆.

bon rings in the molecule increases with increasing temperature of the surrounding seawater. Determination of the (past) composition of these cell membrane lipids can therefore be used to reconstruct the temperatures at which these Archaea were living. We have studied several aspects of this paleothermometer in greater detail and made significant improvements to their determination.

TEX₈₆ improvements and applications.

We first improved the analytical method of the TEX₈₆ paleothermometer. This led

to an improvement of the analytical reproducibility of ± 0.3 °C and the deviation in absolute concentration measurements was reduced to 5% of the measured average. The TEX₈₆ values for organic material out of the water column and from the uppermost layer of the seafloor sediment best match the temperatures of the uppermost 100 m of seawater. However, the small cells of Crenarchaeota cannot sink to the seafloor by themselves as organic matter is less dense than water. We found that the cells of Crenarchaeota are eaten by crus-

* Corresponding author: schouten@nioz.nl

taceous zooplankton. The time spent in the gastrointestinal tract of the crustaceans was found not to affect the TEX_{86} value. Analysis of a sediment core from an anoxic branch of the Oslofjord, showed that the measured TEX_{86} record paralleled the average spring-autumn air temperature record in Oslo. Temperature estimations of the transition from the last ice age to the present interglacial

period were made using two cores drilled from the Arabian Sea. The TEX_{86} temperatures were compared with values from another paleothermometer, the U^{K}_{37} (Fig. 2). Both proxies reflected different temperatures with different trends. This could be explained by differences in the growing season of the Archaea and the algae which produce the components upon which the U^{K}_{37} index is based.

The results show that the TEX_{86} paleothermometer can now be measured with reproducibilities similar to that of other paleothermometers and yield reasonable temperature estimates from a variety of settings and time periods.

Ancient DNA: A window to paleo-environmental changes in microbial ecosystems as illustrated by an Antarctic lake and a fjord

Marco J.L. Coolen* and Jaap S. Sinninghe Damsté

Marine or lake sediments frequently serve as archives of past aquatic microbial communities and, consequently, as recorders of environmental and climate change. Usually, these archives are read using specific chemical fossils, called biomarkers. We have shown that the study of fossil genetic material (DNA) can add a lot of information on the composition of past microbial communities to the biomarker approach. We studied changes in the microbial ecosystems of two Antarctic Lakes at an unprecedented species-level in sediments of over 10,000 years old.

Preservation conditions for ancient DNA were expected to be highest in cold and anoxic settings such as prevail in the Holocene sediment records of Antarctic lakes and fjords of the Vestfold Hills, eastern Antarctica. Our two study sites were the Small Meromictic (i.e. permanently stratified) Basin (SMB) in Ellis Fjord and the nearby, also permanently stratified, saline, Ace Lake (Fig. 1). Both basins are characterized by sulfide-rich anoxic bottom waters and sediments. Whereas SMB was continuously connected to the surrounding ocean during the Holocene, Ace Lake was initially a freshwater filled melt-water lake but became connected to the ocean 9,400 years ago as a result of post-glacial sea-level rise and then became permanently stratified and anoxic.

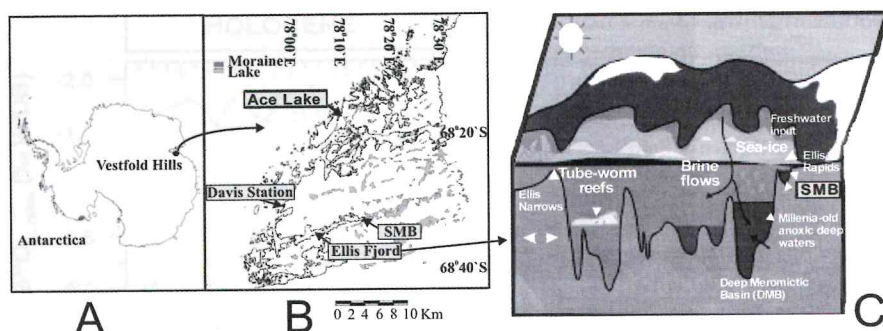


Fig. 1. (A) Location of the Vestfold Hills in Eastern Antarctica and (B) the two sampling sites in the Vestfold Hills: the Small Meromictic Basin (SMB) and Ace Lake and the nearby Australian Davis Station. (C) Location of the permanently stratified SMB with millenia-old anoxic deep waters in Ellis Fjord.

Using gravity cores, we reconstructed up to 10,000-year-old (Holocene) records of phytoplankton and bacterioplankton members, indicative for environmental change, based on their fossil genetic signatures. In order to ground-truth these ancient DNA or "paleogenomical" findings, we performed a parallel analysis of

chemical fossils and their isotopic signatures as an indication for the biochemical pathways used to biosynthesize them.

Previous work had shown that the Holocene sediments of the SMB in Ellis Fjord, contained numerous diatom skeletons and indeed we found high contents of a specific biomarker for certain species of diatoms belonging to the genera *Navicula*, *Haslea*, *Pleurosigma* or *Rhizosoleni*; i.e. the highly branched isoprenoid (HBI) C_{25:2} alkadiene. In order to test the suitability of fossil DNA as a novel paleoecology proxy, we focused our search on the algae which might have produced this specific HBI biomarker based on preserved genetic markers of diatoms. We used the sensitive Polymerase Chain Reaction (PCR) technique for this purpose. Despite the finding that the HBI biomarker had reacted with sulfide within 500 years after their deposition, the genetic material of the diatoms was relatively well preserved for



Gravity coring at Ace Lake, Vestfold Hills, Antarctica. The sediment core was 150 cm long, spanning 10,450 calendar years of deposition.

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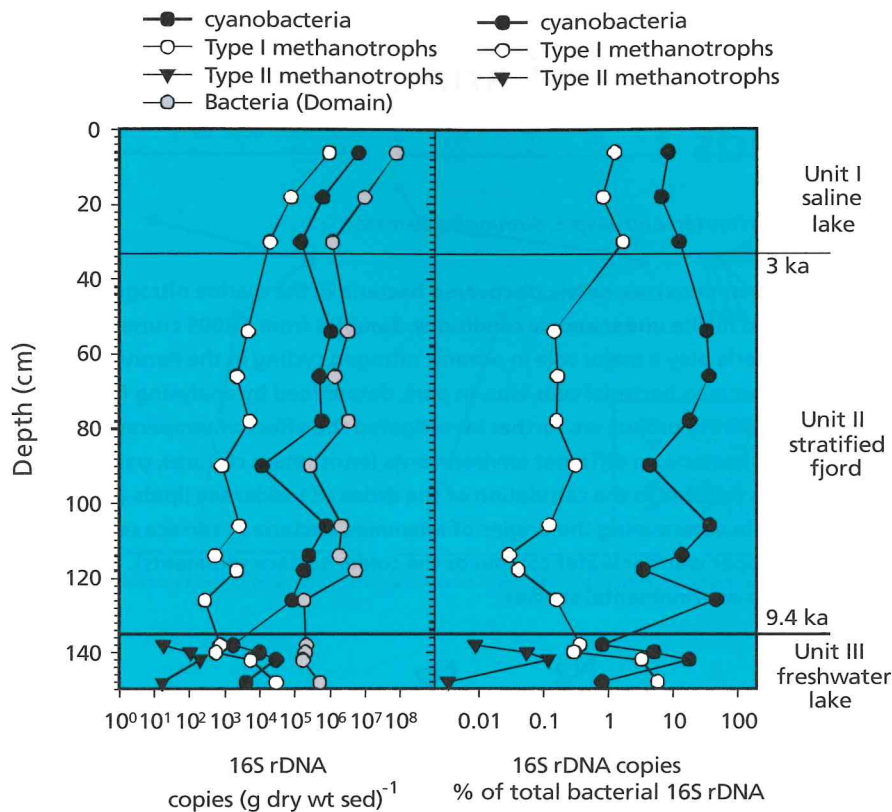


Fig. 2. Quantitative distribution of sedimentary 16S rDNA of bacteria (general), cyanobacteria, and aerobic methanotrophic bacteria (Type I and II) as revealed by quantitative polymerase chain reaction (PCR). (A); Quantity expressed as copies per gram of dry weight sediment or (B); as the percentage of total bacterial copy numbers. Unit III: freshwater sediments deposited >9,400 calendar years ago. Unit II: Post-glacial input of marine waters at 9,400 calendar years ago caused water column stratification and bottom water anoxia. Unit I: Closed stratified saline lake with anoxic bottom waters.

at least 2,500 years and we were able to identify different strains of the genera *Haslea* and *Navicula* as the Holocene sources of the HBI biomarkers.

Another aspect of the project was to study Holocene biological sources of the biomarker bacteriohopanoids in Ace Lake. Bacteriohopanoids are widespread chemical fossils in the geosphere, but because many aerobic and anaerobic bacteria have these structures in their cell walls, they are not very specific as indicators for ecological and environmental changes. Therefore, we searched for more specific genetic markers to identify the Holocene bacterial species which were the sources of these biomarker compounds, the bacteriohopanepolyols, (BHPs). A suite of intact BHPs were identified with a variety of molecular structures throughout the sediment core from Ace Lake, reflecting changes in bacteria populations caused by large changes in salinity. These large and sudden changes in salinity is caused by the fact that Ace

Lake was initially an isolated, wind-mixed and non-stratified fresh water lake until about 9,400 years ago. When the sea-level rose after the last ice-age, water from the Southern Ocean could flow over a dam into the lake, immediately sinking to the bottom because of its high salinity. Some BHPs showed an isotopically very light carbon signal ($\delta^{13}\text{C}$), which is indicative for bacteria incorporating carbon from methane into their cells. This aerobic consumption of methane must have taken place by bacteria which lived in the interface between the oxygenated fresh

surface water and the anoxic, sulfidic high-salinity bottom waters when Ace Lake had become a stratified lake as a result of post-glacial input of marine waters. In addition, aerobic methane consumption could have taken place in the top few cm of oxygenated sediment when Ace Lake was still vertically well-mixed freshwater lake more than 9400 years ago. Since oxygen is absent from the sediment record, these buried bacteria could not have been active any more, which proves that their DNA in the fossil record is ancient.

Using our fossil DNA approach, we could indeed identify several methanotrophic bacteria and some species were unique for the old freshwater sediments (>9,400 years ago). We could also identify new species of methanotrophic bacteria from the high salinity period as the sources of the isotopically very light BHPs. Furthermore, the distribution of the methanotrophic species as well as additional sources of BHPs (freshwater cyanobacteria) enabled us to refine the environmental history of Ace Lake (Fig. 2).

This project showed that preserved genetic markers can reveal a large subset of Holocene planktonic organisms varying from algae such as diatoms, to cyanobacteria and methanotrophic bacteria which carry information about past environmental conditions. In addition, the identification of species based on these preserved genetic markers can help to identify fossil sources of lipid biomarkers. As such, the combination of both methods yielded much more paleo-environmental information than expected from the individual analysis.



Control and distribution of anammox bacteria and ladderane lipids

Jayne E. Rattray, Ellen C. Hopmans, Stefan Schouten and Jaap S. Sinninghe Damsté*

Anaerobic ammonium oxidizing bacteria (anammox) are newly discovered bacteria in the marine nitrogen cycle, with the unique ability to oxidize ammonium and nitrite under anoxic conditions. Samples from a 2005 cruise have provided us with evidence that anammox bacteria play a major role in oceanic nitrogen cycling in the Peruvian upwelling. Evidence for the presence of anammox bacterial cells was, in part, determined by analysing for their unique 'biomarker' ladderane lipids. In a separate project we further investigated the effect of temperature on the production of ladderane lipids in anammox bacteria, in different environments (enrichment cultures, particulate organic matter and surface sediments). This resulted in the calculation of the index of Ladderane lipids with 5 cyclobutane rings (NL₅). The NL₅ has application in determining the origins of anammox bacteria in surface sediments (i.e. if anammox bacteria originated from the upper warmer water column or the colder surface sediments). The NL₅ index could be of relevance for future paleo-environmental studies.

Introduction

Until recently it was understood that the most important process responsible for the removal of nitrogen from the marine environment was denitrification (Fig. 1). However, in 1995 the discovery of the anaerobic ammonium oxidation (anammox) process in a wastewater treatment reactor has changed the way we view the cycling of nitrogen under anoxic conditions. Anammox bacteria performing the anaerobic oxidation of ammonium were found to be members of the bacterial group, the planctomycetes. Like all other bacteria classified as planctomycetes, anammox bacteria contain special compartments in their cell (Fig. 2a). However, unlike their closest relatives, they contain a unique compartment called the anammoxosome, the postulated site of the anammox reaction. In addition, anammox bacteria have been found to contain

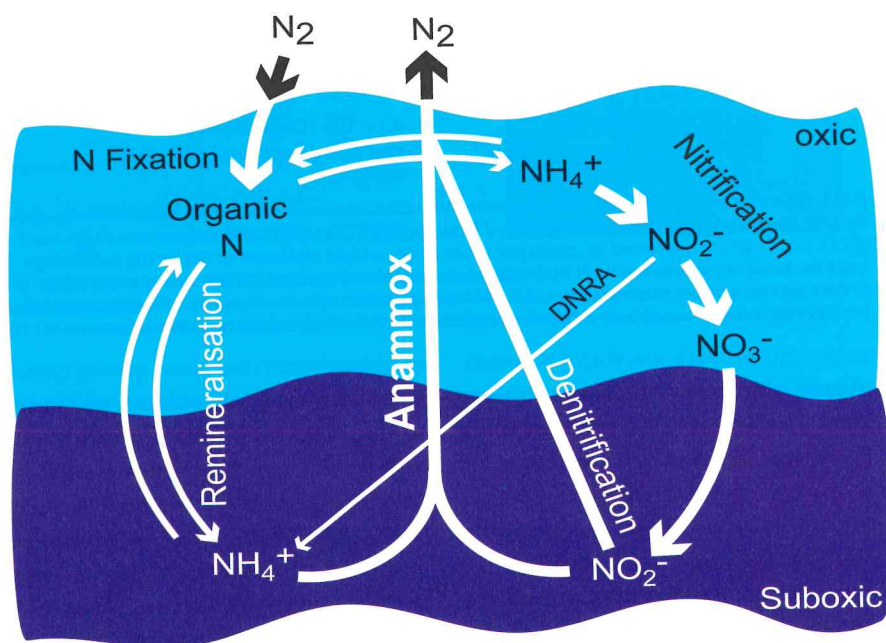


Fig. 1. Simplified version of the marine nitrogen cycle following the discovery of the anammox reaction. DNRA – disimilatory nitrite reduction to ammonium.

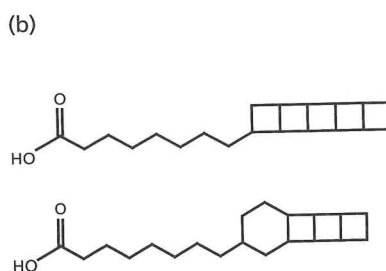
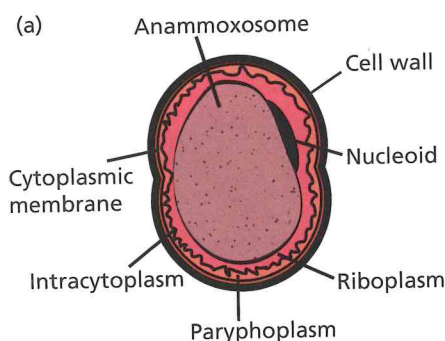


Fig. 2. The anammox cell (a) and ladderane fatty acid structures (b)

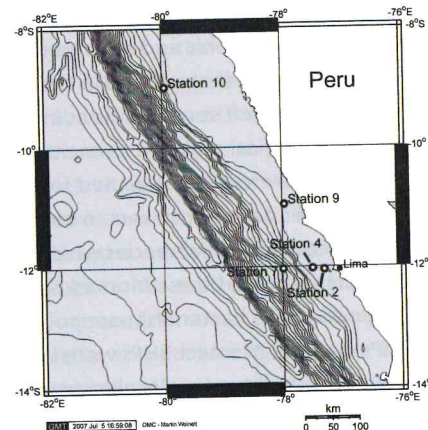


Fig. 3. Sampling sites and stations along the Peruvian oxygen minimum zone during the R/V Olaya 2005 cruise

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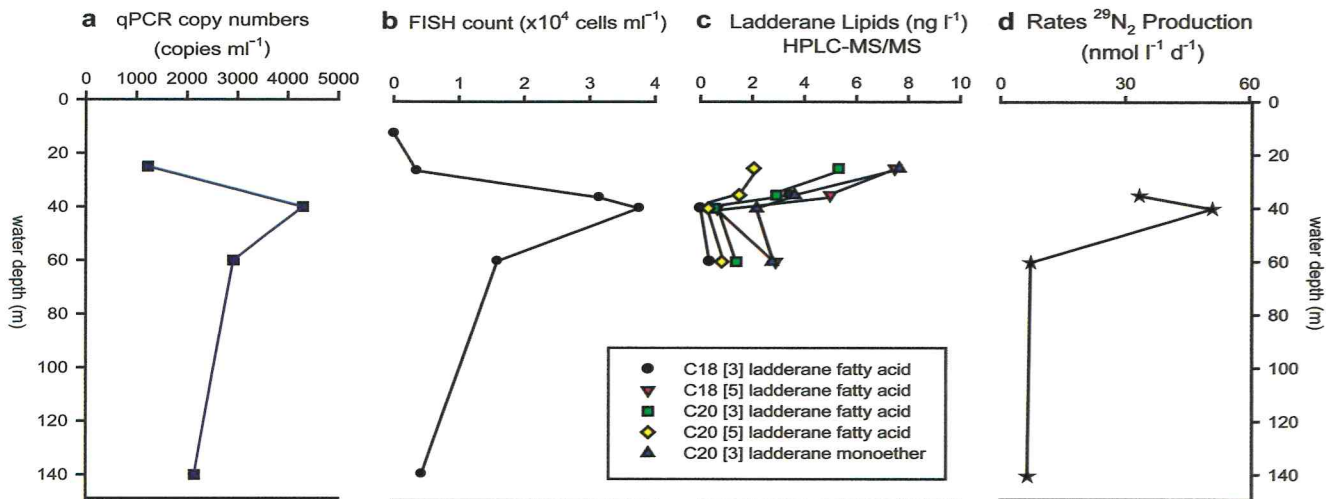


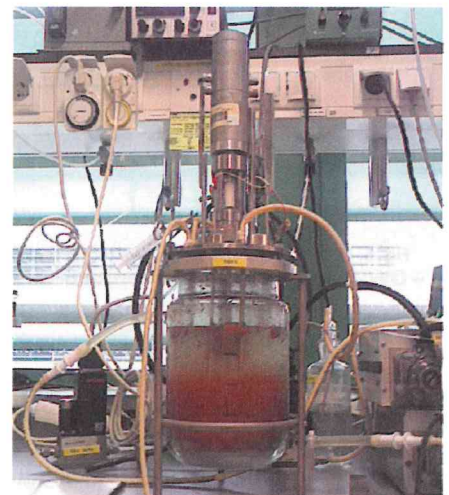
Fig. 4. Distribution of anammox cell counts, ladderane lipids and rates of N_2 production via the anammox process, at Peruvian upwelling station 7.

unusual membrane lipids with either three or five cyclobutane rings, named ladderane lipids (Fig. 2b). Since these lipids are unique to anammox they can be successfully used as 'biomarkers' or tracers for anammox cells and the anammox process.

Peruvian OMZ

The Peruvian oxygen minimum zone (OMZ) was chosen as a suitable site for investigating the occurrence of anammox bacteria, because it is an important area of global primary and secondary productivity (providing a large supply of

ammonium), and forms one of the largest oceanic masses of suboxic water. Therefore, studying this upwelling system could give us a good indication to the magnitude that the anammox process plays in nitrogen cycling on a global scale. From samples taken at the stations (Fig. 3), the rates of the anammox reaction were measured using ^{15}N -labelling techniques, the anammox species using DNA, anammox cell numbers using FISH/qPCR, and the ladderane biomarker lipids using HPLC/APCI-MS/MS. Samples were taken on board using conductivity, temperature, depth (CTD) sampling



Anammox enrichment sequencing batch reactor, used during the temperature experiment.



Sampling using CTD equipment on board the R/V Olaya

equipment, or *in situ* pumps (not shown). Typical depth profiles of the anammox rates, cell counts and ladderane lipids are shown in figure 4. In general, results showed that only the anammox process (and not denitrification) was responsible for the removal of nitrogen at all stations sampled. Thus, providing more evidence that the anammox process is a major sink for oceanic nitrogen, and thus constitutes an important process in the global biogeochemical cycling of nitrogen.

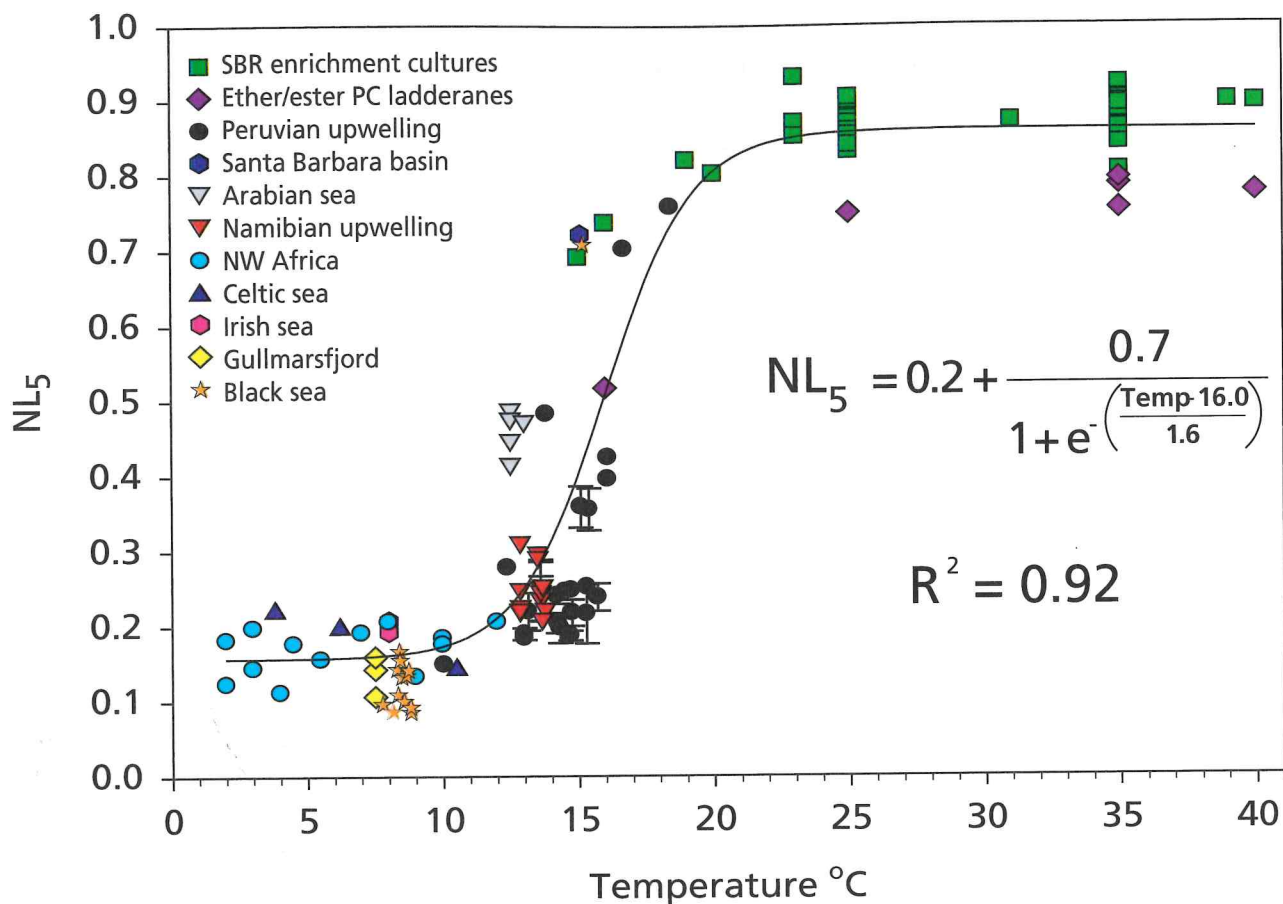


Fig. 5. Graph of the NL₅ index plotted in relation to temperature.

Temperature index

Ladderane lipids are excellent biomarkers for the occurrence of anammox bacteria however, nothing was known about what controls the distribution of these unusual membrane lipids in anammox bacteria. To investigate the influence of temperature on ladderane lipid production in anammox bacteria, an inoculum of the species "*Candidatus Brocadia fulgida*" was cultured at 35°C and then split between three different sequencing batch reactors set at 16°C, 25°C and 35°C. The biomass was cultured, harvested and the lipids extracted. Results showed lad-

derane lipids with a shorter acyl chain (C₁₈) were more predominant at lower temperatures while ladderanes with a longer acyl chain (C₂₀) were more abundant at higher temperatures. According to this relationship we were able to calculate the NL₅ index, which describes the relationship of the two different ladderane lipid chain lengths (i.e. 20 or 18 carbon atoms, where [5] is the number of cyclobutane rings) in response to temperature:

$$NL_5 = \frac{C_{20} [5] \text{fatty acid}}{(C_{18} [5] \text{fatty acid} + C_{20} [5] \text{fatty acid})}$$

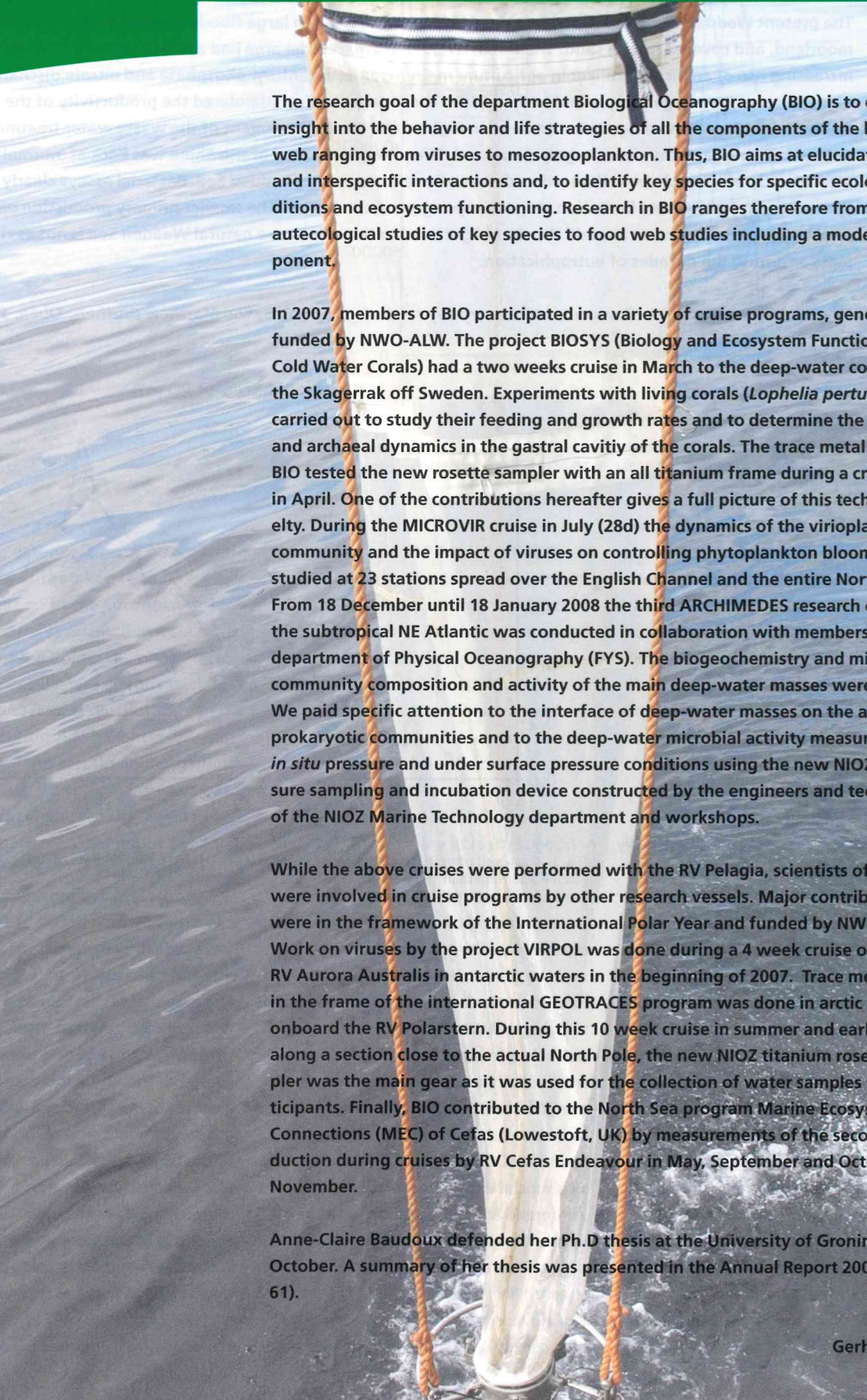
We subsequently discovered that the NL₅ relationship holds true for all ladderane lipid samples analysed, including anammox bacteria from enrichment cultures, water column particulate matter and sediments (Fig. 5). The index can be used to determine the origin of the anammox cells producing ladderane lipids in sediments (if they are water column or surface sediment derived) and therefore, the NL₅ relationship could be used in future paleo studies as an indicator to reveal the origin of fossil ladderanes.

External Projects Marine Biogeochemistry and Toxicology

- Environmental controls on present and past microbial diversity as revealed by extant and fossil DNA from Antarctic Ace Lake and Ellis Fjord (NAAP/NWO – ALW, SPINOZA).
B. Abbas, M. Coolen and J.S. Sinninghe Damsté, in cooperation with the CSIRO (Australia)
- Rapid global change during the Cenomanian/Turonian oceanic anoxic event in the tropical ocean: Examination of a natural climatic experiment in Earth history (UU).
J.S. Sinninghe Damsté, in cooperation with the Utrecht University
- Validation and paleotemperature proxies in marine and lacustrine systems (DARWIN UU).
J.S. Sinninghe Damsté, in cooperation with the Utrecht University
- Role of cyanobacteria in present and past biogeochemical cycling (DARWIN).
T. Bauersachs and J.S. Sinninghe Damsté, in cooperation with the NIOO – CEME
- Fossil DNA as recorder of global change and ancient biodiversity in Quaternary marine settings (NWO – ALW, SPINOZA).
A. Boere, M. Coolen, J.S. Sinninghe Damsté
- Bioavailability of surfactants in marine sediments (ERASM).
K. Booij, in cooperation with Aquasense and IRAS (Utrecht University)
- Contaminant fate assessment in the Berau delta (NWO – WOTRO).
K. Booij, in cooperation with the Research Centre for Oceanography – LIPI (Indonesia)
- The biophysical properties of newly – discovered membrane lipids: Insights into the functioning of cell membranes of marine microorganisms (NWO – Molecule to Cell program).
H. Boumann and S. Schouten, in cooperation with the Radboud University Nijmegen, the University of California at Davis (USA) and CalTech (USA)
- International Census on Marine Microbes (Sloan Foundation).
H. Boumann and J.W. de Leeuw
- The nitrogen cycle: foraminifera, bacteria and molecular paleontology of the marine deeper redox zone (NWO – ALW).
J. Brandsma and J.S. Sinninghe Damsté, in cooperation with the Radboud University Nijmegen and the Utrecht University
- Assessment of tropical environmental change and its teleconnections for the last deglaciation by means of high resolution biomarker analysis (NEBROC).
I.S. Castañeda, S. Schouten and G.J. Brummer (MCG), in cooperation with the University of Bremen (Germany)
- Environmental controls on ancient microbial diversity and metabolic processes as revealed by stratigraphic analysis of fossil and extant functional genes (NWO – Vernieuwingsimpuls, Veni grant).
M. Coolen
- A new sea surface temperature proxy based on planktonic archaeal membrane lipids, the TEX₈₆ (NWO – ALW).
C. Huguet and S. Schouten
- The impact of Anammox on the present – day and past oceanic nitrogen cycle (NWO – ALW).
A. Jaeschke and J.S. Sinninghe Damsté, in cooperation with the Radboud University Nijmegen and the Skidaway Institute of Oceanography (USA)
- Fate of land – derived organic compounds in the coastal ocean (Marie Curie Intra – European Fellowships (EIF).
J.-H. Kim and J.S. Sinninghe Damsté
- Bacterial anaerobic methane oxidation in high temperature environments (DARWIN).
A. Klimiuk and J.S. Sinninghe Damsté, in cooperation with the NIOO – CEME and the Wageningen University
- Development, calibration and application of independent salinity proxies (Paleosalt) (NWO/ESF EuroCLIMATE).
M.T.J. van der Meer, S. Schouten and G.J. Brummer (MCG)
- Continental climate signals from marine sediments: validation of organic proxies based on membrane lipids of soil bacteria (DARWIN).
F. Peterse and J.S. Sinninghe Damsté, in cooperation with the Wageningen University
- Global anoxic events (Ministry of Economic Affairs, Shell).
A. Mueller and J.S. Sinninghe Damsté, in cooperation with the Utrecht University, IMAU (KNMI) and Shell
- Ecology and lipid chemistry of marine Crenarchaeota in present and past marine environments (DARWIN).
A. Pitcher and J.S. Sinninghe Damsté, in cooperation with the NIOO – CEME and the Radboud University Nijmegen

- Long – chain diols as palaeoproductivity proxies (NWO – ALW).
S. Rampen and J.S. Sinninghe Damsté, in cooperation with the Skidaway Institute of Oceanography (USA)
- Anaerobic ammonium oxidation (anammox): A new shunt in the oceanic nitrogen cycle? (NWO – ALW).
J.E. Rattray, E.C. Hopmans and J.S. Sinninghe Damsté, in cooperation with the Radboud University Nijmegen and the Max Planck Institute for Marine Microbiology (Germany)
- Microbial diversity and functionality in cold-water coral reef ecosystems (MICROSYSTEMS; ESF/NWO – ALW).
A. Stadnitskaia and J.S. Sinninghe Damsté in cooperation with the University of Ghent (Be), LSCE Gif-sur-Yvette (Fr), the University of Erlangen (Ge), GeoBio-Center/LMU (Ge), MPI for Marine Microbiology (Ge) and the Geological Institute Zürich (Su)
- From hothouse to icehouse: Evolution of Mesozoic and Cenozoic sea water temperatures (NWO Vernieuwingsimpuls, Vici).
V. Wilmott and S. Schouten
- Biomarker and isotope studies of organic matter cycling in the Black Sea: A focus on bacteria and archaea (NSF).
J.S. Sinninghe Damsté, in cooperation with the Skidaway Institute of Oceanography (USA)
- Development, evaluation and application of organic geochemical tracers for terrestrial carbon input into the marine environment (NWO – ALW).
J.W.H. Weijers, E.C. Hopmans and J.S. Sinninghe Damsté
- High – resolution reconstruction of Late – Glacial and Holocene climate variability in equatorial East Africa, based on laminated lake sediments from Mt. Kilimanjaro (CHALLACEA, ESF).
J.S. Sinninghe Damsté in cooperation with the University of Ghent (Be), the Natural Environment Research Institute (Dk), the University of Amsterdam and the Geoforschungszentrum (Ge)
- Evolution and ecology of cold seep structures in the Gulf of Cadiz, NE Atlantic: interaction between the geosphere and the biosphere (NWO/RFBR program for scientific cooperation between the Netherlands and the Russian Federation).
T.C.E. van Weering and J.S. Sinninghe Damsté, in cooperation with the Vrije Universiteit Amsterdam, the Moscow State University (Russia) and the All – Russia Research Institute for Geology and Mineral Resources of the Ocean (Russia)

Biological Oceanography



The research goal of the department Biological Oceanography (BIO) is to obtain insight into the behavior and life strategies of all the components of the lower food web ranging from viruses to mesozooplankton. Thus, BIO aims at elucidating intra- and interspecific interactions and, to identify key species for specific ecological conditions and ecosystem functioning. Research in BIO ranges therefore from autecological studies of key species to food web studies including a modelling component.

In 2007, members of BIO participated in a variety of cruise programs, generally funded by NWO-ALW. The project BIOSYS (Biology and Ecosystem Functioning of Cold Water Corals) had a two weeks cruise in March to the deep-water coral reefs in the Skagerrak off Sweden. Experiments with living corals (*Lophelia pertusa*) were carried out to study their feeding and growth rates and to determine the bacterial and archaeal dynamics in the gastral cavity of the corals. The trace metal group of BIO tested the new rosette sampler with an all titanium frame during a cruise (17d) in April. One of the contributions hereafter gives a full picture of this technical novelty. During the MICROVIR cruise in July (28d) the dynamics of the viroplankton community and the impact of viruses on controlling phytoplankton blooms were studied at 23 stations spread over the English Channel and the entire North Sea. From 18 December until 18 January 2008 the third ARCHIMEDES research cruise to the subtropical NE Atlantic was conducted in collaboration with members of the department of Physical Oceanography (FYS). The biogeochemistry and microbial community composition and activity of the main deep-water masses were followed. We paid specific attention to the interface of deep-water masses on the activity of prokaryotic communities and to the deep-water microbial activity measured under *in situ* pressure and under surface pressure conditions using the new NIOZ high pressure sampling and incubation device constructed by the engineers and technicians of the NIOZ Marine Technology department and workshops.

While the above cruises were performed with the RV Pelagia, scientists of BIO also were involved in cruise programs by other research vessels. Major contributions were in the framework of the International Polar Year and funded by NWO-ALW. Work on viruses by the project VIRPOL was done during a 4 week cruise onboard the RV Aurora Australis in antarctic waters in the beginning of 2007. Trace metal work in the frame of the international GEOTRACES program was done in arctic waters onboard the RV Polarstern. During this 10 week cruise in summer and early autumn along a section close to the actual North Pole, the new NIOZ titanium rosette sampler was the main gear as it was used for the collection of water samples for all participants. Finally, BIO contributed to the North Sea program Marine Ecosystem Connections (MEC) of Cefas (Lowestoft, UK) by measurements of the secondary production during cruises by RV Cefas Endeavour in May, September and October/November.

Anne-Claire Baudoux defended her Ph.D thesis at the University of Groningen on 12 October. A summary of her thesis was presented in the Annual Report 2006 (p. 59-61).

Towards a natural Wadden Sea

Bouwe R. Kuipers* and Govert J. van Noort

The present Wadden Sea was formed less than 1000 years ago, when large floods eroded the dunes and the coastal moorland, and covered it with sand. The Dutch rivers that entered the area had a minor nutrient load. With the increasing use of artificial fertilizer in agriculture in the twentieth century, phosphate and nitrate discharge by the Rhine became very large and peaked in the 1980's. The eutrophication stimulated the productivity of the Wadden Sea but also caused anoxic spots in the German Bight. After the improvement of the waste water treatment, the nutrient discharge of the rivers largely decreased. The phosphorus load of the Rhine was back at 'normal' level by 1990 already but it took more than a decade to notice effects on the Wadden Sea. Bacterial assays clearly showed that nowadays phosphate limitation stops the spring plankton bloom. The smaller primary production will have lowered the animal production as well. We should get used to the idea that a natural Wadden Sea is not as rich in biomass as during the decades of eutrophication.

'The tide flows in, the tide flows out, twice every day returning....(song by the Matthew Brothers, Oban, Scotland, 1975)

As Prof. L. van Straaten of the Groningen University long ago used to demonstrate with a 'Russian Peat Corer' to his students, the sediment of the Wadden Sea tidal flats consists basically of a 1-1.5m thick layer of dune sand (fine, wind selected sand), deposited over 'Holland Peat'. This peat layer is at some places more than 18 m thick and was formed during the 'Holocene land formation' after the last Ice Age. It is the accumulated fossilized plant debris of extensive - and, due to the rise of the sealevel, also slowly rising - freshwater swamps behind the barrier of dunes which protected them from the North Sea. Human settlements were still present in these bogs as late as the early Middle Ages, as appears from a.o. fragments of 11th-century pottery and traces of huts and a well, found under the sand, on the surface of the peat, in the middle of what is now Balgzand tidal flat in the western Wadden Sea.

As witnessed by early medieval records of disastrous floods - which no doubt were accompanied by a new transgression of the sea - the dunes eroded and the once closed barrier fell apart into individual Frisian islands and large tidal inlets. The sea swallowed thousands of km² of medieval coastal moorland and covered the peat with sand. Ever since, the resulting Wadden Sea is flooded twice daily with water from the North Sea. Actually, the tides bring Dutch coastal water, a

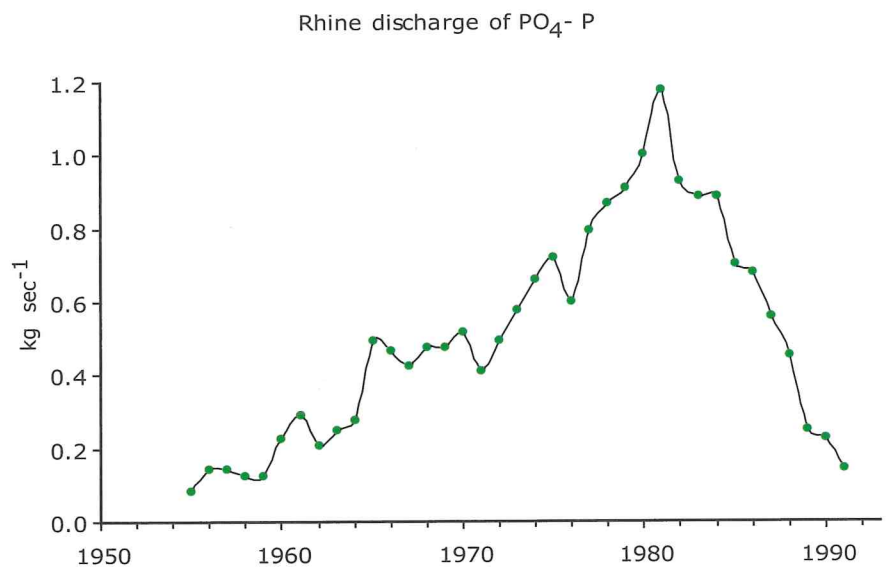


Fig. 1. Dissolved phosphate discharge of the Rhine since 1955. Based on data of Rijkswaterstaat (Cadée and Hegeman 1993, NJSR 31: 147-152)

mixture of seawater and the freshwater discharges of the rivers Scheldt, Meuse and the Rhine, into the estuary. It seems likely that during the first several ages of the young Wadden Sea, these rivers did not bring the spectacular amounts of nutrients that were regarded normal in the 20th century. Therefore, production in the area must have been less than in our time. On the other hand, the system was much larger since it still included the Zuiderzee and considerable other parts of the Wadden Sea that were later closed off or reclaimed for agriculture.

During the industrial revolution in the 19th century and after the introduction

of artificial fertilizer (1850), the Wadden Sea gradually received an increasing input of nutrients (especially nitrogen) and organic matter. In that time waste water was not treated at all. Moreover, from WW II to 1980, the phosphorus discharge of the Rhine increased 9-fold. As a consequence, primary and secondary production became so high that during several decades the estuary offered virtually inexhaustible feeding grounds for migrating birds and fishes. However, especially in the German part, anoxic waterlayers and black spots on the seabed began to show up as signs of a

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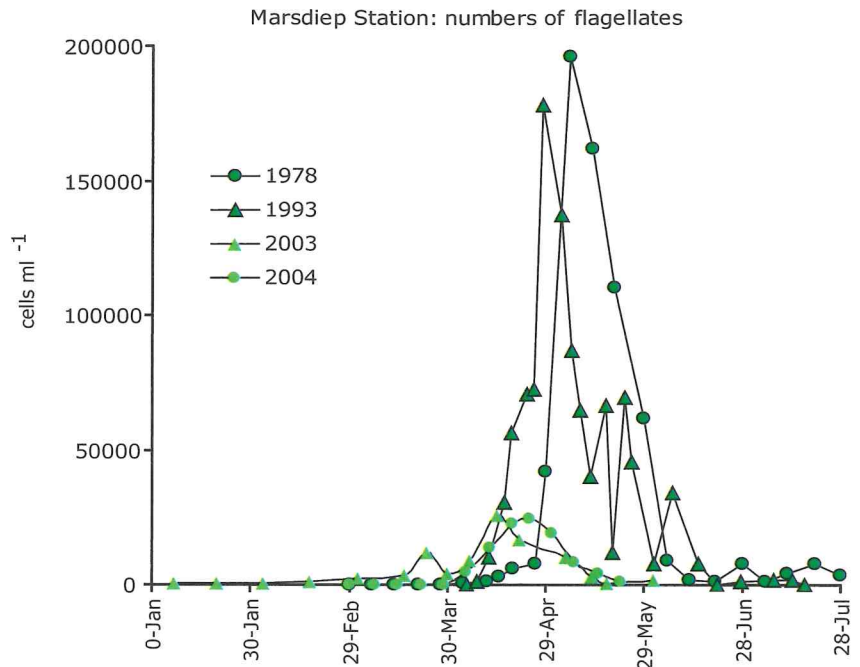


Fig. 2. Comparison of the flagellate spring blooms in 2003 and 2004 with those in 1978 and in 1993 (Cadée and Hegeman 1993; Brussaard et al. 1996, MEPS 144: 211-221).

beginning deterioration of our coastal system. Measures taken to reduce the eutrophication of the European surface waters and rivers resulted in a successful cleaning of the Rhine: the phosphorus discharge in 1990 was already back at the level of 1950 (Fig. 1). Possibly due to release of phosphorus from reserves in the seabed (and certain ongoing inputs from the land), it took many years before a significant change in the Wadden Sea in response to the cleaning of the Rhine could be established. However, since 2000 the water has become visibly clearer, the phytoplankton blooms are much smaller than during the decades of eutrophication and thick layers of foam on the beaches belong to the past. The benthic invertebrate biomass and production seems presently to decrease as well.

In order to verify if the present small spring phytoplankton blooms are actually phosphorus limited, experiments were done in the Marsdiep during the spring of 2003 and 2004. Samples were collected weekly from the NIOZ-jetty in the main tidal inlet of the western Wadden Sea, where the abundance and productivity of phytoplankton has been

monitored by NIOZ for almost 40 years now. Our experiments were bacterial bioassays using bacterioplankton, the performance of which is less complicated than bioassays with algae. Bacteria were simply separated from all other plankton by filtration through 0.8 µm pore size filters and, much easier than with phytoplankton, bacteria were incubated in the dark. Due to their much smaller size (which means a relatively larger body surface), bacteria are as least as good in taking up dissolved nutrients from the water as algae. So a shortage indicated by such bacterial bioassays holds certainly for phytoplankton at the same time.

The results were quite clear: at the time when a spring bloom really began to accelerate in the past, the algae in the Marsdiep stopped growing in 2003 and 2004 (Fig. 2). The phosphate-concentration was at that moment close to zero (0.048 µM) and the bacteria in our experiments grew faster only if the addition contained phosphate (P). While single additions of carbon (C) or nitrate (N) had little effect, bacterial growth rate responded strongly – with 5-8 times higher growth rates – between 19 April

and 10 May 2004 to additions of CNP, NP and P alone (Fig. 3).

It is quite certain that algae in the Marsdiep suffered from the same severe P-depletion, causing the very early ending of the spring phytoplankton bloom, which for decades lasted a month longer and functioned as the main annual food pulse for the huge benthic invertebrate populations of the Wadden Sea. The conclusion seems clear: the future of the wildlife in the Wadden Sea has from now on become dependent on the scarce input of phosphate into the system. This has, however, also a positive side: the future situation seems much more 'natural' than that under the heavy eutrophication during the 20^{est} century.

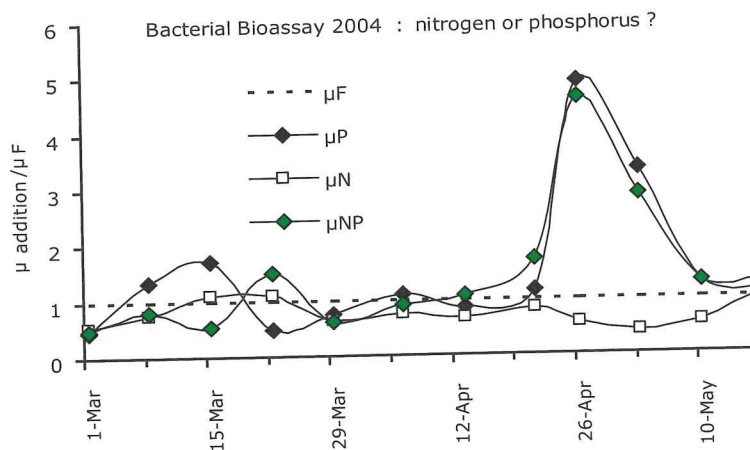
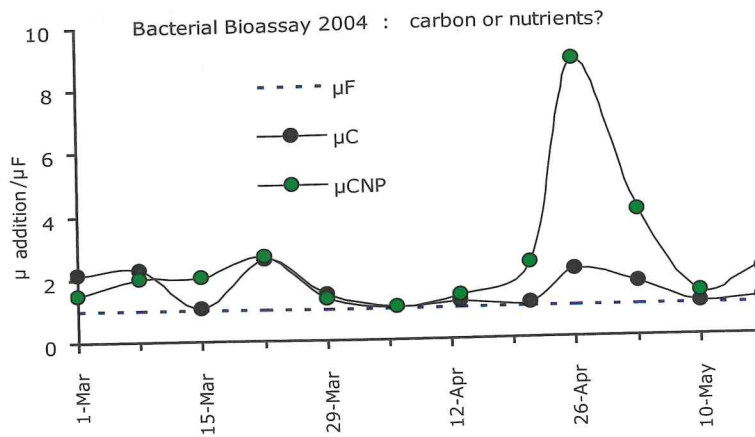


Fig. 3. Bioassay results for 2004 on the effects of additions of nitrate (μN), phosphate (μP) and/or carbon (μC) compared to the control without addition (μF).

Sponges in cavities of tropical coral reefs form major sink of dissolved organic carbon

Jasper M. de Goeij and Fleur C. van Duyl *

Large amounts of dissolved organic carbon (DOC) disappear in coral cavities, at rates equalling the primary production of tropical reefs. The dominant consumers are encrusting sponges, which cover 25% of the total surface in cavities but account for 75% of the organic matter removal. Three sponge species were studied in detail that live in association with microbes. Speculations about the role of these microbes in DOC uptake have been going on for decades. By tracing ^{13}C -enriched algal derived DOC in specific fatty acids it was shown that the microbes as well as the cells of the sponge *Halisarca caerulea* assimilate DOC. The high DOC consumption by sponges concurred with a surprisingly fast sponge cell turnover. This emphasizes the important role of cavity sponges in the processing and transformation of organic matter on coral reefs.

The research focussed on organic matter cycling in cavities in coral reefs of Curaçao (Netherlands Antilles). Flux studies revealed that coral cavities are quantitatively important net sinks of dissolved organic carbon (DOC). More than 90% of total organic carbon disappearing in coral cavities and cryptic habitats comprise of DOC. The total organic carbon removed daily in coral cavities amounted to $342 \text{ mmol C.m}^{-2}$ cryptic surface in Curaçao. The areal surface of the cavities usually exceeds the open reef surface. The cryptic surface in a coral reef may comprise up to 8 m^2 per square metre planar reef and is often the largest habitat in reefs. This implicates that the organic matter fluxes into cavities may even be up to 8 times higher than $342 \text{ mmol C.m}^{-2}.\text{d}^{-1}$, equalling the primary production on coral reefs which amount up to $2250 \text{ mmol.m}^{-2}.\text{d}^{-1}$ (Hatcher 1997). Therefore coral cavities play a key role in processing organic matter on reefs. Considerable parts of the inner walls of coral cavities are covered with a thin veneer of sponges. The DOC and bacterioplankton removal by these sponges within the cavities was compared with the removal by organisms living in or on other dominant surface components as 'bare rock' and the sandy sediments on the bottom of the caves. We selected 3 species of coral cavity sponges notably the 2.5 mm thick encrusting sponges *Halisarca caerulea*, *Mycale microsigmatosa* and *Merlia normani* for experiments. The sponges, considered representatives for the sponge commu-



A typical coral cavity with a sandy bottom under live coral overhangs (volume of ca 80 L)

nity in cavities, removed $840\text{-}1080 \text{ mmol carbon.m}^{-2}$ sponge surface. d^{-1} in incubation chambers. After closure of incubation chambers with sponge the DOC concentration in the water (average $125 \mu\text{M}$) dropped by 13-20% within 10 minutes (Fig. 1). Cavity sponges are apparently important consumers of DOC comprising 95% of their diet. Up to 75% of the organic carbon removed in coral cavities in Curaçao is estimated to be removed by sponges, despite the fact that encrusting sponges cover only 25% on average of the total surface area in coral cavities (walls and sandy bottom). The organic matter consumption by the

sediments amounted to only 18% of the total removal of organic carbon by cavities. It is obvious that in coral cavities, the encrusting sponges consume the largest amounts of organic matter, with DOC as their bulk food.

The different sponge species taken from coral cavities harbored high concentrations of microbial cells, with densities in excess of 109 per ml of sponge tissue. The role of these sponge associated microbes is still unclear. It has been speculated for decades that they play a role in DOC con-

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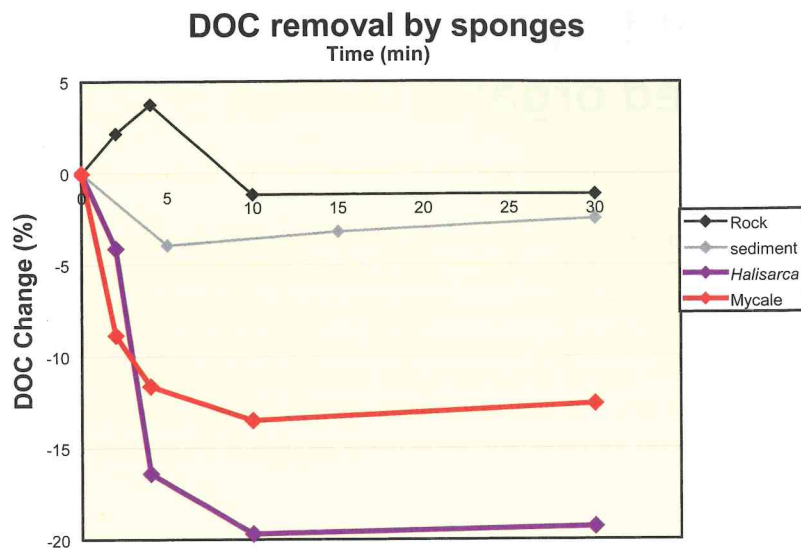
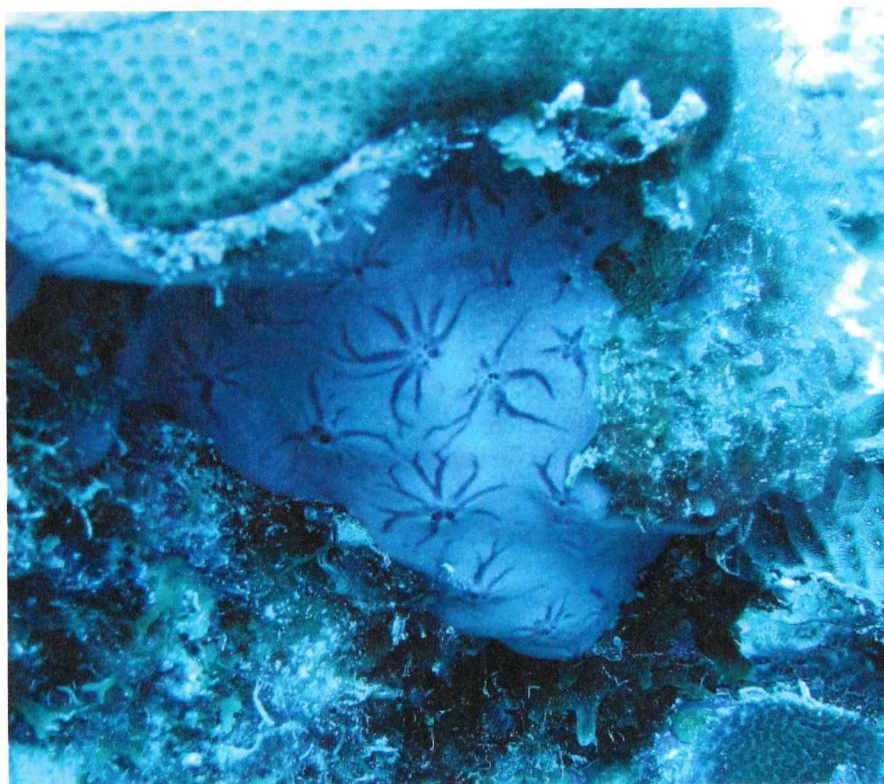


Fig. 1. The encrusting sponge *Halisarca caerulea* under a coral overhang. Note the star-like outflow openings of the sponge (oscula). Size of the sponge ca 10cm diameter.

sumption by the sponge holobiont, but proof failed as yet. In incubation experiments with ^{13}C -enriched organic matter substrates we investigated whether the sponge or its associated microorganisms are responsible for the DOC removal. ^{13}C -enriched glucose, diatom derived DOC, diatom derived particulate organic carbon (POC) and bacterioplankton respectively were added to the sponge *H. caerulea* and the fate of this material was traced in specific bacterial and sponge biomarkers. The ^{13}C enriched-glucose was marginally incorporated in sponge associated bacteria and mainly respired. The ^{13}C -DOC was rapidly (within 1h) incorporated in the sponge associated microbes as well as in the sponge evidencing for the first time that also sponge cells directly assimilate DOC. As biomarker for the sponge phytanic acid was used, a fatty acid, which cannot be synthesized by bacteria nor occurred in the diatom derived food. Certain sponges can synthesize phytanic acid from degradation products of chloro-

phyll. Particulate diatom derived food and bacterioplankton were, as expected, mainly processed by the sponge host. *H. caerulea* consistently respired ca 40% and assimilated ca 60% of the consumed organic matter. The high assimilation rate was surprising considering the relatively low biomass increase and reproductive effort.



Relative changes in dissolved organic matter concentrations in closed incubation chambers of 1.7 L with encrusting cavity sponges *Halisarca caerulea*, *Mycale microsigmatosa*, sediment on the bottom of the cavity and microbiota on bare rock in the cavity respectively.

To investigate the fate of assimilated carbon, the sponge *H. caerulea* was incubated with bromodeoxyuridine (BrdU). BrdU is incorporated in newly synthesized DNA strands during the cell division, so BrdU positive cells are actually dividing cells. Their numerical increase in time allows assessment of the proliferation of sponge cells and the duration of the cell cycle. Results showed that choanocyte cells that line the chambers of the sponge where the food is taken up, turn over rapidly, i.e. every 5-6 hour. Histological preparations of sections through the sponge revealed that "old" choanocyte cells may be shed and are removed via the aquiferous canal system of the sponge. This study on the ecophysiology of the cavity dwelling sponge *H. caerulea* contributed to our insight of the processes of organic matter cycling in sponges and to our understanding of the carbon mass balance in coral cavities.

The research was mainly funded by the Netherlands Institute for Scientific Research- Netherlands Foundation for the Advancement of Tropical Research (NWO-WOTRO).

Ultraclean sampling of trace elements and isotopes in the ocean by the TiTAN sampler

Klaas R. Timmermans*, Patrick Laan and NIOZ Marine Technology

A new international study of the biogeochemical cycles of trace elements and isotopes in the Arctic and Southern Oceans (GEOTRACES) during the International Polar Year urged the development of an improved sampling system for trace metals and isotopes. A novel rectangular frame was designed and constructed of titanium, holding two rows of 12 Go Flo samplers, as well as various CTD sensors. Testing and daily use of this TiTAN system during cruises by RV Pelagia and RV Polarstern showed that the system is ideal for ultraclean water sampling. TiTAN enables the collection of vertical sections of trace elements and isotopes at the same efficiency and resolution as hitherto only feasible for 'traditional' variables like nutrients.

In the recent past, the ultraclean sampling of ocean waters for trace elements and isotopes was a very time-consuming process. The sampling was done by using Go Flo bottles mounted on a Kevlar wire. Only 10 bottles maximally could be used per cast irrespective of depth and thus the sample capacity was limited in view of the desired resolution over the total water column. Moreover, all the bottles were mounted manually on and off the cable and carried over the deck to a clean room container for the processing. All in all, it was a time consuming and back-breaking exercise.



Traditional way of sampling trace metals.

In order to increase the number of sampling bottles, a pilot experiment was executed: a CTD rosette sampler frame was modified in such a way that Go Flo bottles could be used. The frame itself was epoxy-coated. Also, a new winch with Kevlar wire was used. This new experimental setup was successfully tested onboard RV Pelagia during the third IRONAGES cruise in October 2002, when deposition events of iron-dust from the Sahara were quantified in the waters west of the Canary Islands. The big advantage over the traditional way of sampling was the higher resolution, i.e. more depths in the water column could be sampled. However, the Go Flo bottles still had to be transferred manually to the laboratory.

A further step involved the design and construction of a novel rectangular titanium frame with 2 rows of 12 Go Flo samplers. A new pneumatic system was developed at NIOZ and used for closing the Go Flo's. Upon recovery the frame is placed inside an ultraclean laboratory container (Fig. 1) where water can be drawn via filtration units into storage flasks. The whole procedure is very time-efficient with a shipboard turnover time of 3 hours. We are now able to collect vertical sections of trace elements and isotopes at the same efficiency and resolution as hitherto only feasible for 'traditional' variables like nutrients.

The system functioned excellently and yielded large numbers of samples during a cruise by RV Pelagia in the Canary Basin in November 2005. Dissolved iron was measured by Flow Injection



The new TiTAN system.

Chemiluminescence. The concentrations of dissolved iron as obtained with the new all titanium frame were very similar to the results from the water samples collected by the traditional Kevlar wire cast. An example is given for the station at 17.5°N, 30°W (Fig. 2 left panel). Very low dissolved Fe values of ~0.4 nM (1-4 km depth) were found, similar to the values observed earlier in the Canary Basin by the prototype (epoxy-coated) CTD frame during the 2002 pilot study. For comparison, the results of the JGOFS NABE cruise program 1988/89 by the well-known Fe-studygroup led by John Martin (Moss Landing Marine Laboratories, USA) were plotted as well (Fig. 2). Although their station was at 47°N, 20°W, so north of our study area, the profiles showed great

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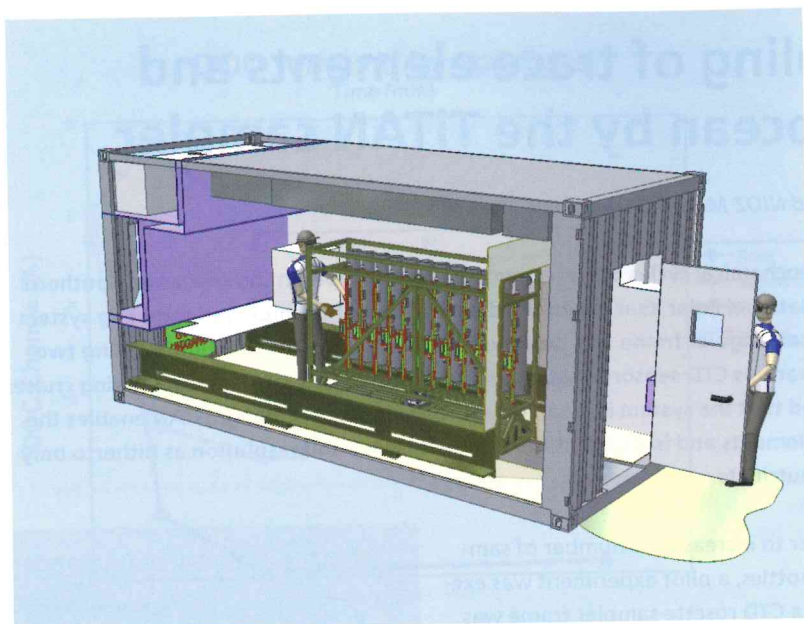


Fig. 1. Design drawing of the new frame and container.

similarity for the 1-4 km depth zone. The comparisons warrant the suitability of the new frame for trace metal sampling. Nitrate concentrations were used to check for leakages of the new closing system of the sampling bottles. Again, the new titanium frame with Go-Flo bottles proved identical to the traditional sampling systems (Fig. 2 right panel). It can be concluded that the new all titanium frame (TiTan) in combination with the clean container enables an efficient trace metal sampling of 24 depths in one cast (including CTD profile), saving expensive ship time. During the GEOTRACES cruise onboard RV Polarstern in 2007 along a section near the North Pole, the new NIOZ Titan sampler was the main gear as it was used for the collection of water samples for all participants.

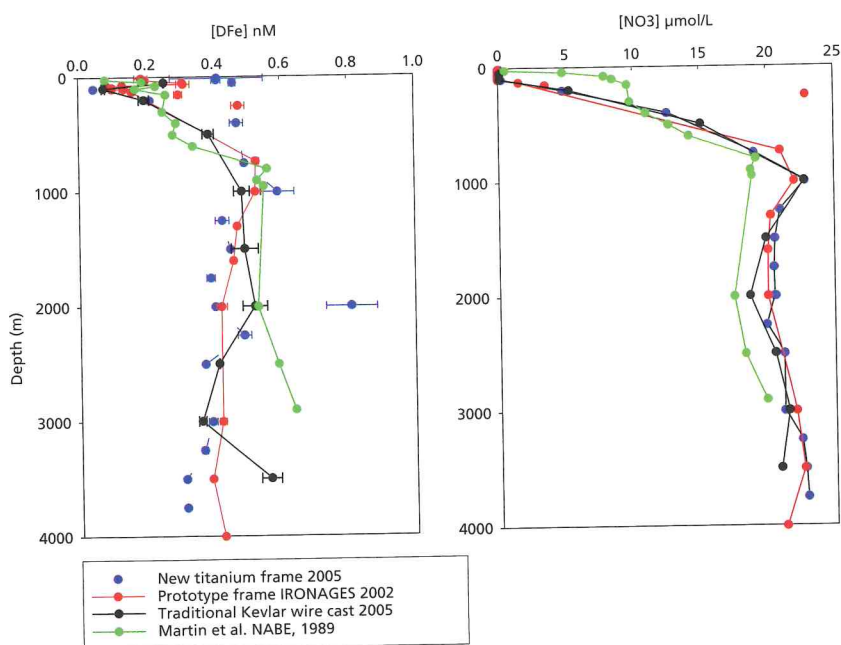


Fig. 2. Vertical profiles of dissolved iron (DFe) and nitrate (NO₃) by casts of the new all titanium frame and a traditional cast, both during the test cruise of November 2005, and compared to results by the prototype epoxy-coated CTD frame during the pilot study 2002 and data by the NABE program by Martin et al. (1993; DSR II 40: 115-134)

External Projects Biological Oceanography

- Activity, rates, carbon use and high-pressure microbial ecology of the deep sea (ARCHIMEDES, NWO/ALW).
T. Reinthaler, G.J. Herndl, H.M. van Aken (FYS) and H. Boekel (MTI)
- Pelagic Archaea in the changing coastal Arctic (PACCA, NWO/ALW – IPY).
E. Sintes and G.J. Herndl
- Prokaryotic activity in the North Atlantic deep waters assessed by MICRO-CARD-FISH in relation to bulk activity (PROACTINOR, Marie Curie Fellowship, EU).
M.M. Varela and G.J. Herndl
- Prokaryotic activity and phylogeny of oceanic systems (PAPHOS, Marie Curie Fellowship, EU).
H. Agogué and G.J. Herndl
- Microbial diversity and ecosystem functioning: concepts, open questions and recommendations for integration of microbes into general ecological frameworks (Responsive Mode Project, Network of Excellence, MARBEF, EU).
G.J. Herndl, in cooperation with Baltic Sea Institute, Warnemünde (Germany)
- Role of Saharan dust input on DOM cycling in nitrogen- vs. phosphorus-limited systems: a comparison between the subtropical North Atlantic and the Eastern Mediterranean Sea (Network of Excellence EurOceans, EU).
G. Spyres and G.J. Herndl, in cooperation with University of the Aegean, Lesvos (Greece)
- Microbial Population Structure of the World's Oceans (W. & M. Keck Foundation, USA).
M. Brink and G.J. Herndl, in cooperation with Josephine Bay Paul Center for Comparative Molecular Biology and Evolution, Marine Biology Laboratory, Woods Hole (USA)
- Influence of deep ocean viruses on prokaryotes (VIPeR, NWO-ALW).
T. Reinthaler, D. de Corte and G.J. Herndl, in cooperation with Earth and Ocean Sciences, University of British Columbia, Vancouver (Canada)
- Molecular microbiological approach to the ocean biogeochemistry (Japan Society for the Promotion of Science).
T. Yokokawa and G.J. Herndl
- Reducing the spread of invasive organisms by treating ballast water in ships (various industrial funds).
F. Fuhr and M.J.W. Veldhuis
- Virus control of the picophytoplankton *Micromonas pusilla* population dynamics in European waters (MICROVIR, ALW-NWO).
J. Martinez Martinez and C.P.D. Brussaard
- Fast Advanced Cellular and Ecosystems Information Technologies (FACEiT, 6th FWP EU).
L. Peperzak and C.P.D. Brussaard
- The significance of viruses for polar marine ecosystem functioning (VIRPOL, IPY-NL).
C. Evans and C.P.D. Brussaard
- Whole genome sequencing of a *Phaeocystis globosa* virus (GENOSCOPE, France).
C.P.D. Brussaard, in cooperation with Structural & Genomic Information Lab, Marseille (France)
- Comparative genomic analysis of viruses infecting *Phaeocystis globosa* and *Micromonas pusilla*, two eukaryotic microalgae of global distribution (US-DOE JGI, USA).
C.P.D. Brussaard, in cooperation with University of Delaware (USA)
- Rapid development of an ecosystem/ecological modelling capacity on the North Sea (DEFRA, London, UK).
P. Ruardij, in cooperation with Centre for Environment, Fisheries & Aquaculture Science (Cefas), Lowestoft (UK)
- Effect of phosphate additions on fish production (Ministry of Agriculture, Nature and Food Quality, The Hague).
P. Ruardij
- Marine Ecosystem Connections, southern North Sea. Subproject: secondary production by crustaceans (MEC, NWO-ALW 835.20.041).
S.S. Oosterhuis and M.A. Baars, in cooperation with Centre for Environment, Fisheries & Aquaculture Science (Cefas), Lowestoft (UK)
- Towards Remote Sensing supported Monitoring of the North Sea (ToRSMoN, NIVR AGI 53515).
M.A. Baars, in cooperation with National Institute for Coastal and Marine Management (RWS RIKZ), The Hague
- Sustainable production, physiology, oceanography, natural products, genetics and economics of sponges (Sponges, 6th FWP EU).
F.C. van Duyl, in cooperation with Institute for Physiological Chemistry, Mainz (Germany)
- Biodiversity and ecosystem functioning of deep water coral reefs in the Mediterranean Sea and the NE Atlantic (NWO-ALW).
C. Maier and F.C. van Duyl

- Dissolved organic matter cycling on coral reefs: Are coral cavities sinks of DOM? (NWO-WOTRO).
J.M. de Goeij and F.C. van Duyl
- Health status of coral reefs along the east coast of Kalimantan (Indonesia) (NWO-WOTRO).
M. Nugues (MEE), F.C. Van Duyl and R.P.M. Bak (MEE)
- The role of native and/or invasive ecosystem engineers in explaining biodiversity (Responsive Mode Project, MARBEF, 6th FWP EU).
F.C. van Duyl
- CARBOOCEAN (Integrated Project 6th FWP of EU).
H. Zemmeling and H.J.W. de Baar
- Prominent uptake of anthropogenic CO₂ by the Southern Ocean via Antarctic Intermediate Water (NWO-ALW).
H. Zemmeling and H.J.W. de Baar
- IPY GEOTRACES (NWO-ALW, NAAP).
H.J.W. de Baar
- Kinetic reactivity of dissolved Fe species in seawater determine the availability of Fe for phytoplankton. (sub-project GEOTRACES, NWO-IPY).
C.-E. Thuroczy, L.J.A. Gerringa and H.J.W. de Baar, in cooperation with Alfred Wegener Institute, Bremerhaven (Germany)
- Dissolved Aluminium and Manganese as Source Tracers for Iron in Polar Oceans (sub-project GEOTRACES, NWO-IPY, NWO-ALW).
R. Middag and H.J.W. de Baar
- Physical and Chemical Speciation of Dissolved Fe in the Polar Oceans (subproject GEOTRACES, NWO-IPY, NWO-ALW).
C.-E. Thuroczy and L.J.A. Gerringa
- CO₂ & ncp (BSIK).
M. Klunder and H.J.W. de Baar
- Southern Ocean primary productivity in a high-CO₂ world (NWO-ALW, NAAP).
B. Bontes, K.R. Timmermans and H.J.W. de Baar, in cooperation with Groningen University, Haren
- Improved quantification of Southern Ocean diatoms as indicators for Carbon Fixation (KERGUELEN, SRON).
M. Sligting, K.R. Timmermans, M.R. Wernand (FYS) and H.J.W. de Baar, in cooperation with Institute for Environmental Studies, Vrije Universiteit, Amsterdam
- Ocean Carbon Cycle (NEBROC-2).
H.J.W. de Baar and L.J.A. Gerringa
- Microbial carbon fixation in past and future high CO₂ oceans, sub-project "Interactions of zinc, iron and CO₂ system with polar oceans plankton in a high CO₂ world" (Darwin center – NIOZ).
A. Hoogstraten, K.R. Timmermans and H.J.W. de Baar
- The UK SOLAS Deep Ocean gas Exchange Experiment (UK SOLAS NE/C001702/1).
H.J. Zemmeling, in cooperation with the University of East Anglia, Norwich (UK)
- Time Series Measurements of Dimethyl Sulfide Dynamics at BATS.
H.J. Zemmeling, in cooperation with Woods Hole Oceanographic Institution (USA)
- Carbon dioxide emission from a Dutch intertidal estuary (CARBOOCEAN and CarboEurope).
H.J. Zemmeling, in cooperation with Imares, Wageningen

Marine Ecology and Evolution

The department aims for a mechanistic understanding of the structure and dynamic behaviour of marine macrobenthos populations and communities. Taking up one of the great challenges in modern ecology, we try to understand the properties of populations and communities on the basis of characteristics of individual organisms. We focus on the role of bottom-up (food input and competition for food and other resources) as well as top-down (predation) processes in structuring benthic communities.

The work within the department of MEE covers three major themes:

- The structuring role of top-predators in marine ecosystems
- Competition, life-history strategies and dynamic energy budgets
- Recruitment and dispersal in relation to spatial and genetic structure of benthic invertebrate populations

At the level of the individual benthic invertebrate, studies were continued on performance (e.g. growth, age and size at maturity, fecundity, survival, or more generally energy budgets) in response to food availability and other environmental conditions, as well as research on the consequences of choosing a specific energetic strategy for competitive interactions and fitness.

At the population level, we focused intensively on recruitment processes (e.g. intra- and interspecific adult-juvenile competition by means of settlement inhibition by adults, or the competition for food affecting the age and size at metamorphosis), because it has been observed that the period around the settlement of the recruits is extremely important in marine benthic population regulation. In 2007 recruitment studies were performed again in intertidal systems (Wadden Sea), shallow coastal seas (North Sea) and in coral reef communities in deep water (continental shelf edge) and in the tropics (Caribbean). In 2007 also the work on an avian predator, the red knot *Calidris canutus* and its bivalve prey was continued in the Wadden Sea as well as on the Banc d'Arguin, Mauritania. The red knot colour ring programme which started there six years ago begins to produce reliable estimates of annual survival rates in relation to habitat choice.

The department was closely involved in the 'Global Flyway Network', a foundation by Dutch law, that was established in 2006 in association with Birdlife Netherlands and Birdlife International. Using the Global Flyway network as an umbrella, the amalgamation is intended of a series of existing demographic research initiatives into a true worldwide observatory of the changing fates of shorebird populations and the habitats on which they depend.

In 2007 Jeroen Reneerkens (on preen wax composition of sandpipers), Isabel Smallegange (on interference competition and patch choice in shore crabs) and Joana Cardoso (on growth and reproduction in bivalves) defended their PhD theses.

Henk van der Veer



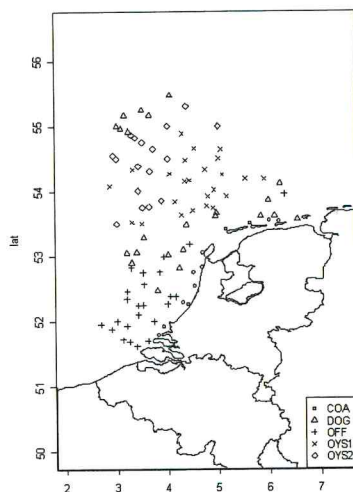
Characterizing the diversity of biological communities

Tineke A. Troost and Jaap van der Meer*

Nowadays, 'biodiversity' is generally regarded as an important indicator of ecosystem health. However, no general agreement exists on what exactly is meant with the diversity of a biological community and how it should be measured. Classical diversity indices give only a limited summary of the community of interest, while other more-informative measures are often community-specific, difficult to interpret, or not very concise. We combined these measures into a new index that contains all of their good properties.

Classical diversity indices such as Simpson's index are often used to characterize the diversity of a community. These indices focus on the number of species ('species richness') and their relative abundance ('evenness') and do not take into account how much these species actually differ from each other ('species distinctiveness'). Therefore, they give only a limited summary of the community of interest, and totally different assemblages may be characterized by similar index values. To better capture the diversity of a system, ordination methods such as 'principal components analysis' or 'correspondence' analysis are used. A disadvantage of these methods is that they are difficult to interpret and that their results cannot be compared between communities that do not share the same species.

We propose to solve the above problems by extending Simpson's index with species distinctiveness. We quantify 'distinctiveness'

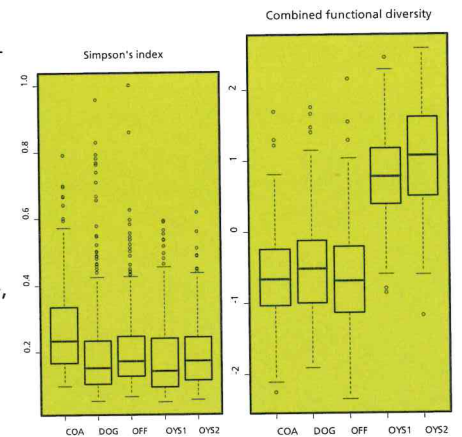


Five faunistically distinct regions on the Dutch part of the continental shelf. The Oysterground is split in two regions (OYS1 and OYS2).

ness' by means of species properties or traits that are linked to their functioning or to their effect on the system's energy flow, such as for example body size or feeding mode. For this, we combine multiple traits, as together these will give a more complete and general picture of the communities' functional diversity than a single trait. Furthermore, we make use of an ordination method. Apart from the fact that this ordination method solves the problems related to combining multiple traits, it also optimizes the functional diversity index in such a way that it will show the differences between communities with maximum clarity.

The resulting 'canonical index' provides a concise, general and unambiguous measure to characterize the differences and similarities of biological communities with respect to their functional diversity. The measure is interpretable in terms of (relative importance of) species traits, and may thus form a first step towards a better understanding of biodiversity. Furthermore, the index is optimized to clearly show differences in diversity, but it may also be optimized with respect to one or a few variables of interest. As such it may be used to study how functional diversity responds to for example environmental gradients or human disturbances.

The canonical index was successfully tested using a dataset on organisms living in and on the bottom of the Dutch part of the North Sea. In this area, five regions are recognized that are known to vary distinctly with regard to species assemblages. As expected, the canonical index performed better at characterizing



Simpson's index, does not show any distinction between the zones (left panel), whereas the newly developed canonical index (right panel) clearly separates the Oysterground from the rest.

these communities than the classical diversity indices. A second case study on oil contamination illustrated that the canonical index can indeed help to provide more insight in the effects of pollution (or other factors) on functional diversity.

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The harbour porpoise (dis-)entangled

Kees Camphuysen*

The harbour porpoise is the smallest and most numerous dolphin in the North Sea. Historically, the harbour porpoise was a common species in Dutch coastal waters, but for reasons not quite understood, it gradually disappeared during the 1950s and early 1960s. Somewhere late in the 20th century the harbour porpoise returned and we witnessed an increase in both sightings and strandings in The Netherlands. To investigate the cause of death of the stranded porpoises, NIOZ and Wageningen IMARES jointly organised two mass-necropsies. It appeared that roughly half of the porpoises found dead had drowned in fishing gear.

The harbour porpoise *Phocoena phocoena* is a small fish-eating dolphin, with a maximum length of only 1.8 m. The shallow Dutch coastal waters, estuaries and river mouths, the Wadden Sea and the former Zuiderzee (now the fresh water lake IJsselmeer) were prime habitats for this species for centuries. In the 1930s and 1940s, harbour porpoises were so common that few people kept notes and little is known about the habitat preferences of porpoises in the past. One of the pioneer researchers, studying porpoises in the wild rather than as stranded animals, was former NIOZ director dr. Jan Verwey. His descriptions of porpoises in the Marsdiep area are some of the very few first-hand accounts of their behaviour and fluctuations in seasonal abundance in Dutch nearshore waters. Comparisons of his notes made around World War II and those made by him in the 1970s illustrate that harbour por-



Fresh carcass of a harbour porpoise on the beach of Texel (photo Salko de Wolf).

poises were so rare in the 1970s, that they could be considered locally extinct. Convincing explanations for the decline have never been given. The Afsluitdijk was mentioned by some, toxic organo-

chlorines as PCBs and DDT were raised as an issue by others, but the explanations proposed have never really been conclusive.

An unexpected return

Sightings in the 1970s were near-absent and strandings were quite rare. Just over 15 porpoises were annually found stranded. A gradually increasing number of sightings in the mid-1980s to early 1990s was followed by a spectacular come-back. At first, only full-grown animals were seen and the occurrence was virtually restricted to mid-winter. In later years, thousands were recorded in winter and spring, and more and more animals were seen in summer and autumn, including mother-calf combinations. Both the historic decline and the recent increase in sightings were concurrent with similar trends in strandings. Only



Photo by: Wilbert & Corina Romijn.

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the recent increase in strandings was carefully documented: 30 year⁻¹ in the 1980s, 45 year⁻¹ in the 1990s, and c. 250 year⁻¹ in the early 21st century (Fig.1).

It is difficult to fully understand the return of the porpoise. There is evidence, however, that distributional shifts rather than population fluctuations underlie the trends observed. The re-distribution of harbour porpoises in the North Sea may have been triggered by local reductions or shifts in prey availability, in particular in the northern North Sea.

Bycatch or disease: what caused all these strandings?

So, more sightings were received and strandings increased, but was the increase in strandings simply a reflection of larger numbers roaming the area? Were there any anthropogenic factors involved that needed attention? The aim of two mass-necropsies organized by NIOZ in conjunction with IMARES (commissioned by the Ministry of Agriculture, Nature and Food Quality) was to identify the main lesions and causes of death of porpoises stranded on our coasts.

Of a total of 536 animals found in 2006, 64 were kept frozen for necropsy. Frequent observations included net marks on the skin, subcutaneous and muscular bruises, emaciation, parasitic infections, pneumonia, congestion and

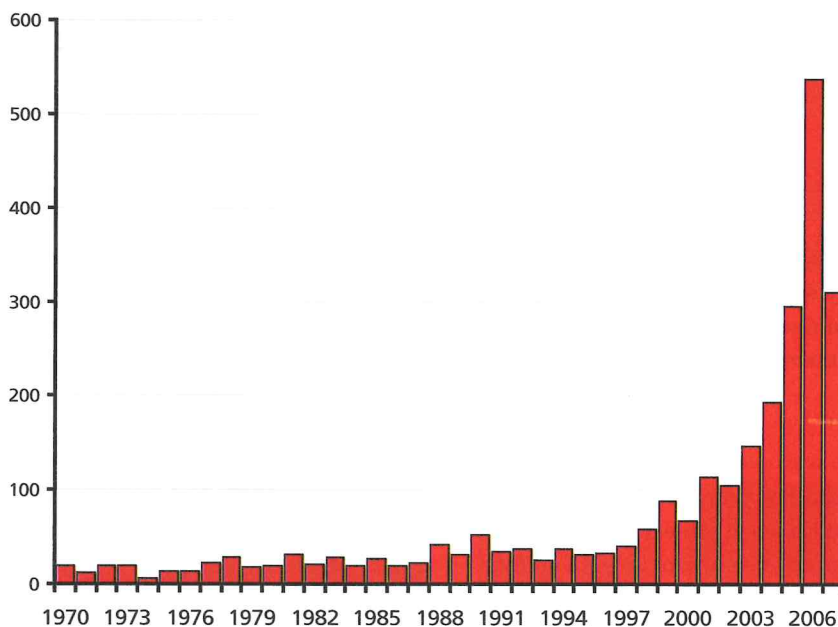


Fig. 1. Documented strandings of harbour porpoises in The Netherlands since 1970 (data from Naturalis and NIOZ).

oedema. Two causes of death were significant: by-catches in fishing gear and infectious diseases. By-catch in fishing nets (64%) was mainly observed in animals stranded in March and April while infectious diseases (30%) occurred throughout the year. The study showed that the diagnosis of the cause of death cannot be based on external observations only, and that by-caught porpoises are not always healthy. In 2007, 55 individuals out of a total of 310 stranded animals were kept for necropsies, this time organized by the veterinary faculty of Utrecht University. The diagnosis "proba-

bly by-catch" was made in 48% of the necropsies, but this figure is prone to modification following the results of histopathology of the tissues sampled. Of the suspect animals, 54% were in a good physical condition when they were drowned, but the rest were emaciated. Several cases of pneumonia and parasite infections were found.

And the latest trend...

And now for 2007. Declines were reported again! Strandings declined with 42% relative to 2006 and sighting rates declined markedly, indicating that harbour porpoises had not returned with the same strength in numbers in the course of 2007. There are currently small resident populations in the Delta area, small groups of animals that are around throughout the year. Along the North Sea coast, however, there was a recently established seasonal pattern of very low numbers in summer, and peak numbers in winter and early spring. This seasonal pattern would imply that the porpoises 'arrive' in the course of autumn and leave in late spring, probably for foraging areas elsewhere. Early signs received in 2007 suggest that the picture might change. Obviously, the decline might be a temporary fall-back in numbers followed by a return in years to come, but given other dramatic changes in the



Preparation for dissection.

North Sea in recent years, we should not be surprised by a more structural decline in wintering numbers in our country. Given the high bycatch rates of stranded animals and the fact that extensive set-net fisheries are currently developing, this retreat could well be to the benefit of the porpoise. Bad luck for the whale-watchers, however, sailing the TESO ferry across the Marsdiep to Texel had only just become a whalewatching experience again!



Careful dissection of a stranded harbour porpoise by a pathologist.

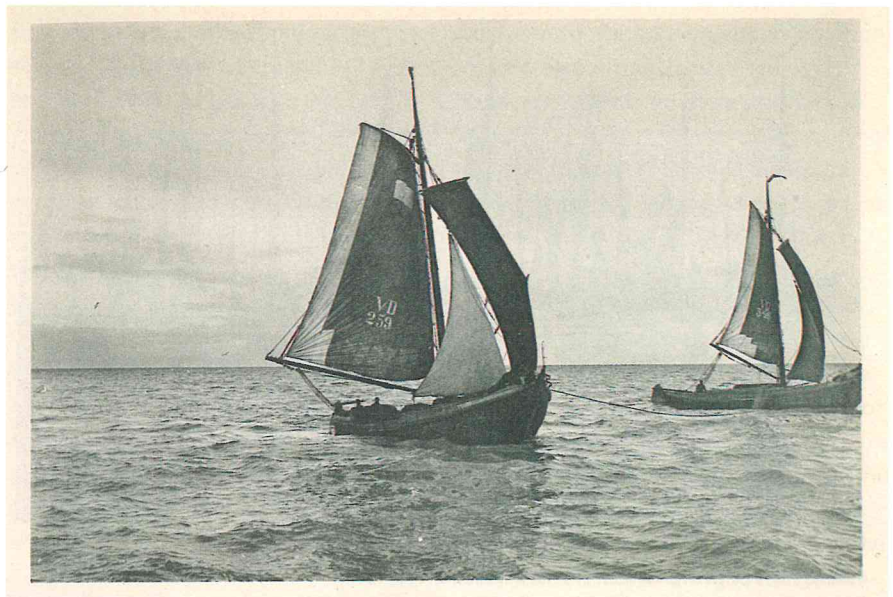
External Projects Marine Ecology and Evolution

- Macrozoobenthos monitoring in Wadden Sea and Ems-Dollard (BIOMON, RWS-RIKZ)
R. Dekker and C.M. Waasdorp
- Fragile biodiversity linkages: production and consumption in a nutrient-poor seagrass-dominated intertidal ecosystem, the Banc d'Arguin, Mauritania (NWO-WOTRO).
J. A. van Gils, M. van der Geest, T. Piersma and J. van der Meer, in cooperation with Parc National du Banc d'Arguin (PNBA; Mauritania), University of Nouakchott (Mauritania), Groningen University, University of Nantes (France).
- Marine propagation along the coasts of Europe (MarPACE, EU).
C.J.M. Philippart, in cooperation with 20 European marine research institutes.
- Effects of the construction of an offshore wind park on macrobenthos (NZW, NUON/SHELL).
R. Daan, M. Mulder & M.J.N. Bergman.
- Effects of the offshore wind park Egmond aan Zee (OWEZ) on recruitment of benthos (NZW, NUON/Shell).
P. van 't Hof, M.J.N. Bergman and G.C.A. Duineveld.
- Hotspot ecosystem research on the margins of European seas, workpackage 2: Deep water coral reefs (HERMES, EU).
M.S.S. Lavaleye and G.C.A. Duineveld.
- Climate-related shifts in the NCP ecosystem, and consequences for future spatial planning (BSIK, Klimaat voor Ruimte).
G.C.A. Duineveld, R. Witbaard and J. van der Meer
- MER Venus fisheries in Mauritania, maerl bottoms (IMARES).
M.S.S. Lavaleye and G.C.A. Duineveld.
- Biodiversity and ecosystem FUNCTIONING in contrasting southern European deep-sea environments (BIOFUN, ESF).
R. Jeffreys, G.C.A. Duineveld and M.S.S. Lavaleye.
- GIS-charts of bottom fauna for an offshore wind farm (BSIK, We@Sea).
M.S.S. Lavaleye.
- Biodiversity of the High Seas (IMARES).
M.S.S. Lavaleye.
- Global Flyway Network: the shorebird ecological demographics and conservation initiative (BirdLife Netherlands).
T. Piersma.
- Size dependent predation risk for young bivalves (NEBROC)
H. Andresen and J. van der Meer
- KRW benthos (KRW, RIKZ)
J. Drent and J. van der Meer
- Structural and functional diversity (SUSUSE, NOW-ALW)
T. Troost and J. van der Meer
- Ecology of estuarine and coastal macrobenthos (NIOZ - NIOO-CEME)
P. Honkoop and J. van der Meer
- Beached bird survey monitoring programme (RIKZ)
C.J. Camphuysen
- Critical interactions BETWEEN Species and their Implications for a preCAUTIONARY fisheries management in a variable Environment - a modelling approach (BECAUSE, Leibniz Institut für Meereswissenschaften an der Universität Kiel)
C.J. Camphuysen
- Conservation of marine areas in Portuguese waters (SPEA/BirdLife, Lisboa)
C.J. Camphuysen
- Chronic oil pollution in Europe (IFAW, Brussels)
C.J. Camphuysen
- Porpoise bycatch issues in European waters (IFAW Brussels, MUMM/BMM /UGMM)
C.J. Camphuysen
- Harbour Porpoise dissections (Imares, University of Utrecht)
C.J. Camphuysen
- Nearshore windfarm seabird observations (Imares, Texel)
C.J. Camphuysen
- Impact of oil spills on seabirds (DG Environment, Sea Alarm Brussels, University of A Coruña)
C.J. Camphuysen
- Het gebruik van zeetrekellingen bij de analyse van populatieveranderingen in de Noordzee kustzone (SOVON)
C.J. Camphuysen
- Reducing the Impact of Oil Spills (RIOS)
C.J. Camphuysen

Fisheries research in the former Zuiderzee: the report of 1907

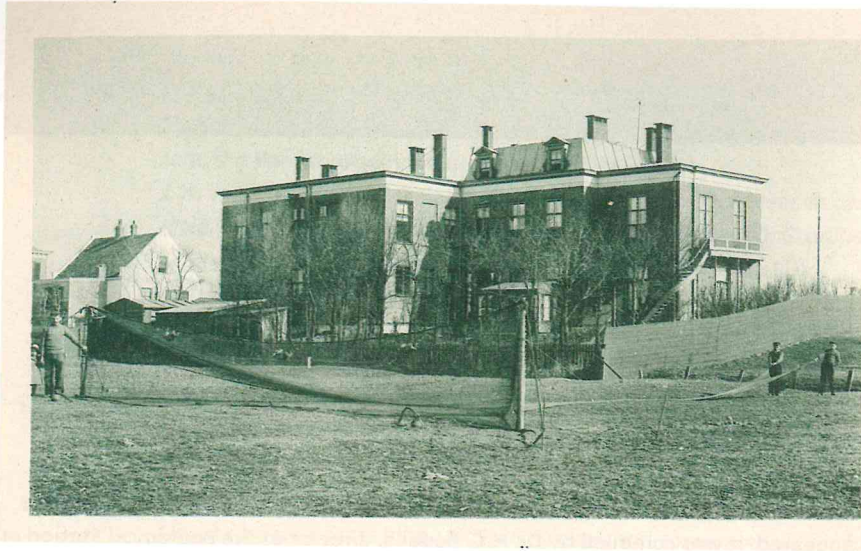
*Martien Baars**

Hundred years ago an extensive study on the fisheries in the brackish Zuiderzee appeared. It was compiled by Dr. H.C. Redeke, director of the Zoological Station in Den Helder, and his report can be regarded as an important precursor of modern fisheries research studies. The description of the Zuiderzee fisheries also became historical: many fishermen lost their job when 75 years ago the 'Afsluitdijk' closed the Zuiderzee.



Ships from Volendam fishing with the 'wonderkuil'

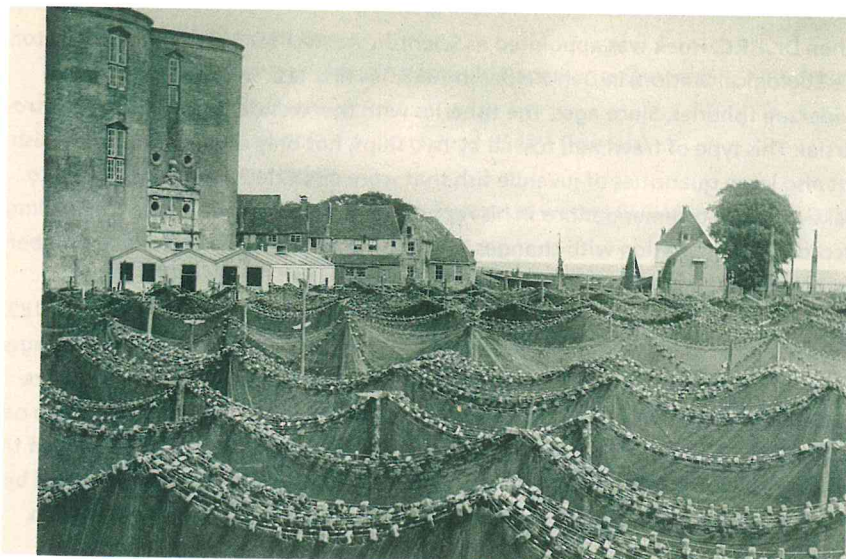
When Dr. P.P.C. Hoek was appointed as Scientific Advisor for Fisheries (and director of the Zoological Station) in Den Helder in 1888, his first task was to report on the Zuiderzee fisheries. Since ages, the fisheries with the 'wonderkuil' had been controversial. This type of trawl net, towed by two ships, not only caught commercial fish but also large quantities of juvenile fish that were discarded. Hoek was unable to make strong recommendations in his report of 1889. Statistical flaws in the landing records, in combination with changes in the fishing effort by an increasing number of fishing ships and gear types, hampered the analysis of the fisheries of the Zuiderzee. Due to Hoek's report, more systematic catch records were started in 1892. After the bad fishing seasons of the years 1903 and 1904, many fishermen messaged the authorities the complaint that the fisheries by the 'wonderkuil' caused severe depletion of fish stocks. The Council for Fisheries charged Dr. H.C. Redeke with a new study on the Zuiderzee fisheries. Redeke was the successor of Hoek as director of the institute in Den Helder. The building hosted both the Zoological Station (owned by the Netherlands Zoological Society) and the new State Institute for Sea Research, dedicated to fisheries.



The 'wonderkuil' on display behind the Zoological Station, Den Helder



Fishing ships (with 'wonderkuil') in the harbour of Volendam



Drift nets for anchovy fisheries, Enkhuizen

During the preparation of the report of 1907, Redeke could analyse the catch registrations in 15 fishing harbours over a period of 15 years, 1882-1906. These harbours were (in alphabetical order) Bunschoten, Durgerdam, Elburg, Enkhuizen, Harderwijk, Hoorn, Huizen, Kampen, Lemmer, Marken, Medemblik, Monnikendam, Urk, Volendam and Vollenhove. Prices per kilogram were lowest for shrimp (2.5 – 4.5 cents per kg) and herring (3 – 10 cents), and highest for eel (12 – 38 cents) and anchovy (14 – 61 cents), respectively. Flounder and sandeel, with intermediate prices, were other important species. Prices varied largely from year to year but also depended on the way of fishing. Fish caught by the 'wonderkuil' was of lower quality and sold for much lower prices than when caught with other gear. In his analysis, Redeke could not confirm the decline for the fisheries as a whole. The complaints after 1903 and 1904 seemed to be due to the low catches of anchovy - the fish with the highest price but also with the most irregular abundance in the Zuiderzee. The total catch of commercial fish species was not particularly low in these years. The statistics presented showed a variation by a factor of 2 in the total amount of fish. Records were lowest in 1895 and 1896 with total amounts of 8.3 and 8.4 million kilograms, and highest in 1901 and 1902, with 16.8 and 16.5 million kilograms, respectively. The fluctuations in the catches were irregular and did not indicate a persistent decreasing trend. However, the high densities of fishing ships and the conflicts between fishing with towed gear versus fishing with static gear, urged Redeke to recommend the building of organisational structures. Until then, the fisheries had no structure whatsoever, and everybody was free in his way where and when what fish to catch. Redeke proposed, among others, to license the fisheries and to form a representative body of fishermen. This would be the official body towards the government but should organize and supervise the fisheries themselves. Redeke suggested an 'extinction strategy' for the 'wonderkuil': permits should be given to the current users but should be withdrawn once the permit-holders stopped fishing.



Ship from Enkhuizen for anchovy fishing

The report by Redeke in 1907 also documented the Zuiderzee fisheries visually. Photographs were taken of various types of fishing ships and fishing techniques. The collection of pictures in the report became well-known and several examples are depicted here. Besides the description of the fishery data and methods, also a series of research cruises was executed in the Zuiderzee. Main ships were subsequently the 'Zeemeeuw', the 'Amsterdam' and the 'Kampen', but small fishing ships were also used. The research group under the leadership of Redeke comprised Dr. P.J. van Breemen (fish and plankton studies), Dr. W.E. Ringer (hydrographic observations and the photographer), Dr. G.J. de Groot, Dr. J.J. Tesch and several other people from universities and the navy. The catches and measurements during these cruises contributed

to the knowledge of the biology of the six commercial species. There was an innovative research experiment with marked flounders. The fish were marked with numbered copper plates. These were attached with a silver thread to the dorsal side of the fish. A total of 514 flounders were marked and released at several sites between September 1905 and April 1906. No less than 284 (55%) were recaptured by fishermen by the end of December 1906. Most recaptures occurred in the Zuiderzee itself but 17 marked specimens were caught along the North Sea coast. Nine of these fishes were reported as far as the French Channel coast, including 2 fishes in the Seine estuary near Le Havre. The hydrographical studies during the cruises involved temperature and salinity, oxygen concentrations, nutrients (nitrogen compounds and silicate). Van

Breemen found very high densities of diatoms and copepods compared to the North Sea. The diatom abundance was regarded responsible for the large numbers of bivalves in the sediment (preyed upon by the flounder). These first observations of the short food chain in the Zuiderzee, suggested a very high productivity of this shallow sea. However, it soon became clear that the productive Zuiderzee and its fisheries would persist only for another twenty five years after the appearance of the report by Redeke's report in 1907.

The closure of the Zuiderzee

The first idea to close the Zuiderzee dates back to Hendric Stevin (son of the famous engineer and mathematician Simon Stevin) in 1667 during the Golden Age. A realistic design for a closure dike was made by Cornelis Lely in 1891 as the first step for the subsequent reclamation of new agricultural land in the Zuiderzee. However, there was no governmental budget for the construction of the ambitious 'Afsluitdijk' ('Enclosure dike'). The plans revived when some real disasters had occurred. A storm flood during 13 and 14 January 1916 caused casualties and a lot of damage around the Zuiderzee. At several sites the dikes broke and a number of polders flooded. A subsequent storm flood in the night of 22 to 23 February that same winter caused another 16 casualties at the Island of Marken. Besides these disasters, the famine in The Netherlands in 1918 at the end of the Great War urged the government to look for new reclamation areas for agriculture. The bill on the Zuiderzee Works passed the Dutch parliament in 1918. A first dike from the mainland of North-Holland to the island of Wieringen was built during 1920-1924 and thereafter the building of the 30 km long 'Afsluitdijk' started. The work was accomplished on 28 May 1932. The bill on the Zuiderzee Works intensified the hydrobiological research in the area. The Netherlands Zoological Society (NDV) made a plan to describe the present state in a series of monographs on the Zuiderzee. Redeke again played



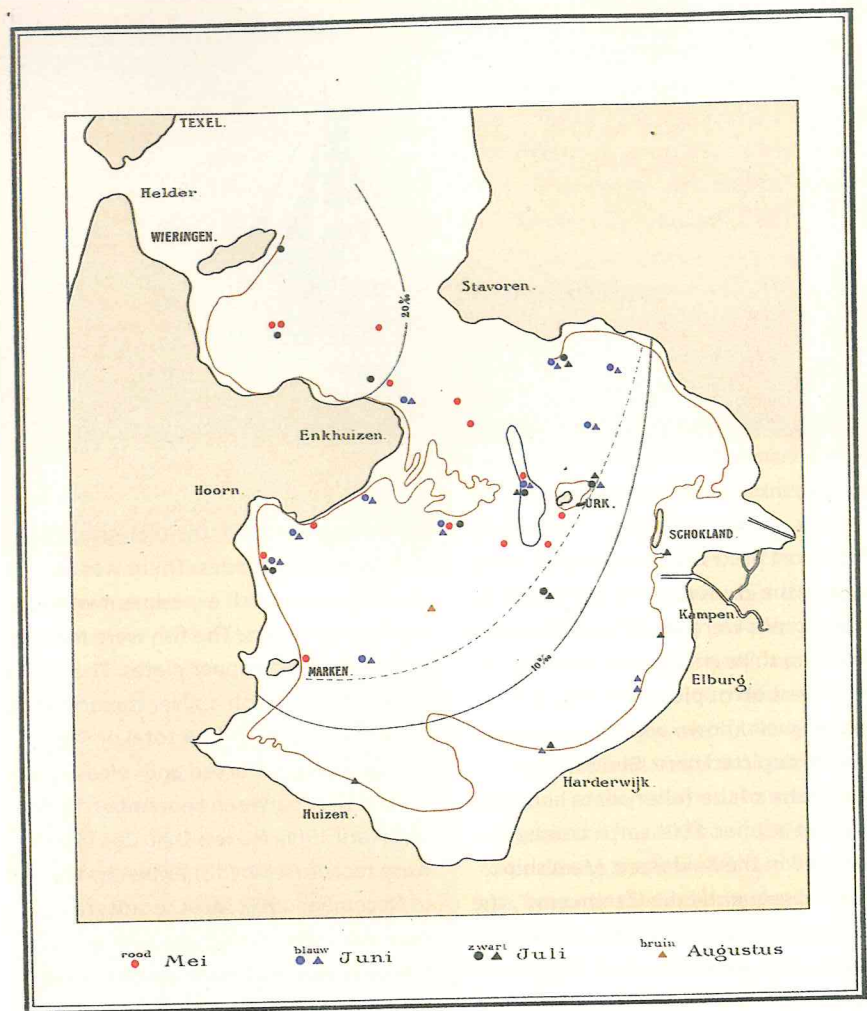
Men from Lemmer preparing bait for fisheries on flounder

an important role in the research and the processing of the data. A first report was already published in 1922, followed by other reports in 1929 and 1936. A final report in 1954 described the whole transformation of Zuiderzee into IJsselmeer. After the closure, the new IJsselmeer turned from brackish into a completely freshwater body in a number of years. The marine species herring, anchovy, sandeel and shrimp, all disappeared.

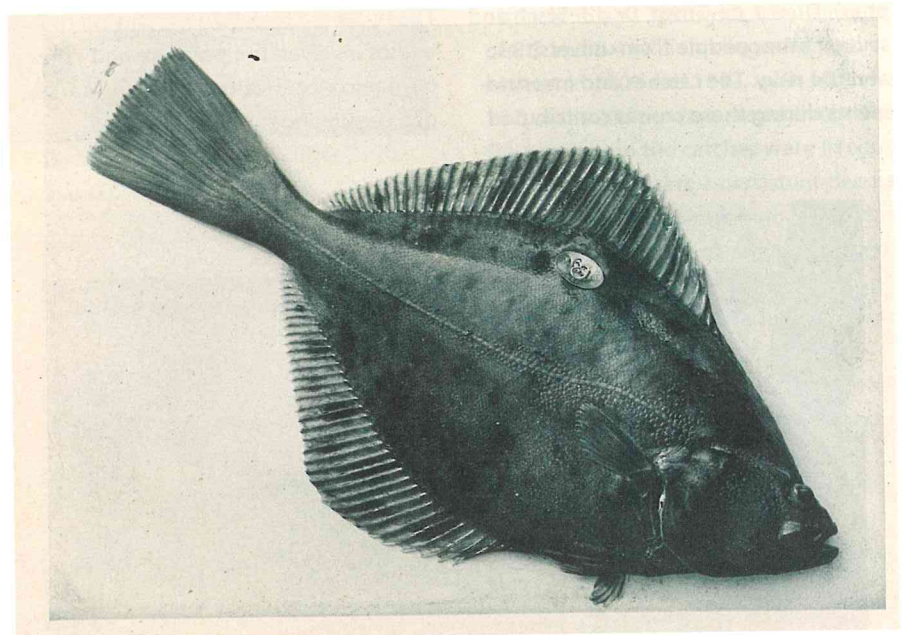
During the many years of planning and construction of the 'Afsluitdijk', the fishermen of the Zuider Zee had often protested against the closure since most of them would have to look for another job. Eibert den Herder in Harderwijk was their most active leader and he used film, photography and paintings to illustrate the uniqueness of the Zuiderzee fisheries. Once the battle for the Zuiderzee was lost, the fisheries on eel was the only branch that remained and this fishery grew to about ten-fold the former size. New fisheries on the freshwater species pike-perch and perch could not replace the other important old fisheries and only part of the fishermen kept their profession. Den Herder and his sons went into the tourist business and founded the Dolfinarium in Harderwijk. In the current plans for renovation of the 'Afsluitdijk', also ideas are discussed to create large openings, which would result in a more regular change from fresh- to seawater than the abrupt changes at the two sluices now present. In this way part of the former brackish character of the Zuiderzee area could be restored.

Acknowledgements

Gerhard Cadée suggested this overview to commemorate the appearance of Redeke's report one century ago. He and Willem Dekker (Imares) also improved the text. Bert Aggenbach helped with the reproduction of some of the original illustrations.



Map with the distribution of anchovy eggs and larvae in 1905



Marked flounder

Scientific Support Services



Marine Research Vessels and Facilities

Marieke J. Rietveld*

The NIOZ research vessel *Pelagia* sailed 317 operational days in total for 16 cruises during 2007. The National Programme for Sea Research comprised 8 cruises by *Pelagia* and another 3 projects by other research vessels. Active participation in the Ocean Facilities Exchange Group (OFEG) continued.

Marine Research Facilities

The Netherlands Marine Research Facilities (MRF) is a national structure integrated within NIOZ. MRF advises the Earth and Life Sciences (ALW) of the Netherlands Organisation for Scientific Research (NWO) on the technical, logistic and financial aspects of the National Programme for sea research. MRF supplies suitable ship capacity, dedicated technicians and sea-going equipment. When sea-going research projects have been approved of and granted by ALW, MRF assists the chief scientists in their planning, preparation and execution of the cruises. MRF also advises ALW on long-term investments, in consultation with the financial department and marine technical services of NIOZ and the advisory committees on CTD systems, auto-analyser systems, moored instrumentation systems, bottom sampling and seismic systems and biological sampling systems. Scientists and technicians from all Dutch groups involved in sea-going research participate in these advisory committees for pooled equipment. The Long Term Planning on MRF investments is updated every year and the update for the years 2007 – 2011 was submitted to NWO/ALW.

NIOZ/MRF is responsible for the maintenance of the national equipment pool and NIOZ runs several marine research vessels and other facilities for accommodating scientific programmes of the oceanographic community in the Netherlands. NIOZ participates with its multipurpose RV *Pelagia* and its equipment pool in the Ocean Facilities Exchange Group (OFEG), wherein ship-time is exchanged between partners on a bartering basis.

Research vessels

Research vessel *Navicula* is a 25 m NIOZ research ship specially designed for working in the shallow Wadden Sea. She has been built in 1980, and elongated in 1999, with a major upgrade in 2004. In 2007 an overall fire monitoring and alarm system has been installed. RV *Navicula* sailed for 187 days and also worked in the German and Danish part of the Wadden Sea.

The largest sea-going facility is RV *Pelagia*, a 66 m NIOZ research vessel developed for oceanographic research in coastal seas, on continental shelves and in the blue ocean. RV *Pelagia* was built in 1991 (ISM Certified) and was specially designed as a multipurpose research vessel with most favourable nautical and acoustical properties, with a very low noise level due to diesel-electric drive. Scientific gear used onboard comprises a variety of CTD-systems and water samplers (including the Ultra Clean CTD system TiTAN), diverse biological sampling methods, seismic surveys, deep tow sonars, coring activities (box-, multi-, pis-



Testing the MOB boat.

ton, gravity, vibro-, CPT) as well as deployment and recovering of deep-sea moorings and bottom landers, including a deep sea crawler (MOVE!). Since 2006 RV *Pelagia* is equipped with a KONGSBERG EM 300 1 x 2 degree Swath multi-beam echo sounder for shallow and deep water.

In 2007 the implementation of the recommendations of the Committee Future *Pelagia* (CFP) resulted in an amended labour agreement for the members of the *Pelagia* crew.

Since RV *Pelagia* is now over 15 years of age and has come to the midterm of her operational life time, an expertise survey was held for the development of a long term maintenance plan for the remainder of the ship's operational life, and to decide on the right moment for a mid-life conversion. The expert's report will be presented to the NIOZ board at the beginning of 2008.

Recovery of ALBEX lander after one year of deployment in Witthard Canyon.
Photo: Carlo Fiori.

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RV Pelagia cruise programme 2007

After a four week maintenance period, RV PELAGIA sailed for 317 operational days, including a barter cruise of 26 days for a science team of Bremen University. In August a survey was done in the North Sea on a 28 days commercial charter. On 31 August 2007, just before the ship was sailing out for a research cruise in the northern North Atlantic, NIOZ could offer a possibility to the research council NWO to invite the standing Dutch Parliament Committee for Science & Technology, and give a presentation of the NWO science policy on board RV Pelagia in Scheveningen harbour.



RV Pelagia leaving Galway harbour packed with gear end of September 2007. Picture Courtesy GalwayShips.com.

Science projects were funded by the Netherlands Research Council NWO (also funding 92 days ship time), the European Union (no ship time funding), and NIOZ (175 days of which 98 days for the NWO National Programme and 19 matching EU/IGBP projects); 50 days were funded by charterers and other third parties. An overview of the Pelagia cruise program 2007 is presented below and this over-

view also comprises the cruises by other research vessels with Dutch participation. Details of the cruises within the National Programme (funded by NWO) are given in the next subchapter.

To accommodate the cruises by RV Pelagia, diplomatic clearance has been granted by Denmark, France, Germany, Iceland, Ireland, Morocco, Norway,

Portugal, Spain, Sweden and UK. Besides calling at homeport Texel, port calls for change of crew and scientific party as well as (un)loading scientific equipment took place in Brest (France), Cuxhaven (Germany), Caniçal and Funchal (Madeira-Portugal), Lisbon and Portimão (Portugal), Cork and Galway (Ireland), Aberdeen (Scotland - UK), Lysekil (Sweden) and Fortaleza (Brazil).

Cruises by RV Pelagia and by NIOZ parties on other ships during 2007

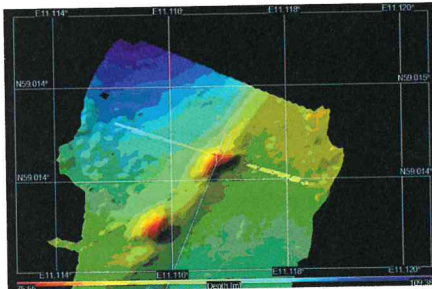
For cruises on foreign research vessels both the chief scientist and the leader of the NIOZ party are indicated.

Res. vessel & cruise	Departure	Arrival	Area	Project	Chief Scientist/NIOZ scientist
Aurora Australis V3	16/01 Hobart (Aus)	15/02 Hobart	Antarctic	SAZ-Sense	B. Griffiths / C.P.D. Brussaard (BIO)
Pelagia 64PE260	05/02 Texel	09/02 Texel	North Sea	COSTRA	M.J.N. Bergman (MEE)
Pelagia 64PE261	19/02 Texel	02/03 Texel	North Sea	COSTRA	M.J.N. Bergman (MEE)
Pelagia 64PE263	07/03 Lysekil (Swe)	15/03 Lysekil	Skagerrak	BIOSYS	C. Maier (BIO)
Pelagia 64PE265	19/03 Texel	26/03 Texel	North Sea	NoordzeeWind	R. Daan (MEE)
Pelagia 64PE266	26/03 Texel	31/03 Texel	North Sea	BSIK	G.C. Duineveld (MEE)
Pelagia 64PE267	11/04 Texel	27/04Lisbon (Por)	North Atlantic	GEOTRACES/HERMES	K.R. Timmermans (BIO)
Pelagia 64PE268	28/04 Lisbon (Por)	17/05 Portimao (Por)	North Atlantic	MiCROSYSTEMS	H. de Haas (MCG)
Aegaeo	07/05 Piraeus (Gre)	18/05 Piraeus	Med. Sea	Poseidon II	A. Gogul / T. Yokokawa (BIO)
Cefas Endeavour	15/05 Lowestoft (UK)	22/05 Lowestoft	North Sea	MEC	D. Sivyer / S.S. Oosterhuis (BIO)
Pelagia 64PE269	20/05 Portimao (Por)	11/06 Cork (Irl)	North Atlantic	CANYONS	H.C. de Stigter (MCG)
Pelagia 64PE270_a,b,c	13/06 Cork (Irl)	01/7 Brest (Fra)	North Atlantic	HERMES	M.S.S. Lavaley (MEE)
Maria S. Merian 05/3	14/06 Nuuk	04/07 Nuuk	W-Greenland	MSM05	J. Harff / T.O. Richter (MCG)
Discovery 320	15/06 Falmouth (UK)	18/07 Clyde (UK)	North Atlantic	DOGEE II	P. Nightingale / H.J. Zemmeling (BIO)
Pelagia 64PE271	03/07 Brest (Fra)	30/07 Texel	North Sea	MICROVIR	C.P.D. Brussaard (BIO)
Polarstern ARK-XXII/2	28/07 Tromso (Nor)	10/10 Bremerhaven	Arctic Ocean	SPACE/GEOTRACES	U. Schauer / P. Laan (BIO)
Pelagia 64PE273	03/08 Cuxhaven (Ger)	26/08 Cuxhaven	North Sea	Charter BSH	---
Pelagia 64PE275	31/08 Texel	27/09 Galway (Irl)	North Atlantic	CAMP/VAMOC/LOCO	G.-J. A. Brummer (MCG)
Cefas Endeavour	13/09 Lowestoft (UK)	21/09 Lowestoft	North Sea	MEC	D. Sivyer / S.S. Oosterhuis (BIO)
James Clark Ross JR209	27/09 Immingham (UK)	08/10 Cape Verde	North Atlantic	Madeira Abyssal Plain	C. Day / M. Baas (MBT)
Pelagia 64PE276	30/09 Galway (Irl)	23/10 Galway	North Atlantic	CARBONATE	H. de Haas (MCG)
Poseidon	15/10 Texel	19/10 Texel	North Sea	NoordzeeWind	M.J.N. Bergman (MEE)
Pelagia 64PE278	26/10 Galway (Irl)	18/11 Caniçal (Por)	North Atlantic	Barter Uni-Bremen	D. Kieke / S. van Heuven (RUG)
Cefas Endeavour	26/10 Lowestoft (UK)	02/11 Lowestoft	North Sea	MEC	L. Fernand / M.A. Baars (BIO)
Pelagia 64PE279	21/11 Funchal (Por)	16/12 Fortaleza (Bra)	N./S. Atlantic	LOCO-IW	J.J.M. van Haren (FYS)
Pelagia 64PE280	19/12 Fortaleza (Bra)	16/01/2008 Las Palmas	N./S. Atlantic	ARCH-OCEAN	G.J. Herndl (BIO)

National Programme for Sea Research

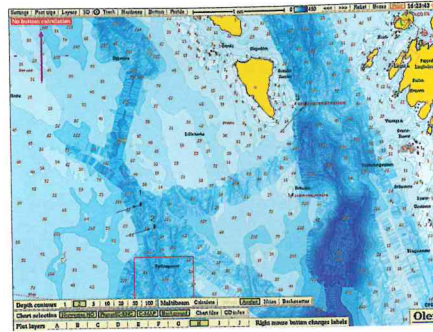
In 2007 the National Programme consisted of eight Pelagia cruises and three programs were done by NIOZ parties on other research vessels, all facilitated by grants of NWO/ALW.

1. BIOSYS (BIODiversity and EcoSYstem Functioning of Deep Water Coral Reefs in the Mediterranean and N.E. Atlantic; chief scientist Dr. C. Maier, NIOZ). A 14 days cruise was performed in the Skagerrak off the Swedish coast on board RV Pelagia. During the cruise aspects of the ecology and biology of cold water corals on Tisler Reef were studied.



Multibeam map of sampling site

2. MiCROSYSTEMS (Seismic, sedimentological, geochemical and biological studies of carbonate mounds, mud volcanoes and mud diapirs in the SE Gulf of Cadiz, part of the ESF EuroDIVERSITY programme; chief scientist Dr. H. de Haas, NIOZ). A 24 days cruise on board RV Pelagia was performed with the aim to resolve the morphology and the internal structure of the carbonate mounds at the Pen Duick Escarpment and one or more mud volcanoes in the Gulf of Cádiz.



Map of research area

3. HERMES-CANYONS (Hotspot Ecosystem Research on the Margins of European Seas – Canyons; project manager Prof.dr. T.C.E. van Weering, chief scientist Dr. H. de Stigter, NIOZ), a 21 days cruise was performed in the Atlantic Ocean in the Lisbon-Setúbal and Nazaré Canyons offshore the Portuguese coast, and the Whittard Canyon in the northern Bay of Biscay South West of Ireland, on board RV Pelagia. The aim of the cruise was to determine by which processes exactly the canyons are incising themselves in the seafloor, and under what conditions these processes are active.

4. MiCROVIR (Virus control of the picoplankton *Micromonas pusilla* population dynamics in European waters, chief scientist Dr. Corina Brussaard, NIOZ). A 30 days cruise was performed studying the greater North Sea and Channel area to clarify the ecological importance of virus infection for the widely distributed picoplankton *M. pusilla*.

5. CARBONATE (Carbonate mound studies, an ESF EuroMARC project, programme manager Prof.dr. T.C.E. van

Weering, chief scientist Dr. H. de Haas, NIOZ). A 24 days cruise on board RV Pelagia was performed West of Ireland to study the carbonate mounds and the role of these systems in the global carbon cycle. The cruise was specifically aimed at determining the most suitable sites by means of seismics, multibeam, coring, video and lander deployment, for drilling with the German MEBO drilling system on a subsequent cruise with the Irish RV Celtic Explorer.

6. GEOTRACES (Global marine biogeochemistry of trace elements and isotopes) – test cruise UCC system. The newly developed NIOZ Ultra Clean CTD system (UCC - TITAN) was successfully tested and approved for the upcoming Polarstern cruise (see under 10), during a 12 days test cruise by RV Pelagia in the deep waters of the North Atlantic Ocean between Texel and Lisbon.

For the investment subsidy NWO-Large two cruises were performed for the LOCO project (Long-Term Ocean Climate Observations).

7. CAMP/LOCO/VAMOC North Atlantic (Long-Term Ocean Climate Observations – North Atlantic; project manager Dr. H. van Aken, Chief Scientist Dr. G.J. Brummer, NIOZ); a 28 days cruise was performed by RV Pelagia in the North Atlantic for the CLIVAR work on the transect Malin Shelf – Greenland (CAMP) and for the deployment of the VAMOC lander and the recovery & redeployment of the 4 LOCO moorings in the Irminger Sea.



Science team and crew before a breathtaking background during a cruise on RV Pelagia in the Irminger Sea, East of Greenland, in September 2007.

8. LOCO/IW (Long-Term Ocean Climate Observations – Internal Waves; project managers Dr. H. van Haren and Dr. L. Maas, NIOZ): a 26 days cruise was performed in the North Atlantic, south of the Canary Islands and east of Brazil by RV Pelagia.

For the Netherlands contribution to the International Polar Year (IPY) 2007/2008, cruise participation was granted by NWO/ALW for a programme in antarctic waters and for the GEOTRACES programme in arctic waters.

9. Work on viruses by the IPY-project VIRPOL was done during a 4 week cruise onboard the Australian RV Aurora Australis in antarctic waters in the beginning of 2007 (project manager Dr. C.P.D. Brussaard).

10. Netherlands participation in the Arctic cruise (ARK-XXII/2) with RV Polarstern, project manager Prof.dr. H. de Baar, NIOZ and Groningen University). The 75 days ARK-XXII/2 expedition was a central contribution to the International Polar Year 2007/2008. The Netherlands contribution was concentrated on the work with the NIOZ Ultra Clean CTD system TITAN and subsequent analyses of iron and other trace metals to determine the physical and chemical speciation of dissolved trace metals in the Polar Oceans.



Dutch science team posing in front of RV Polarstern on the ice edge of the North Pole August 31 2007.

11. Netherlands participation in the British program Marine Ecosystem Connections (Cefas, Lowestoft) in the southern North Sea comprised measurements of the secondary production during 8d-cruises by RV Cefas Endeavour in May, September and October/November.

The OFEG was established to use research vessels from different European institutes more efficiently by exchanging ship time and large equipment. Participants of OFEG are NERC and NOCS (UK), IFREMER (France), BMBF (Germany), NIOZ (NL), UTM-CMIMA of the Spanish research council CSIC, and IMR-UoB of

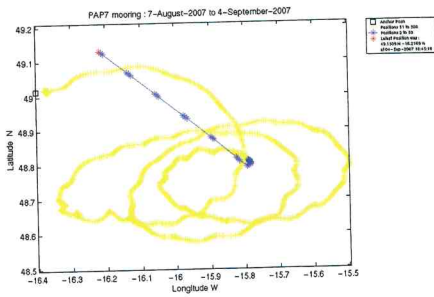
Norway. In 2007 the OFEG fleet consisted of 21 research ships. The OFEG's primary objective is bartering ship time and exchange of major marine equipment without the need to exchange money. This arrangement has significant advantages. It allows scientists access to a wider range of facilities and equipment than would otherwise be possible, and also it reduces wasted time, and therefore wasted costs on long transit passages.

In 2007 a number of Dutch barter exchange cruises were performed in the OFEG framework. A 27 days cruise for a science team of the University of Bremen (Chief Scientist Dr. M. Rhein/Dr. D. Kieke) was done by RV Pelagia in the northern North Atlantic. The UK RRS James Clark Ross did piston core sampling for 2 days in the Madeira Abyssal Plain for a NIOZ science group during the outward voyage from Immingham to the Antarctic. The German RV Poseidon did a 5 days cruise in the Offshore Windpark Egmond aan Zee off the Dutch coast for the NIOZ NoordzeeWind project. Since 1998 NIOZ participated in OFEG with 27 exchanges. Total number of exchanged ship days for the Netherlands numbered 325 by the end of 2007.



The Ultra Clean CTD alongside RV Polarstern during the ARK-XXII/2 cruise in the Polar Sea

Another OFEG advantage is offered by opportunistic interventions by recovering, when within reach, lost equipment



A drifting UK PAP mooring circling in the North Atlantic from 7 August – 4 September 2007, when picked up and recovered by RV Pelagia, then setting course straight to 57°N 28°W where RV Pelagia will deploy the BOBO lander. Picture courtesy NOC.

or drifting moorings, as well as by en-route servicing and turn-around of partners' moorings. In September 2007 RV Pelagia could successfully recover a drifting Porcupine Abyssal Plain (PAP) mooring with 1000 m steel wiring and equipment for a science team of NOC Southampton, during passage from Texel to the Irminger Sea with only a few days' deviation from the original passage track.

OFEG meetings and other international activities

This year the OFEG met twice for its regular meetings, in May in Bergen, Norway, and in November in Paris, France. On 7 February the OFEG members attended the naming ceremony of the UK RRS James Cook, performed by her Royal Highness, Princess Ann, at the quay of the National Oceanography Centre in Southampton. After the ceremony an extra OFEG meeting convened to discuss issues of interoperability and trans-national operational teams in relation to possibilities of financial support by the European Commission. Responding to the recommendations of the ESF Marine Board Ocean Research Fleets Working Group (OFWG), OFEG accepted its role within the European research fleet for academic research to act as a forum for the Global and Ocean Class fleet, including heavy equipment. Also OFEG will investigate ways of investment co-ordination and cost sharing. Another favourable development evolving from the partnership is the impulse to international co-operation and

exchange of marine technicians for training and support on board. In October the first OFEG-TECH workshop was organised by the Norwegian OFEG partner IMR in Bergen.

M.J. Rietveld was invited guest at a number of international meetings. At a seminar regarding the French research fleet, organised by the French Ministry of Higher Education & Science and held in Paris on 26 March, she was an invited speaker and testified on Ifremer's high seas research vessel fleet from an international viewpoint. The UNOLS/RVOC meeting at the Florida Institute of Oceanography in St. Petersburg, Florida, USA, was attended in April. In June the European Research Vessel Operators (ERVO) convened at the Flemish Institute of Marine Science (VLIZ) in Ostende, Belgium. Rietveld participated also in the 21st meeting of the International research Ship Operators Meeting (ISOM), hosted by the Institute of Oceanography of the Chinese Academy of Science (IOCAS), in Qindao, China, in October.



L'Atalante

James Cook

Discovery

M.S. Merian

Pelagia

Pourquoi Pas?

Sonne



Alkor



G.O.Sars



Heincke



Meteor



Poseidon



Le Suroit



Thalassa



Jan Mayen



Johan Hjort



Sarmiento de Gamboa

James Clark Ross



Hesperides



Polarstern*)



Garcia del Cid



The 2007 OFEG fleet

*) only joint cruises

Marine Technology

Marck Smit*, Patrick Laan, Henk Zemmeling, Geert-Jan Brummer, Aad Vaars, Gerard Duineveld

After a few turbulent years - characterized by several scans and reviews - in 2007 we were very happy to have a strong focus again on our core business: executing "effective technology for excellent science". About 22% of the department's capacity was used to support scientific research cruises at sea, a slight increase of 2% compared to 2006. The workload in modifications and corrective maintenance was considerably higher compared to 2006. In 2007 we worked on 355 projects, of which a few are highlighted below. To improve the Science-Technology interaction we organized a workshop for scientists on "how to run a technical project effectively" in February.

Measuring ultra low iron concentrations in the Arctic

Honoring the international Polar Year 2007 – 2008, 2 major cruises had to be carried out on the German Icebreaker RV Polarstern using the new NIOZ developed TITAN Ultra Clean Water Sampling system. The main objective of these cruises was to measure very low concentrations of trace metals, mainly iron, manganese and aluminum.

The challenge was to adapt the newly developed Ultra Clean system to the RV Polarstern and the harsh operating environment.

Ultra Clean sampling in the Arctic.



A. Deployment of the Surface Skimmer from the RV Discovery (UK-SOLAS DOGEE II – cruise). B. The mini catamaran carrying the rotating glass drum. C. Drama on day one: the skimmer was hit, partly sunk and capsized!. D. But ..., after a few days of hard work by Electronics Engineer John Cluderay the Surface Skimmer was fully operational again

Carbon dioxide fluxes at the sea surface

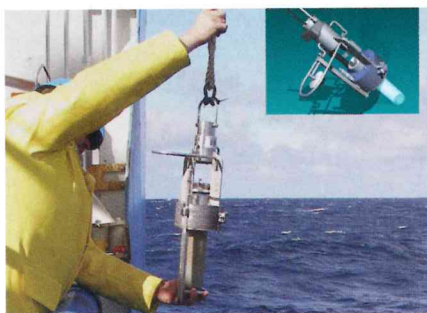
For studying the biochemistry at the air-sea interface samples have to be taken from the top micro-layers of the sea surface. A rotating glass drum was used for skimming this top-layer. Water samples were taken, simultaneously, at 10, 100 and 200 cm depth to study depth profiles. All the samples were stored in gas-tight bottles.

A very light micro-catamaran supported the glass drum, thus allowing the sampling of small waves. A bigger catamaran was used to follow the bigger waves and to create some payload capacity. The complete system was operated via radio control.

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Water and bottom sampling combined in one cast

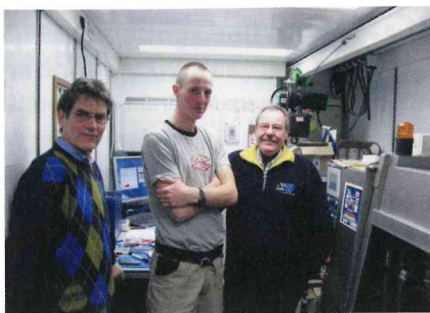
During the LOCO-cruise a vast track of water column measurements was planned at the North Atlantic between Ireland and Greenland. Lowering a rosette water sampler to 5.000 m and bringing it back takes quite some time: approximately four hours. When a bottom sample is needed afterwards the same time interval is required again. In close cooperation with the scientist a system was developed to combine the CTD water sampling with a small bottom sampler, in a way that both could be used within the same cast. The new "mono-corer" that was developed experienced a successful maiden trip.



Recovery of the mono-corer during the LOCO-IS cruise. Inset: 3D CAD design drawing of the mono-corer

North Sea Wind Park monitoring program

For the North Sea Wind Park – de facto Netherlands first protected area for marine life - an extensive monitoring program was executed. A wide range of measurements and analyses were carried out using bottom landers, larvae traps, an underwater acoustic to cell phone link, and a suite of other instruments.



Very high resolution for XRF sediment analyzer

One of the ways of looking back into the climate history is by analyzing ocean sediment cores. For the NIOZ X-Ray Fluorescence (XRF)-core scanner a so called Super Slit was developed enabling a very narrow X-ray beam adjustable from 10 mm to 0.1 mm to enter the sediment. Through the resolution of core analyses this innovation could be improved to only a few decades. This development was performed for techno startup company Avaatech BV.

European cooperation in Marine Technology

The European cooperation within OFEG (Ocean Facilities Exchange Group) in the field of RV ship time-exchange has now been working very effectively for several years. In order to improve the exchange

of major – expensive - marine research equipment the OFEG-TECH network was established in October 2007.

Furthermore this network aims to improve the exchange of experience and knowledge in the field of Marine Technology. An overview of the available OFEG major equipment is temporarily hosted on: <http://www.nioz.nl/OFEG>

Shipboard technical support

A busy schedule of Scientific Research Cruises was supported. Apart from the cruises on the RV Pelagia we supported cruises on the RV Discovery (UK), RV Polarstern (Germany), RV Poseidon (Germany) and the RV Navicula.



On board of NIOZ regional vessel RV Navicula NIOZ Instrument Technician Johan van Heerwaarden is adapting a video system on deep-sea crawler MOVE.



Data Management Group

Taco F. de Bruin*, Ronald X. de Koster, Margriet A. Hiehle and Jan Nieuwenhuis

In 2007 the Data Management Group (DMG) participated actively in a series of national and international oceanographic data management projects, while continuing to work on the day-to-day activities for the National Cruise Programme and for the institute.

The DMG is a separate group within the department of Physical Oceanography, funded by NWO-ALW and NIOZ. The DMG represents NIOZ and the Dutch academic oceanographic community within the National Oceanographic Data Committee (NODC). It also serves as the National Antarctic Data Centre (NADC). The main tasks of the DMG are to assist scientists during all phases of a project with data management and, secondly, to archive and keep available and accessible all relevant data of NWO-ALW and NIOZ cruises.

The work for the national (Bsic-funded) NODC-*i* project and the EU-funded SeaDataNet project was continued and extended during 2007. These are two multi-year data management projects, both aiming at a fully distributed and transparent data access architecture. The NODC-*i* project is a national project to enable access to the data holdings of the partners within the NODC. A unique aspect of this project is the inclusion of spatial infrastructural information on top of the environmental information. The EU-funded SeaDataNet project (www.seadatanet.org), with 49 partners from 35 countries bordering the seas around Europe, aims to build a pan-European data access infrastructure. The NODC-*i* project will become the Dutch node in the European SeaDataNet data access network thus it is made sure that both projects will be compliant.

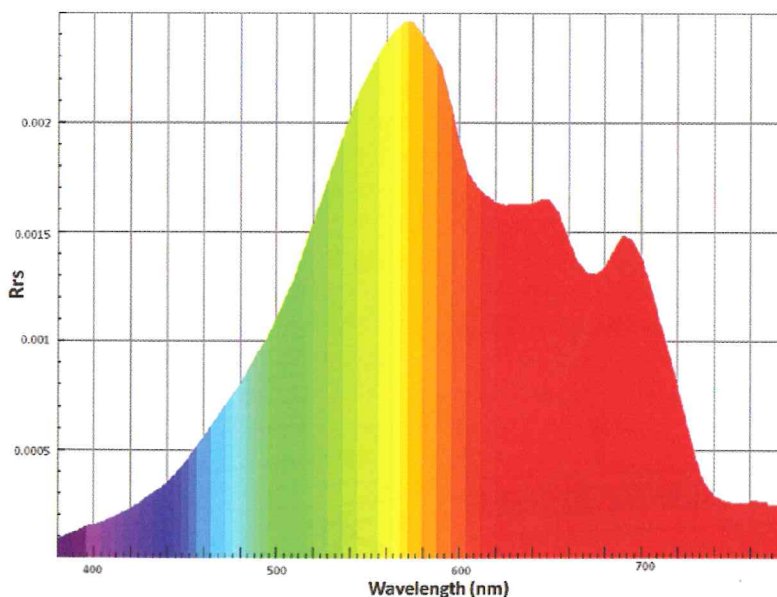
The DMG maintains a series of databases and project websites and pages. A part of these are dynamically linked. This activity includes the daily update of the cruise diary pages on the NIOZ website www.nioz.nl/cruises. The actual positions of RV Pelagia and other research vessels hosting NIOZ scientists, is dynamically

obtained from data supplied by the Climate Research Division of the Scripps Institution of Oceanography and shown on an online map.

The work of populating the NIOZ-CODIS hydrographic database continued. By the end of the year, the CODIS hydrological database contained data from 148 cruises, comprising 5949 CTD profiles and 1809 sample bottle casts. All NIOZ databases were consulted frequently. On average, there were 2290 logins per day. A login is defined as 'a retrieval of data and/or metadata in tabular or graphical form from a database'. One login can consist of multiple queries on the database. Many requests for data and (graphical) data products, both from within the institute as from outside, were answered. These requests are very diverse and range from questions on rescuing data from old and rather obscure cruises to

assisting with the interpretation and processing of XBT data. As participant in the NODC, NIOZ actively participates in international organizations as the IOC Committee on International Oceanographic Data and Information Exchange (IODE) and the ICES-Working Group on Data and Information Management.

Staff of the DMG participated in the CAMP/VAMOC/LOCO/ASOF-2007 (64PE275) and the BSIK/LOCO-IW07 (64PE279) cruises onboard RV Pelagia. Shore-based staff also assisted scientists and crew onboard during these cruises with the delivery and interpretation of weather information. Staff was also involved in several 13-hours cruises onboard RV Navicula for the Marsdiep-project. DMG processed the standard CTD data for all research cruises.

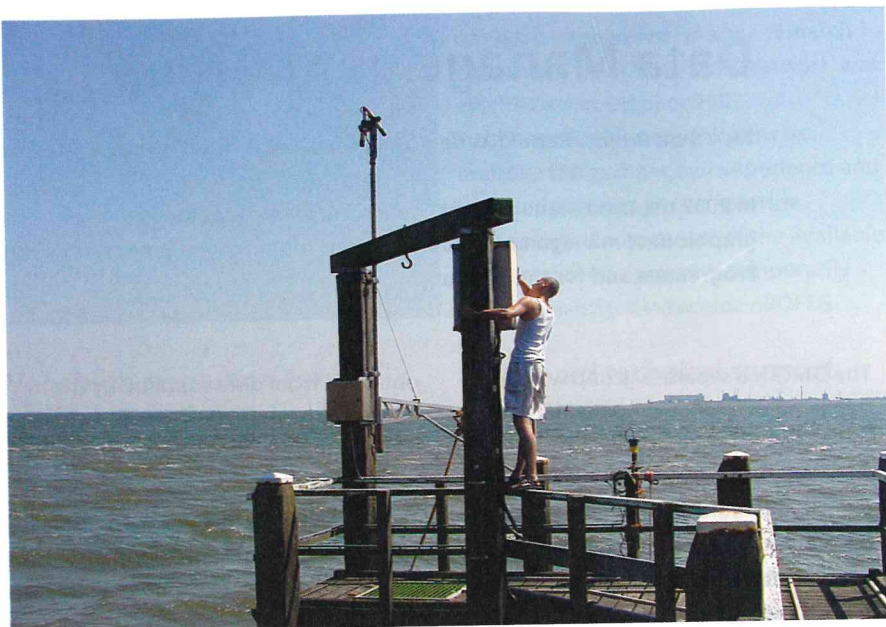


Real-time display of Rrs, remote sensing reflectance, from the colours database. <http://www.nioz.nl/colours>

*corresponding author: bruin@nioz.nl, <http://www.nioz.nl/dmg>

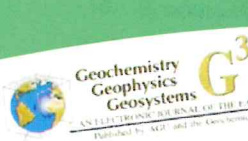
The COLOURS database was developed by DMG to provide online access to the data from the COLOURS project by M. Wernand. This is a long-term Remote Sensing monitoring project at the NIOZ Jetty for automated determination of suspended matter (TSM) and chlorophyll (Chl-a) in the Marsdiep.

Work has started to set up and populate a database on Wadden Sea data. Furthermore, web sites for the NODC and the International Research Ship Operators' Meeting (ISOM) were maintained by the DMG. An additional task of the DMG is the development and maintenance of the Netherlands Antarctic Data Inventory (NADI, <http://www.nadi.nl>) for



the Antarctic research projects in the Netherlands. A DMG staff member is the Chief Officer of the Joint Committee on Antarctic Data Management (JCADM), which currently has representation from 31 countries, and co-chairs the International Polar Year Subcommittee on Data Policy and Management. DMG staff participated in a series of national


and international meetings related to oceanographic and polar data management. At these meetings, DMG staff members gave 10 oral presentations on various aspects of scientific data management.


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Aging of marine organic matter during cross-shelf lateral transport in the Benguela upwelling system revealed by compound-specific radiocarbon dating

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Coupled Thermal and Hydrological Evolution of Tropical Africa over the Last Deglaciation
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Environmental precursors to rapid light carbon injection at the Palaeocene/Eocene boundary

Aapjy Sluijs¹, Henk Brinkhuis¹, Stefan Schouten¹, Steven M. Bohaty², Cédric M. John³, James C. Zachos⁴, Gert-Jan Reichert¹, Jaap S. Sinningh Damsté¹, Erica M. Crouch¹ & Gerald R. Dickens⁵

Eocene thermal maximum—a period of about 35 million years ago—is a “C-depleted” (light) carbon to the increase in global surface temperature that characterizes the climate. The sequence of events remains controversial, but records of environmental precursors to the Palaeocene/Eocene boundary have been identified.

Unravelling the sequence of events at the onset of the PETM has been difficult, given the rapid nature of the perturbation. Some climate proxy records suggest that onset of warming slightly preceded deep marine sediment sections, where bioturbation has blurred particularly for the onset of the event. Instead, the evidence for early warming is within the...


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Reduced North Atlantic Deep Water Coeval with the Glacial Lake Agassiz Freshwater Outburst
 Helga Kikk¹, Fiesche Kleiven, et al.
 Science 319, 60 (2006)
 DOI: 10.1126/science.1148924

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Mid-Cretaceous (Albian–Santonian) sea surface temperature record of the tropical Atlantic Ocean

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ABSTRACT
 Paleoclimatic records of geologic time periods characterized by extreme global warmth such as the mid-Cretaceous are important for a better understanding of the Earth's climate system under extreme conditions of global warmth (e.g., Barton, 1983; Huber et al., 1995, 2002). The mid-Cretaceous greenhouse phase, such as levels of atmospheric CO₂ (deep-time study, mid-Cretaceous greenhouse climatic and related processes, such as rates and modes of meridional heat transport, and the possible existence of oceanic circulation systems, or the possible existence of polar ice, are not well understood (e.g., Frakes et al., 2004; Miller et al., 2005; Royer et al., 2004; Pincus et al., 2007). Existing marine long-term records based on δ¹⁸O paleothermometry suggest that mean sea surface temperatures (SSTs) increased during the Cretaceous thermal maximum, mostly in Tertiary time (e.g., Jenkinson et al., 1994; Clarke and Jenkinson, 1999; Huber et al., 2002; Wilson et al., 2002). However, SST data from paleotropical ocean are sparse and restricted to certain time slices (e.g., Kolodziej and Rader, 1988; Norris et al., 2002; Wilson et al., 2000; Dominikov et al., 2006), mainly because continuous tropical mid-Cretaceous sections are either not available or often characterized by patchy occurrence of well-preserved microfossils.

This study fills this gap by establishing a long-term SST record based on TEX₁ paleothermometry (Schouten et al., 2002, 2003) from a 147-m-thick composite section of Albian–Santonian black shales deposited at Demerara Rise in the western equatorial Atlantic (Ocean Drilling Program [ODP] Sites 1258 and 1259; Fig. 1). In contrast to the existing Cretaceous SSTs, the TEX₁ proxy is independent from changes in the chemistry and oxygen isotope composition of ambient seawater.

Keywords: Cretaceous thermal maximum, paleotropical sea surface temperatures, TEX₁, Demerara Rise, Ocean Drilling Program Leg 207.

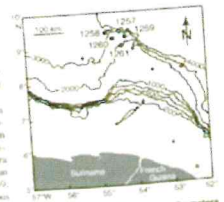


Figure 1. Location and bathymetry (in meters below sea level) of Ocean Drilling Program Leg 207 sites in Demerara Rise in western equatorial Atlantic (modified from Erbacher et al., 2004).

INTRODUCTION
 The geological record of the mid-Cretaceous holds a wide array of paleoclimatic evidence for extreme conditions of global warmth (e.g., Barton, 1983; Huber et al., 1995, 2002). The mid-Cretaceous greenhouse phase, such as levels of atmospheric CO₂ (deep-time study, mid-Cretaceous greenhouse climatic and related processes, such as rates and modes of meridional heat transport, and the possible existence of oceanic circulation systems, or the possible existence of polar ice, are not well understood (e.g., Frakes et al., 2004; Miller et al., 2005; Royer et al., 2004; Pincus et al., 2007). Existing marine long-term records based on δ¹⁸O paleothermometry suggest that mean sea surface temperatures (SSTs) increased during the Cretaceous thermal maximum, mostly in Tertiary time (e.g., Jenkinson et al., 1994; Clarke and Jenkinson, 1999; Huber et al., 2002; Wilson et al., 2002). However, SST data from paleotropical ocean are sparse and restricted to certain time slices (e.g., Kolodziej and Rader, 1988; Norris et al., 2002; Wilson et al., 2000; Dominikov et al., 2006), mainly because continuous tropical mid-Cretaceous sections are either not available or often characterized by patchy occurrence of well-preserved microfossils.

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MATERIAL AND METHODS
 ODP Sites 1258 (9°20'N, 54°43'W, water depth 1092 m) and 1259 (9°18'N, 54°11'W, water depth 1754 m) are situated on the gently sloping (1:1) continental shelf of a submarine plateau off the northern coast of the Demerara Rise was located in the core of the...

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Dissertations

1. Baudoux, A.-C. The role of viruses in marine phytoplankton mortality. Groningen University, 148 pp.
2. Buisman, M.C. Ferry-observed variability of currents and bedforms in the Marsdiep inlet. Utrecht University, 150 pp.
3. Cardoso, J.F.M.F. Growth and Reproduction in Bivalves: an energy budget approach. Groningen University, 207 pp.
4. Huguet, C. TEX₈₆ paleothermometry: proxy validation and application in marine sediments. Utrecht University, 186 pp.
5. Lam, F.-P.A. Ocean and laboratory observations of waves over topography. Utrecht University, 176 pp.
6. Reneerkens, J.W.H. Functional aspects of seasonal variation in preen wax composition of sandpipers (Scolopacidae). Groningen University, 168 pp.
7. Smallegange, I. Interference competition and patch choice in foraging shore crabs, University of Amsterdam, 292 pp.
8. Stadnitskaia, A.N., Bio – and Petroleum Geochemistry of Mud Volcanoes in the Sorokin Trough (NE Black Sea) and in the Gulf of Cadiz (NE Atlantic): From Fluid Sources to Microbial Methane Oxidation and Carbonate Formation. Utrecht University, 227 pp.
9. Swart, A.N. Internal waves and the Poincaré equation – Numerical computation and laboratory experiments. Utrecht University, 190 pp.
10. Weijers, J.W.H. Soil – derived branched tetraether membrane lipids in marine sediments: reconstruction of past continental climate and soil organic matter fluxes to the ocean. Utrecht University, 204 pp.

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Courses

Course 'Introduction to Oceanography' (RUG), 26 March – 5 April. Contact person prof. dr. H.J.W. de Baar.

This annual course started already in 1931 at the Zoological Station in Den Helder, and from 1965 onwards it has been a joint course between NIOZ and the University of Groningen. In 2007 there were 21 students participating including 3 foreign students. The first part was in Groningen in February and comprised introductory lectures and workshop style lectures (mostly presented by the students themselves), followed by a written examination. The practical part coordinated by dr. H. Zemmeling was held at Royal NIOZ from 26 March-5 April. About 20 NIOZ colleagues contributed to various parts of the course. Three teams of 5-6 students were doing fieldwork in a rotating scheme between (i) two day cruises with RV *Navicula* in the Wadden Sea, (ii) two day time series biology at the jetty, and (iii) two days time series chemistry at the jetty. Another, fourth, team of 4 students pursued two parallel projects on (iv) organic contaminants and (v) marine optics. The combined datasets of observations on interacting physics, chemistry and biological primary productivity were assembled, interpreted and finally reported by the students in a suite of powerpoint presentations.

Course 'Marine Ecosystems' (RUG), 11 -29 June. Contact person prof. dr. G.J. Herndl.

During the first week, lectures were given at the Groningen University (RUG) on the composition and regulation of pelagic and benthic food webs in the different ecological provinces of the world's oceans in general and the North Sea in particular. The second and the third week were devoted to practical work performed at NIOZ in the BIO and MEE departments. The 24 students were distributed over 9 different topics. Some of the topics were more lab-oriented, others involved more extensive field work. The program comprised research on the metabolism of selected benthic organisms such as on the cold water coral, *Lophelia pertuso* and on pelagic communities. Sampling was performed in the North and Wadden Sea with the R/V *Navicula*. Underlying research questions, the methods used and the results obtained were discussed during powerpoint presentations by each group at the end of the course and reported in paper-like manuscripts.

NCK summer school 2007, 25 June-6 July. Contact person prof. dr. H. Ridderinkhof

The Netherlands Centre for Coastal Research (NCK) in which different universities and institutes participate, organized a summer school on coastal (morpho) dynamics at NIOZ. The summer school was coordinated by dr. H. Winterwerp. PhD students and some scientists from institutes participated. The summer school consisted of lectures and practical training. Lectures were given by professors and senior scientists from the associated partners of NCK. Practical training was done by executing a short field program and analyzing the data by groups of participants. In the evening general lectures on oceanographic research were given. The summer school was finished with a presentation of the different groups on the results of their data analysis.

Het Zoölogisch Station begon in 1876 in een houten keet. Het begin van het wetenschappelijk onderzoek in de Waddenzee.



De Keet

De Max Weber op het wad

Bestuderen van zeeorganismen

Leren van de zee

T.J. Nederland beschikt hiervoor thans over een maritiem laboratorium, waar modern fysiologisch onderzoek mogelijk is in aansluiting op het bio-ecologisch onderzoek op zee (...). En zo gaat het verder, in een sterk vergevorderde brochure, ongedateerd maar vrijwel zeker uit de vroege jaren dertig van de vorige eeuw. De brochure is onder anderen onderkend door Dr. Jan Verwey, vanaf 1931 tot 1965 directeur van het Zoölogisch Station in Den Helder. Om dat laatste is het in de brochure te doen. De onder-takenaars, marien biologen en onderzoekers van de Waddenzee van het eerste uur, leggen in bloemrijke taal uit hoe (...) de buitenstaander, die gaarne wetenschappelijk onderzoek steunt (...), weemoedig groot belang kan zijn voor een (...) centrum voor rijver marien-biologisch onderzoek (...).

Een badstrijd dus, en het werke. Op 22 april 1933 kon het, na een verbouwing sterk verbeterde, Zoölogisch Station weer in gebruik worden genomen. Ook werd het nieuwe onderzoekschip 'Max Weber' gedoopt. Het schip was extra breed en had, voor het varen op de Waddenzee, een platte bodem. Een langsame waaierbare vanden inaders het later, maar er was ook veel liefde voor de 'Max'.

NIOZ

In 1933 werkten aan het Zoölogisch Station in Den Helder behalve directeur Verwey een bestudeer, een secretaresse en een bankwerker. Kortom: een vaele wetenschappelijke staf van één persoon. Gelukkig hadst er regelmatig wetenschapsopis van verschillende universiteiten op bezoek, voor het

zorgvuldig onderzoek met de Max of om zeeorganismen te bestuderen in de moderne zeeaquaria. In de jaren vijftig breidde de besturing van het instituut zich snel uit met o.a. de latere directeur en chemicus Henk Postma. Om de verandering van een primair biologisch station naar een meer algemeen oceanografisch instituut recht te doen verandert in 1960 de naam in 'Nederlands Instituut voor de Zee' (NIOZ).

Onderzoek op stoom

Omdat rond 1880 het gevaar van overbevissing begon te dagen, wilde Max meer visserskennis aan de hand nemen. Onderzoek en had

hermetiefroeven, laat zien dat het vroege marien-biologische onderzoek, behalve visserijbiologisch, vooral ethologisch was. Studies naar grootschalige processen volgden gauw, zoals het onderzoek naar voedingstromingen in de Waddenzee waarop de latere NIOZ-directeur H. Postma in 1954 zou promoveren. Het ecologische onderzoek promoveerde in 1966 op een studie naar de kinderkamerfunctie van de Waddenzee voor aal. Relatief veel NIOZ onderzoek betrof de rol van grote zeezoogdieren in de Waddenzee, maar



Onderzoeksschepen van het NIOZ



Walvissen vissers vormen nu de grote bedreiging voor gedecimeerde zeezoogdieren
Bultrug gaat altijd voor
Volkskrant-kennis 26/5/07

De walvis bij Texel heeft het uitstapje naar onze kustwateren overleefd. Door de visserij loopt het lang niet altijd goed af met bezoekende zeezoogdieren.
 Door René Didde

Honderden bultrugwalvissen heeft hij al gezien op zijn vele reizen op de Noordzee en de Atlantische Oceaan, maar er zit maar eentje in zijn eigen 'achtertuin' observaties, in het Marsdiep, tussen IJssel en Den Helder, waar dagen lang uitgestrekt bejakt werden het jonge dier dicht bij de kust. Het dier zag direct dat de boot dichtbij kwam. Het dier zwam op het Nederlands onderzoeksschip 'De Zee' en gaf een signaal in een van de 4 knoppen in een van de 4 knoppen. En hij werd verder in de richting van de IJssel. Intelligent gedrag voor zo'n groot dier.



De bultrug in het Marsdiep, mei 2007. Foto Arp



De laatste Nieuwste Nachrichten ROSTOCK

Rostocker Expeditionsschiff schafft erste Etappe

Warnemünder Forscher befahren Westküste Grönlands

Warnemünde/Grönland (NN) • Kreuzfahrtschiff vom Institut für Ostseeforschung am Warnemünde (IOF) fahrten mit dem deutsch-dänischen Expeditionsschiff 'Mariane' die Westküste Grönlands hinauf. Die Expedition begleitet die Expedition.

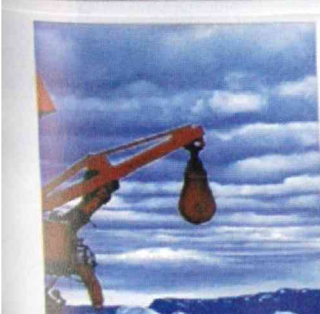


Thomas Lage (l.) und Michael Postach (r.) führen eine Bootsprobe, die Thomas Richter (M.) führt unter dem Spektrator

von niederdänischen Institut für Meeresforschung (NIOZ) sein. Die Expeditionsschiff 'Mariane' führt die Expedition. Die Expedition begleitet die Expedition.

den als hij later ergens anders duikt. Of dood aanspoelt op het strand of verstrakt raakt en verrot. De walvis is een dodelijk dier. Het dier is een dodelijk dier. Het dier is een dodelijk dier.

Een reddingboei
 Nieuwe vistechnieken moeten brandstofkosten drukken



Mittwoch, 27. Juni 2007

Public Outreach

Jan Boon*

In 2007, NIOZ featured twice in international newspapers, 27 times in national newspapers, 36 times in regional newspapers and 15 times in magazines. Furthermore, NIOZ scientists acted in 9 items on the Dutch and the Belgian TV, and in nearly 30 items on national and regional radio programmes.

Newspapers

The northward distribution of many marine species in European seas was reviewed in position paper 9 'Impacts of Climate Change on the European Marine and Coastal Environment' of the Marine Board of the European Science Foundation. As coordinating author and editor, Katja Philippart was allowed to formally hand over the report to a representative of the Flemish Government in Bruges. Belgian national newspapers and the Belgian TV reported on this newsitem.

Another paper led by Katja Philippart which got quite a lot of media attention, focussed on the long-term reactions of the Wadden Sea ecosystem to changes in nutrient levels between 1970 and 2000. The authors attributed this to an initial increase in nutrient levels during the nineteen-seventies and early eighties and a subsequent decrease after the building of sewage treatment installations. Especially the levels of phosphate decreased quite dramatically.

A journalist joined the team led by Gerard Duineveld at the RV Pelagia for several weeks during a research cruise on the ecology of cold-water corals in the N.E. Atlantic Ocean. This resulted in a two page article in the '*Volkskrant*', one of the leading national newspapers.

The '*NRC*', another national newspaper, made an article about the acidification of our oceans due to rising CO₂ levels in the ocean. Hein de Baar contributed to this article.

Many newspapers also referred to an article in PloS Biology about the Sorcerer II Global Ocean Sampling Expedition of Graig Venter, with Gerhard Herndl as one of the co-authors. The paper reported on the unexpectedly large microbial biodiversity in the oceans: only few microbial species occur in very high densities, but orders of magnitude higher numbers of species concur in minute densities. This was established with a new molecular biological analytical technique. The big eco-question now is: Why are they still there?

Several newspapers paid attention to the introduction of invasive species by ballast water of ships and the measures taken by the International Maritime Organization to halt this. Marcel Veldhuis worked on the development of a test protocol to evaluate the efficiency of ballast water treatment installations. These will become obligatory on ships between 2009 and 2016.



Photo: Kees Camphuijsen.



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The year 2007 ended with news issues due to two paleo-oceanographic publications in *Science*. The first one dealt with the influence of the sudden drainage about 8000 years ago of the North-American Lake Agassiz on the speed of formation of North Atlantic deepwater. NIOZ geologist Thomas Richter participated in this paper. The second article in *Science* was on positive feed-back coupling mechanisms in global warming due to increasing atmospheric carbon dioxide levels. This caused the melting of methane-containing gas hydrates in Polar regions. Since methane is a much stronger greenhouse gas than carbon dioxide, this accelerated global warming about 55 million years ago. This article was published in close cooperation with Utrecht University. Jaap Sinninghe Damsté and Stefan Schouten contributed on behalf of NIOZ.

TV coverage

The major TV item in 2007 was the documentary 'The world is flat' on the scientific work of Theunis Piersma and his colleagues on the behaviour and physiology of migratory birds and their preys in the Wadden Sea.

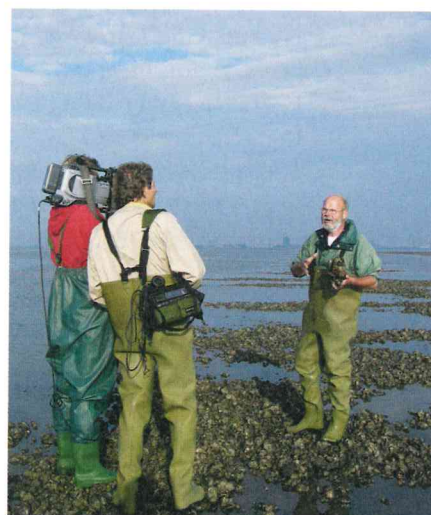
Two unexpected happenings on our doorstep caused a quite lot of spontaneous media attention in the newspapers and on the national TV. In January, the corpses of a few hundreds of birds with an oily coating from a ship's spill stranded on the beaches. Our scientist Kees Camphuysen told the media that this was certainly not a classical oil spill, but a much more aggressive mixture which had rapidly 'dissolved' the feathers and bones of the seabirds. It proved to be a mixture of oil with a detergent. Regrettably, the identity of the ship remained unknown despite serious efforts of the police to trace it.

A few months later, a juvenile humpback whale suddenly appeared feeding in the Marsdiep between Den Helder and Texel; the fifth sighting of a humpback whale in Dutch written history! Kees Camphuysen was again called upon again; this time as a whale expert.

The catches of two southern fish species in our NIOZ fike in the Mokbaai illustrated the ongoing northward shift of species in European waters: several hundreds of pilchards (*Sardina pilchardus*) and gilthead seabreams (*Sparus auratus*) were caught. The latter even marked an official new species for our country. These 'fish-findings' led to an item in the Nature TV-series 'Vroege Vogels TV'.

The same TV programme made an item about the pathology session on stranded corpses of harbour porpoises to learn more about the possible causes for these casualties along the Dutch coast.

The National broadcasting foundation NOS made a TV recording on invasive species in the Wadden Sea which was broadcasted on the 6 o'clock news, featuring Rob Dekker during sampling of the long-term benthic series at the Balgzand intertidal flat.



NIOZ and NWO

It is the policy of NWO as umbrella organization, to make the relation with its research institutes more visible to the outside world. Part of this is the implementation of a new house style for all institutes. Therefore this annual report shows a new and more colourful NIOZ logo, which was finally introduced on 1 September. After sometimes vigorous discussions within the institute and a decision only after two design rounds, a final vote by our personnel decided upon an evolutionary design instead of a revolutionary new design. Also the Dutch name of the institute was slightly modernised to 'Koninklijk Nederlands Instituut voor Zeeonderzoek' instead of the quite old-fashioned '..... Onderzoek der Zee'.

On 31 August, the Committee Education and Sciences of the Dutch Parliament were introduced to the work of NIOZ on board of the RV Pelagia during a short cruise from the harbour of Scheveningen. Board members of NIOZ and NWO as well as other representatives of NWO were also present on this occasion. An overview article about NIOZ was published in the NWO Journal 'Hypothese'.



This year marked also the start of the International Polar Year (IPY). The Dutch part of IPY is coordinated by NWO Earth and Life Sciences. During the cruises to the Antarctic or the Arctic, Corina Brussaard, Clair Evans and Patrick Laan had their own web-logs on VPRO's Noorderlicht (see <http://pooljaar.nl/virussen> and <http://pooljaar.nl/ijzer>). A movie-DVD was also made from the GEOTRACES research cruise to the Arctic.

Exhibitions and local activities

Exhibitions.

A NIOZ exhibition stand was present at the 'Duikvakerebeurs' in Utrecht, at the Lustrum meeting of the Netherlands Institute for Biologists (NIBI), at the celebrations at Texel for the 100th birthday of the TESO ferry company, and at the infomarket for students in animal sciences of the Van Hall-Larenstein Institute.



Visitors

Twelve groups visited NIOZ for a general introduction of the institute by means of a general presentation, the introductory movie and a guided tour.

To stress the advantages of a multi-disciplinary oceanographic institute, a set of six posters was made. The first poster gives the mission and main tasks of NIOZ, while the other posters show the new NIOZ research themes 'Coastal Seas', 'Changing Oceans', 'Dynamic Sea Floors', 'Sea and Climate' and 'Biodiversity'. A4 hand-outs of these posters act as introductory flyer on public occasions, for guests and new personnel.

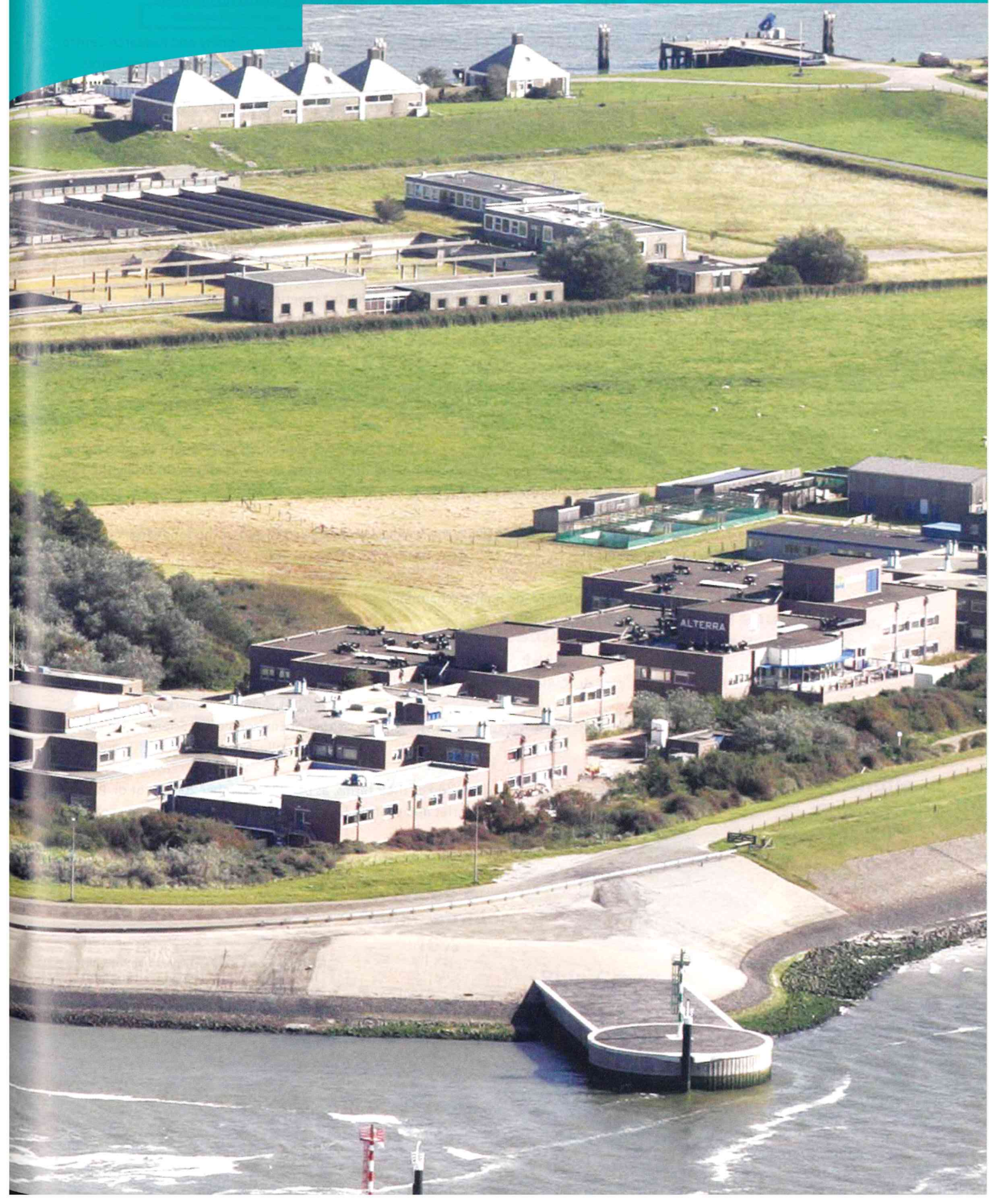
A special award symposium.

Jan van Gils was the proud winner of the Dutch Zoology Prize of the Royal Netherlands Zoological Society. Part of the prize was the organisation of the Symposium 'in the footsteps of Jan Verwey' at NIOZ at 29 June. The subjects of the symposium were the physiological and behavioural adaptations of organisms to changes in ambient conditions

Website Zee in Zicht / Sea on Screen

Together with a number of partners, NIOZ maintains the public web-site www.zeeinzicht.nl/ www.seaonscreen.org on the North Sea. This year, the consortium of 'Zee in Zicht / Sea on Screen' partners was expanded with the Centre for Estuarine and Marine Research of the Netherlands Institute of Ecology, the Flanders Institute for Marine Research, and the NGO 'North Sea Foundation'. With this new input, we intend to expand the sea areas covered by the website with the Wadden Sea and the Delta area in the south-west of our country.

Social Report



Board and science committee

Board

As per 31 December 2007, the Board consisted of the following members:

prof.dr.ir. P. Vellinga (chairman)	Wageningen University and Research Centre
prof.dr. E.A. Koster	Utrecht University, Faculty of Geosciences
prof.dr. L.E.M. Vet	NIOO-KNAW
prof.dr. J.T.M. Elzenga	CEES, Groningen University
G. van der Kamp	Naarden
ir. A. Lubbes	Fugro, Leidschendam
prof.dr. W.P.M. de Ruijter	IMAU, Utrecht University

In the report year 2007, Board and directors gathered five times, on 17 January, 22 March, 23 May, 21 September and 23 November on Texel.

On behalf of the general director of NWO, the meetings were attended by drs. R.J.P. Dekker (NWO-CPI) or by his representative, Mrs. P. Vogel. The minutes were made by Mrs. C.S. Blaauboer-de Jong.

Science Committee

The Science Committee advises the Board and the directors with regard to the general scientific policy of the Foundation and the Institute, she evaluates periodically the scientific programme of the institute.

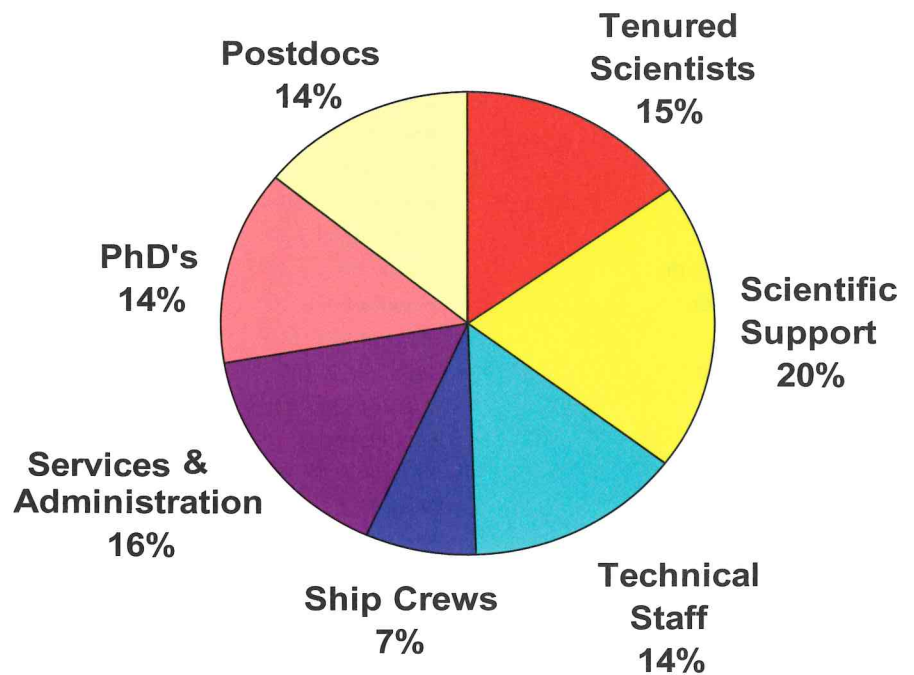
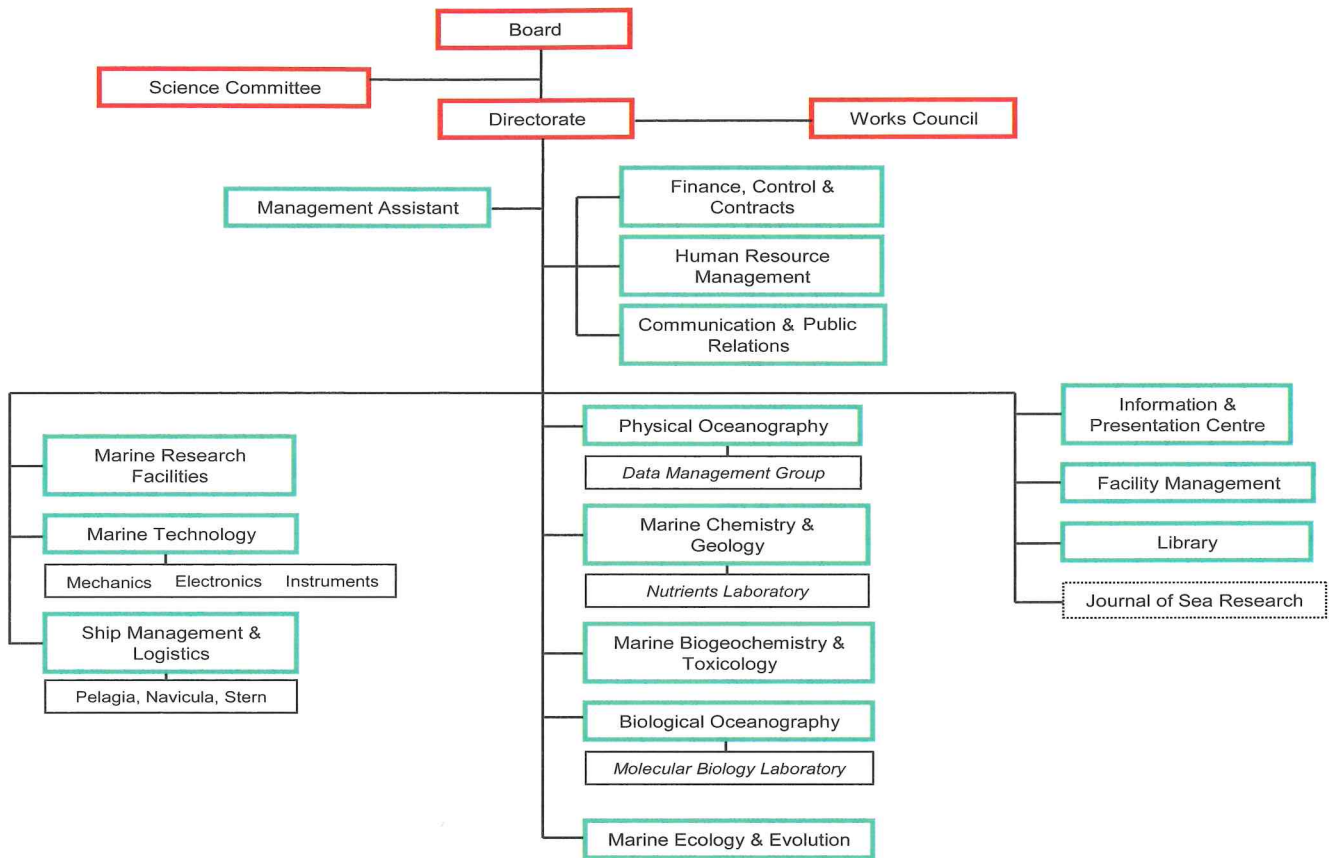
As per 31 December 2007, the Science Committee consisted of the following members:

prof.dr. W.P.M. de Ruijter (chairman)	IMAU, Utrecht University
prof.dr. L. Labeyrie	Laboratoire des Sciences du Climat et de l'Environnement, Université Paris Sud-Orsay, Gif sur Yvette, France
prof.dr. K. Richardson-Kristensen	Marin Økologi, Biologisk Institut, Aarhus Universitet, Århus, Denmark
prof.dr. T.D. Jickells	School of Environmental Sciences, University of East Anglia, Norwich, United Kingdom

Because they reached the end of their terms, as per 23 November 2007, Prof.dr. P. Herman, prof.dr. J.-P. Henriët and prof.dr. J. Simpson stepped back as members of the Committee.

In 2007, the Science Committee gathered on Texel on 22 and 23 November.

Organogram



NIOZ formation in FTE's at 31 December 2007. Total number of FTE's was 190.7 (number of employees 212). Undergraduate students were not included.

Staff list

Directors and staff

Heip C.H.R. prof. dr.
Ridderinkhof H. prof. dr.
Geerken B.M. dr.
Rietveld M.J. MSc
Blaauboer-de Jong C.S.
Boon J.P. dr.
Leeuw J.W. de prof. dr.
Lindeboom H.J. dr.

Human resource management

Vooijs P.C.
Bredewold J.J.H.
Dapper R.
Kuip T.
Mulder-Starreveld J.P.

Finance, control & contracts

Vos T.
Arkel M.A. van MSc
Gootjes J.P.
Honkoop P.J.C. dr.
Kalf J.
Keijser A.
Kooijman-Biermans M.H.M.
Nieuwenhuizen J.M.
Poleacov-Maraiala C.
Tuinen H.A. van
Wernand-Godee I.

Physical Oceanography

Aken H.M. van dr.
Maas L.R.M. prof. dr.
Bruin T.F. de MSc
Buijsman M.C. MSc
Eijgenraam F.
Gerkema T. dr.
Gostiaux, L.M.M.H. dr.
Haren J.J.M. van dr.
Harlander U. dr.
Hazewinkel J. MSc
Hiehle M.A.
Hillebrand M.T.J.
Jong M.F. de MSc
Koster R.X. de
Nauw-van der Vegt J.J. dr.
Nieuwenhuis J.
Ober S.
Veth C. MSc
Wernand M.R.
Zimmerman J.T.F. prof. dr.

Marine Chemistry and Geology

Weering T.C.E. van prof. dr.
Brummer G.-J.A. dr.
Bakker K.M.J.
Bergh G. van den dr.
Boer W.
Crayford S.J.
Epping H.G. dr.
Fallet U. MSc
Gonzalez S.R.
Grove C. MSc
Haas H. de dr.
Iperen J. van
Jonkers L.P. MSc
Koning F.A. dr.
Keuning M.E. MSc
Land C. van der MSc
Mienis F. MSc
Ooijen J.C. van
Richter T.O. dr.
Schogt N.
Stigter H.C. de dr.
Weerlee E.M. van
Witte A.J.M.

Marine Biogeochemistry and Toxicology

Sinninghe Damsté J.S. prof. dr.
Schouten S. dr.
Abbas B.A.
Baas M.
Bauersachs T. MSc
Boere A.C. MSc
Bommel R. van
Booij K. dr.
Boumann H.A. dr.
Brandsma J. MSc
Castañeda I.S. dr.
Coolen M.J.L. dr.
Hopmans E.C. dr.
Huguet M.C. MSc
Jaeschke A. MSc
Kienhuis M.V.M.
Kim J.H. dr.
Klimiuk A.M. MSc
Meer M.T.J. van der dr.
Mets A.
Mueller A. MSc
Ossebaar J.
Panoto F.E.
Peterse F. MSc
Pitcher A.M. MSc
Rampen S.W.

Ratray J.E. MSc
Rijpstra W.I.C.
Stadnitskaia A. dr.

Biological Oceanography

Herndl G.J. prof.dr.
Veldhuis M.J.W. dr.
Agogué H.M.E. dr.
Baar H.J.W. de prof. dr.
Baars M.A. dr.
Bleijswijk J.D.L. van dr.
Brink M.
Brussaard C.P.D. dr.
Corte D. de MSc
Duyf F.C. van dr.
Evans C. dr.
Gerringa A.L. dr.
Goeij J.M. de MSc
Hegeman J.
Hoogstraten A. MSc
Klunder M.B. MSc
Laan P.
Martinez Martinez J. dr.
Maier C. dr.
Middag R. MSc
Noordeloos A.A.M.
Noort G.J. van
Oosterhuis S.S.
Peperzak L. dr.
Reinthalder T. dr.
Ruardij P. MSc
Sintes E. dr.
Snoek J.
Thuroczy C.E. MSc
Timmermans K.R. dr.
Varela Rozados M.M. dr.
Witte H.J.
Zemmelink H.J. dr.

Marine Ecology and Evolution

Veer H.W. van der prof. dr.
Meer J. van der prof. dr.
Andresen H. MSc
Berghuis E.M.
Bergman M.J.N. MSc
Bijleveld A.I.
Bol-den Heijer A.C.
Brink V. van der
Brugge M.C.
Camphuijsen C.J.
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Castillo Solis A.I.

Daan R. dr.
Dapper R.
DeKinga A. MSc
Drent J. dr.
Dekker R. MSc
Duineveld G.C. MSc
Geest M. van der MSc
Gils J.A. van dr.
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Hof P.M.J. van 't MSc
Honkoop P.J.C. dr.
Hout P.J. van den MSc
Iperen J. van
Kooten L. van
Koutrik A. van
Kraan C. MSc
Lavaley M.S.S. MSc
Luttikhuisen P.C. dr.
Meijer K.
Mulder M.
Nieuwland G.
Nugues M.M. dr.
Philippart C.J.M. dr.
Piersma T. prof. dr.
Spaans B. MSc
Troost T.A. dr.
Vézina F. dr.
Waasdorp C.M.
Witbaard R. dr.
Witte J.IJ.

Facility Management

Kralingen P. van
Berbée-Bossen J.
Boks-Visser H.
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Daalder R.M.
Dapper-Maas M.A.
Groot S.P.
Heerschap J.H.
Hillebrand-Kikkert A.
Lakeman R.
Markesteyn A.M.
Sleutel A.
Trap B.
Witte R.J.C.

Information and Presentation Centre

Pool W.G. dr.
Aggenbach R.P.D.
Barten-Krijgsman N.
Derksen J.D.J.
Malschaert H.
Manshanden G.M.
Swift L.A.

Library

Grippeling R.S.M.
Bruining-de Porto M.E.
Raad I de

Editorial Office JSR

Bak-Gade B.

Marine Technology

Smit M.G. MSc
Porto H.H. de
Marine Technology Instrumentation
Boekel H.J.

Bekker R.
Heerwaarden J. van
Keijzer E.J.H.
Schrama M.

Marine Technology Electronics

Koster B.
Asjes A.J.
Buijsman D.J.
Cluderay J.M.N.
Franken H.
Groenewegen R.L.

Laan M.
Schmelling J.W.

Marine Technology Mechanical

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Bakker M.C.
Blom J.J.
Boom L.
Gieles S.J.M.
Grisnich P.W.
Polman W.
Witte Y.
Wuis L.M.

Ship Management and Logistics

Buisman T.C.J.
Adriaans E.J.
Alkema P.R.
Betsema G.L.J.
Ellen J.C.
Heide R. van der
Jongejan W.P.
Jourdan M.T.
Kikkert K.C.
Kleine M.D.M. de
List H.M.
Maas J.J.M.
Mik G.
Puijman E.A.
Seepma J.
Slikke R. van der
Star C.J. van der
Stevens C.T.
Vermeulen G.P.
Vis P.C.A. van der
Vries H. de

Emeritus Scientists

Bak R.P.M. prof.dr.
Beukema J.J. dr.
Cadée G.C. dr.
Wolf P. de dr.

Guest scientists

Bik M.H. MSc
Frade P. Rodrigues
Goeij P.J. de dr.
Hallers-Tjabbes C.C. ten dr.
Jager C. de prof. dr.
Vooyo C.G.N. de dr.

Financial report



Balance sheet

ASSETS	31-12-2007	31-12-2006	LIABILITIES	31-12-2007	31-12-2006
Fixed assets			Equity		
Intangible fixed assets	5,684	35,420	Foundation capital	1	1
Tangible fixed assets	31,559,782	31,522,756	Unrestricted reserve	(7,423,319)	(7,085,715)
			Designated funds	3,408,395	3,524,530
			Restricted reserve funds	32,272,579	31,789,416
	31,565,466	31,558,176		28,257,655	28,228,232
Current assets			Provisions	1,430,199	1,829,068
Stocks	120,110	87,414	Long term debts	2,282,101	2,419,510
Receivables	2,100,036	2,070,803	Short term debts	7,202,360	7,849,889
Cash and cash equivalents	5,386,702	6,610,306		10,914,660	12,098,468
	7,606,848	8,768,523			
Total assets	39,172,314	40,326,700	Total liabilities	39,172,314	40,326,700

Profit and loss account

	2007 actual	2007 budget	2006 actual
Profit			
Grants			
NWO basic funding	10,870,800	10,598,200	10,626,000
NWO investment funding	2,437,386	2,402,900	2,351,975
NWO additional funding	250,000	1,200,000	500,000
Contributions by third parties	5,577,246	5,345,911	5,261,614
Total grants	19,135,432	19,547,011	18,739,589
Other operating income	550,652	297,000	286,122
Available provisions	460,127	125,000	-
Interests received	225,510	85,091	211,265
Total other income	1,236,288	507,091	497,387
Total profit	20,371,720	20,054,102	19,236,976
Personnel costs	11,671,665	11,838,352	10,895,903
Other operating costs	5,263,042	5,527,770	5,434,410
Depreciation	3,349,614	3,254,401	3,148,847
Allocation provisions	409,045	228,301	340,546
Interest paid	74,248	74,250	77,814
Subtotal costs	20,767,615	20,923,074	19,313,695
Change project liabilities	(425,316)	(873,470)	(322,007)
Subtotal	(425,316)	(873,470)	(322,007)
Total costs	20,342,298	20,049,604	19,511,370
Operating result	29,422	4,498	(274,394)
Profit appropriation	375,514	624,873	1,652,448
Result after profit appropriation	404,936	629,371	1,378,053

Cashflow statement

(all amounts x € 1.000)

	31-12-2007	31-12-2006
<i>Operating cashflow</i>		
Balance income and expenses	29	(274)
<i>Adjustments</i>		
Depreciation	3,350	3,149
Movement provision	(399)	(193)
	2,951	2,956
<i>Moving working capital</i>		
Receivables	(29)	(322)
	(33)	4
Short term liabilities	(648)	(4,327)
	(709)	(4,644)
	2,271	(1,963)
Operating cashflow	2,271	(1,963)
<i>Investment cashflow</i>		
Investments intangible fixed assets	-	(3)
Investments tangible fixed assets	(3,357)	(3,029)
Drop in investments	-	615
Investment cashflow	(3,357)	(2,417)
<i>Financing cashflow</i>		
Redemption mortgage	(137)	(134)
Finance cashflow	(137)	(134)
Cash decrease financial year	(1,224)	(4,513)
Cash balance as at January 1	6,610	11,123
Cash decrease	(1,224)	(4,513)
Cash balance as at December 31	5,387	6,610

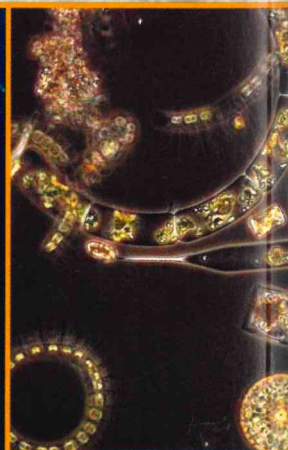
Tjerk Vos

NIOZ Royal Netherlands Institute for Sea Research is part of the Netherlands Organization for Scientific Research (NWO).

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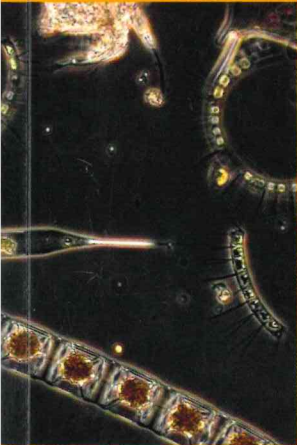
The mission of NIOZ is to gain and communicate scientific knowledge on seas and oceans for the understanding and sustainability of our planet, and to facilitate and support marine research and education in the Netherlands and Europe.



Royal Netherlands Institute for Sea Research



Annual Report 2007 Supplement



Annual Report **2007** Supplement



Texel, May 2008
NIOZ Royal Netherland Institute for Sea Research

The annual report can be ordered free of charge,
by preference on an exchange base, from the
library of NIOZ Royal Netherlands Institute for
Sea Research

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responsibility of the directors:

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PERSONEELSLIJST 31-12-07

DIRECTIE

Heip C.H.R. prof. dr.	algemeen directeur	
Ridderinkhof H. dr.	adjunct directeur	m.i.v. 01-07
Rietveld M.J. drs.	directie-secretaris	
Geerken B.M. dr. ir.	zakelijk directeur	tot 15-03
Blaauboer-de Jong C.S.	dir. secretaresse	
Boon J.P. dr.	communicatie & PR	
Leeuw J.W. de prof. dr.	consultant (inter-) nationale zaken	
Lindeboom H.J. dr.	consultant	

STAFEEHEDEN

Personeels-, Arbo en Milieuzaken

Vooijs P.C.	hoofd	
Bredewold J.J.H.	personeelsfunctionaris	
Dapper R.	medewerker	
Kuip T.	arbocoördinator	
Mulder-Starreveld J.P.	medewerker	

Finance, control & contracts

Vos T.	hoofd/controller	
Arkel M.A. van drs.	projectcontroller	
Gootjes J.P.	hoofd financiële administratie	
Honkoop P.J.C. dr.	ass. projectcontroller	m.i.v. 01-06
Kalf J.	medewerker magazijn	
Keijser A.	medewerker financiële administratie	
Kooijman-Biermans M.H.M.	medewerker financiële administratie	
Nieuwenhuizen J.M.	medewerker magazijn	
Poleacov-Maraiala C.	medewerker financiële administratie	
Tuinen H.A. van	medewerker financiële administratie	
Wernand-Godee I.	medewerker project administratie	

WETENSCHAPPELIJKE AFDELINGEN

AFDELING FYSISCHE OCEANOGRAPHIE

Ridderinkhof H. dr.	hoofd	tot 01-07
Aken H.M. van dr.	wnd hoofd	m.i.v. 01-07
Bruin T.F. de drs.	datamanager MRF	
Buijsman M.C.	projectmedewerker	tot 01-03
Eijgenraam F.	automatiseringsdeskundige	
Gerkema T. dr.	postdoc	
Gostiaux, L.M.M.H. dr.	postdoc	m.i.v. 15-02
Haren J.J.M. van dr.	senior onderzoeker	
Harlander U. dr.	postdoc	tot 01-09
Hazewinkel J.	OIO	
Hiehle M.A.	medewerker Data Management Group	
Hillebrand M.T.J.	senior onderzoekmedewerker	
Jong M.F. de	OIO	
Koster R.X. de	medewerker Data Management Group	
Maas L.R.M. dr.	senior onderzoeker	
Nauw-van der Vegt J.J. dr.	postdoc	
Nieuwenhuis J.	medewerker Data Management Group	
Ober S. Ing.	senior onderzoekmedewerker	
Veth C. drs.	senior onderzoeker	
Wernand M.R.	senior onderzoekmedewerker	
Zimmerman J.T.F. prof. dr.	senior onderzoeker	

AFDELING MARIENE CHEMIE EN GEOLOGIE

Weering T.C.E. van prof. dr.	wnd hoofd	
Epping H.G. dr.	senior onderzoeker	
Bakker K.M.J.	onderzoekmedewerker	
Bergh G. van den dr.	postdoc	
Boer W. ing.	senior onderzoekmedewerker	
Brummer G.-J.A. dr.	senior onderzoeker	
Crayford S.J.	senior laboratoriummedewerker	
Fallet U.	OIO	
Gonzalez S.R.	onderzoekmedewerker	
Grove C.	OIO	m.i.v. 01-03
Haas H. de dr.	projectmedewerker	
Iperen J. van	onderzoekmedewerker	
Jonkers L.P.	OIO	
Keuning M.E.	OIO	tot 01-09
Koning F.A. dr.	onderzoeker	
Land C. van der	OIO	
Mienis F.	OIO	
Ooijen J.C. van	senior onderzoekmedewerker	
Richter T.O. dr.	onderzoeker	
Schogt N.	onderzoekmedewerker	
Stigter H.C. de dr.	projectonderzoeker	
Weerlee E.M. van	senior laboratoriummedewerker	
Witte A.J.M.	senior laboratoriummedewerker	

AFDELING MARIENE BIOGEOCHEMIE EN TOXICOLOGIE

Sinninghe Damsté J.S. prof. dr. jr.	hoofd	
Abbas B.A.	senior laboratoriummedewerker	tot 01-08
Baas M.	senior onderzoekmedewerker	
Bauersachs T.	OIO	
Boere A.C.	OIO	
Bommel R. van	onderzoekmedewerker	
Booij K. dr.	onderzoeker	
Boumann H.A. dr.	postdoc	
Brandsma J.	OIO	
Castañeda I.S. dr.	postdoc	m.i.v. 14-05
Coolen M.J.L. dr.	postdoc	
Hopmans E.C. dr.	onderzoeker	
Huguet M.C.	OIO	tot 01-04
Jaeschke A.	OIO	
Kienhuis M.V.M.	onderzoekmedewerker	
Kim J.H. dr.	postdoc	
Klimiuk A.M.	OIO	
Meer M.T.J. van der dr.	postdoc	
Mets A.	senior laboratoriummedewerker	
Mueller A.	OIO	
Ossebaar J.	laboratoriummedewerker (gedetacheerd)	tot 01-12
Panoto F.E.	senior laboratoriummedewerker	
Peterse F.	OIO	
Pitcher A.M.	OIO	
Rampen S.W.	OIO	
Ratray J.E.	OIO	
Rijpstra W.I.C.	senior onderzoekmedewerker	
Schouten S. dr. ir.	senior onderzoeker	
Stadnitskaia A. dr.	postdoc	m.i.v. 01-03
Wilmoh V.	postdoc	m.i.v. 01-10

AFDELING BIOLOGISCHE OCEANOGRAPHIE

Herndl G.J. prof. dr.	hoofd	
Agogu� H.M.E. dr.	postdoc	
Baar H.J.W. de prof. dr. ir.	senior onderzoeker	
Baars M.A. dr.	senior onderzoeker	
Bleijswijk J.D.L. van dr.	hoofd mol. lab.	
Brink M.	laboratoriummedewerker	
Brussaard C.P.D. dr.	onderzoeker	
Cardoso J.	assistent	tot 01-08
Corte D. de	OIO	m.i.v. 01-10
Duyl F.C. van dr.	senior onderzoeker	
Evans C. dr.	postdoc	
Gerringa A.L. dr.	postdoc	
Goeij J.M. de	OIO	tot 01-03
Hoogstraten A	OIO	m.i.v. 01-11
Hegeman J.	senior onderzoekmedewerker	
Klunder M.B.	OIO	
Laan P.	onderzoekmedewerker	
Maier C. dr.	postdoc	tot 01-07
Martinez Martinez J. dr.	postdoc	
Middag R.	OIO	m.i.v 16-10
Noordeloos A.A.M. Ing.	onderzoekmedewerker	
Noort G.J. van	onderzoekmedewerker	
Oosterhuis S.S.	onderzoekmedewerker	
Peperzak L. dr.	projectmedewerker	
Reinthaler T. dr.	postdoc	
Ruardij P. drs.	onderzoeker	
Sintes E. dr.	postdoc	
Snoek J.	onderzoekmedewerker	
Thuroczy C.E.	OIO	
Timmermans K.R. dr.	senior onderzoeker	
Varela Rozados M.M. dr.	postdoc	tot 01-08
Veldhuis M.J.W. dr.	senior onderzoeker	
Witte H.J.	senior onderzoekmedewerker	
Zemmelink H.J. dr.	postdoc	

AFDELING MARIENE ECOLOGIE & EVOLUTIE

Meer J. van der dr.	hoofd	sabbatical tot 01-08
Veer H.W. van der dr. ir.	wnd hoofd	
Andresen H.	OIO	
Bak R.P.M. prof. dr.	senior onderzoeker	tot 01-11
Berghuis E.M.	senior onderzoekmedewerker	
Bergman M.J.N. Ir.	onderzoeker	
Bijleveld A.I.	toegevoegd onderzoeker	m.i.v. 01-10
Bol-den Heijer A.C.	senior laboratoriummedewerker	
Brink V. van den	assistent	tot 01-05
Brugge M.C.	dierversorger	
Camphuijsen C.J.	projectonderzoeker	
Castillo Solis A.I.	assistent	m.i.v. 01-03 tot 01-05
Daan R. dr.	onderzoeker	
Dapper R.	automatiseringsdeskundige	
Dekinga A. drs. ing.	senior onderzoekmedewerker	
Dekker R. drs.	onderzoeker	
Drent J. dr.	postdoc	tot 01-05
Duineveld G.C. drs.	onderzoeker	
Geest M. van der	OIO	

Gils J.A. van dr.	postdoc	
Hoek J. van der	laboratoriummedewerker	
Hof P.M.J. van 't	OIO	
Honkoop P.J.C. dr.	postdoc	
Hout P.J. van den	OIO	
Iperen J. van	onderzoekmedewerker	
Kooten L. van	assistent	m.i.v. 05-02 tot 05-05
Koutrik A. van ing.	laboratoriummedewerker	
Kraan C.	OIO	
Lavaley M.S.S. drs.	projectonderzoeker	
Luttikhuisen P.C. dr.	onderzoeker	
Meijer K.	assistent	m.i.v. 01-04 tot 01-07
Mulder M.	onderzoekmedewerker	
Nieuwland G.	senior onderzoekmedewerker	
Nugues M.M. dr.	postdoc	
Philippart C.J.M. dr.ir.	onderzoeker	
Piersma T. prof. dr.	senior onderzoeker	
Spaans B. drs.	senior onderzoekmedewerker	
Troost T.A. dr.	postdoc	tot 01-10
Vézina F. dr.	postdoc	
Waasdorp C.M.	senior laboratoriummedewerker	
Witbaard R. dr.	onderzoeker	
Witte J.IJ.	onderzoekmedewerker	

HULPAFDELINGEN

FACILITY MANAGEMENT

Kralingen P. van ing.	hoofd	
Berbée-Bossen J.	telefoniste/receptioniste	
Boks-Visser H.	telefoniste/receptioniste	
Bonne E.	medewerker (detachering)	
Daalder R.M.	medewerker	
Dapper-Maas M.A.	telefoniste/receptioniste	
Groot S.P.	medewerker	
Heerschap J.H.	medewerker	
Hillebrand-Kikkert A.	telefoniste/receptioniste	
Lakeman R.	medewerker	
Markesteyn A.M.	secretaresse	tot 01-11
Sleutel A.	medewerker	
Trap B.	medewerker	
Witte R.J.C.	medewerker	

INFORMATIE EN PRESENTATIE CENTRUM

Pool W.G. dr.	hoofd	
Aggenbach R.P.D.	medewerker	
Barten-Krijgsman N.	grafisch medewerker	
Derksen J.D.J.	systeem/netwerkbeheerder	
Malschaert H. ing.	systeem/netwerkbeheerder	
Manshanden G.M.	medewerker	
Swift L.A.	grafisch medewerker	van 09-07 tot 01-09

BIBLIOTHEEK

Grippeling R.S.M.	hoofd	
Bruining-de Porto M.E.	medewerker	
Raad I. de	medewerker	m.i.v. 22-01

REDACTIE JOURNAL OF SEA RESEARCH

Philippart C.J.M. dr.ir. hoofdredacteur
Bak-Gade B. assistent redacteur

MARINE TECHNOLOGY

Smit M.G. ir. hoofd
Porto H.H. de project engineer MTM

Marine Technology Instrumentation

Boekel H.J. hoofd
Bakker R. instrumentmaker tot 01-11
Heerwaarden J. van instrumentmaker
Keijzer E.J.H. instrumentmaker
Schrama M. instrumentmaker tot 10-07

Marine Technology Electronics

Koster B. ing. hoofd
Asjes A.J. electronicus
Buijsman D.J. electronicus tot 01-02
Cluderay J.M.N. electronicus
Franken H. ing. senior electronicus
Groenewegen R.L. ing. senior electronicus
Laan M. senior electronicus
Schmelling J.W. electronicus

Marine Technology Mechanical

Schilling J. hoofd
Bakker M.C. zeetechnicus electrotechniek
Blom J.J. zeetechnicus
Boom L. zeetechnicus
Gieles S.J.M. komvisser/chauffeur
Grisnich P.W. chauffeur/medewerker logistiek
Polman W. zeetechnicus
Witte Y. zeetechnicus m.i.v. 01-11
Wuis L.M. zeetechnicus

VAARTUIGEN EN LOGISTIEK

Buisman T.C.J. hoofd
Adriaans E.J. havenmeester/schipper
Alkema P.R. medewerker
Betsema G.L.J. scheepstechnicus tot 01-12
Ellen J.C. gezagvoerder
Heide R. van der scheepstechnicus
Jongejan W.P. medewerker
Jourdan M.T. administratief medewerkster
Kikkert K.C. hoofdwerktuigkundige
Kleine M.D.M. de 2e werktuigkundige
List H.M. 2e werktuigkundige
Maas J.J.M. scheepstechnicus
Mik G. scheepskok
Puijman E.A. stuurman
Seepma J. hoofdwerktuigkundige
Slikke R. van der scheepstechnicus tot 01-10
Star C.J. van der schipper
Stevens C.T. scheepstechnicus
Vermeulen G.P. scheepstechnicus
Vis P.C.A. van der machinist/motordrijver
Vries H. de scheepstechnicus/kok

OUD-MEDEWERKERS

Bak R.P.M. prof.dr.
Beukema J.J. dr.
Cadée G.C. dr.
Wolf P. de dr.

m.i.v. 01-11

GASTMEDEWERKERS

Bik M.H. drs.
Frade P. Rodrigues
Goeij P.J. de dr.
Hallers-Tjabbes C.C. ten dr.
Jager, C. de prof. dr.
Voys C.G.N. de dr.

Arbeidsvoorwaarden

CAO ontwikkelingen onderzoekinstellingen

Begin 2007 is overeenstemming bereikt tussen de werknemersorganisaties en de Werkgeversvereniging Onderzoekinstellingen over de zevende CAO.

De salarissen werden per 1 februari 2007 verhoogd met 2 procent, aangevuld met 0,15 procent vanwege het vervallen van buitengewoon verlof bij verhuizen, huwelijk en samenwonen. De procentuele eindejaarsuitkering werd verhoogd van 4,1% naar 5,4% waarbij reeds werd overeengekomen om deze uitkering per 1 januari 2008 verder te verhogen naar 6,1% als aanloop naar een volledige 13^e maand.

Voor meer uitgebreide informatie over deze nieuwe CAO, die per 1 oktober 2006 in werking trad met een looptijd tot 1 januari 2008, wordt verwezen naar het verslagjaar 2006.

Eind 2007 werd een aanvang gemaakt met de voorbereidingen en onderhandelingen voor een nieuwe CAO die per 1 januari 2008 in zou moeten gaan.

Naast een marktconforme loonontwikkeling en looptijd was bij aanvang van de onderhandelingen de inzet van de werkgevers onder meer gericht op employability, terugdringen van verlof, levensfasebewust personeelsbeleid en invoering van een tenure track model.

Arbeidsvoorwaarden op maat (AVOM)

De verkoop van verlofuren is in 2007 wederom toegenomen. Ook van de fiscaal gunstige faciliteit om de vakbondscontributie via AVOM te betalen is meer gebruik gemaakt.

Verkoop verlofuren	96 medewerkers
Koop verlofuren	9 medewerkers
Fietsen	28 medewerkers
Vakbondscontributie	24 medewerkers

Opleiding, cursus en training

Naast individueel gevolgde opleidingen en cursussen zijn er in 2007 enkele in-company cursussen en trainingen georganiseerd, te weten:

- Cursus Statistiek: bedoeld voor het wetenschappelijk en wetenschappelijk ondersteunend personeel.
- Training "Kleur bekennen": gevolgd door leidinggevendenden van het Koninklijk NIOZ. Aspecten als: "wat verwachten we van elkaar en waar spreken wij elkaar op aan" werden ter discussie gesteld.
- Cursus Nederlands: deze werd voornamelijk door de buitenlandse onderzoekers in opleiding en postdocs, in dienst van het NIOZ, gevolgd.
- Training Persoonlijke ontwikkelingsplannen (pop): mede bedoeld om te evalueren waarom het fenomeen "pop" moeilijk van de grond komt en om te brainstormen op welke wijze hieraan wel inhoud en meerwaarde gegeven kan worden

Medewerkersonderzoek

Conform de afspraak binnen de Werkgeversvereniging Onderzoekinstellingen dient er volgens een bepaalde periodiciteit een Medewerkersonderzoek te worden uitgevoerd.

Onder begeleiding van het bureau Effectory heeft dit onderzoek in 2007 plaatsgevonden. De beleving van een groot aantal aspecten zoals werk, bezoldiging, arbeidsomstandigheden, communicatie, leiding, omgang met collega's, loopbaan etc. worden hierbij onderzocht.

Het onderzoek richt zich zowel instituutsbreed als op afdelingsniveau.

In het tweede kwartaal zijn de onderzoeksresultaten gepresenteerd aan directie, leidinggevendenden en medewerkers. Over het algemeen ligt de "tevredenheid" van de NIOZ-medewerker boven het landelijk gemiddelde. Men ervaart het NIOZ als een prettige werkgever in een aangename werkomgeving.

Desondanks springen er drie aspecten uit waarover men niet tevreden is: communicatie, (onduidelijk) beleid en (geen) toekomstperspectief.

In de vergaderingen van de directie en de ondernemingsraad en het managementteam alsook binnen de afdelingen zijn de resultaten geëvalueerd.

In het najaar van 2008 zal er opnieuw een medewerkersonderzoek worden uitgevoerd.

Individueel Klachtrecht

Koninklijk NIOZ beschikt over een regeling Individueel Klachtrecht. Deze regeling biedt werknemers de mogelijkheid om klachten, over een gedraging door of vanwege de werkgever bespreekbaar te maken en te doen onderzoeken. In 2007 zijn er bij de Klachtadviescommissie geen klachten ingediend.

Nieuwe vaarregeling bemanningsleden.

Als gevolg van de aanbevelingen van de Commissie Toekomst Pelagia (zie sociaal jaarverslag 2006) is er in het najaar van 2007 met de werknemersorganisaties overeenstemming bereikt over een nieuwe vaarregeling voor bemanningsleden van de NIOZ onderzoekvaartuigen.

De nieuwe regeling voorziet in een meer marktconform aantal vaardagen op jaarbasis (gemiddeld 183 per jaar) dan volgens de oude regeling het geval was (gemiddeld 167 per jaar). Het bemanningslid dat op 31 december 2007 in dienst was van het Koninklijk NIOZ ontvangt een structurele garantietoelage van 3,5% van het bruto salaris. Bemanningsleden die na voornoemde datum in dienst treden, komen voor deze toelage niet in aanmerking.

Arbo- en Milieujaarverslag 2007

Inleiding

In dit verslag wordt gerapporteerd over de belangrijkste activiteiten op het terrein van arbo en milieu, die in 2007 hebben plaatsgevonden.

Beleid

In het afgelopen jaar is de arbo- en milieuinformatievoorziening aangepast en uitgebreid middels een nieuwe intraweb-site. Nieuwe items zijn o.a. transport gevaarlijke stoffen, beeldschermwerk en opslag van chemicaliën.

In het kader van de richtlijn 89/139/EEG 1 is er een start gemaakt met het inventariseren van de mogelijke explosierisico's op de werkvloer. Voor de beoordeling van de explosierisico's wordt gebruik gemaakt van de gegevens uit de (arbo) risico inventarisatie en evaluatie. Deze gegevens worden, voor de ATEX 137, omgezet in een explosie veiligheidsdocument.

Tevens wordt er, tijdens de doorlopende renovatie van het gebouw, voorafgaande aan de werkzaamheden en inrichting advies gegeven over de arbo- en milieuaspecten.

Voor het komende jaar wordt er o.a. verder gewerkt aan het implementeren van de nieuwe arbowet waarbij inbegrepen de arbocatalogus. Voor het opstellen van deze arbocatalogus vindt er onder andere overleg plaats binnen de Arbonet commissie van de gezamenlijke WVOI instellingen.

In het komende jaar wordt er voor nieuwe medewerkers een brochure samengesteld met relevante en praktische informatie betreffende de NIOZ-organisatie.

Arbo- en Milieucommissie

De Arbo- en Milieucommissie heeft een adviserende en signalerende taak naar de directie en de ondernemingsraad op het gebied van veiligheid en milieu. De commissie is breed van samenstelling vanuit verschillende geledingen. De commissie heeft zich het afgelopen jaar onder andere sterk gemaakt om de voortgang van de renovatie van de laboratoria te bewaken.

Ongevallen

In het afgelopen jaar zijn er een paar (kleine) ongevallen voorgevallen. In één geval is een medewerker doorverwezen naar een huisarts voor het hechten van een kleine snijwond door toedoen van gebroken glaswerk.

Veiligheids- en milieuzaken

Voor de vergunning voor het lozen van afvalwater op het Marsdiep is er bij het Ministerie van Verkeer en Waterstaat vrijstelling aangevraagd voor rapportageplicht. Deze is inmiddels verleend waardoor er geen monsternamen meer noodzakelijk is van het afvalwater. Het NIOZ heeft het afgelopen jaar 36.523 m³ afvalwater geloosd.

Via de afvalcontainer chemische stoffen is het nodige klein chemisch afval afgevoerd. De belangrijkste af te voeren componenten waren oplosmiddelen, giftige chemicaliën, laboratoriumafval en batterijen. Daarnaast is er verlopen olie en via de huisvuilcontainer, bouw- en huisafval ingenomen en afgevoerd.

Bedrijfsgezondheidszorg

De opvarenden van de schepen en de leden van de bedrijfsbrandweer zijn dit jaar periodiek gekeurd en geschikt bevonden. Ook zijn er niet reguliere keuringen gedaan voor personeel dat voer op buitenlandse schepen of keuringen voor duikers.

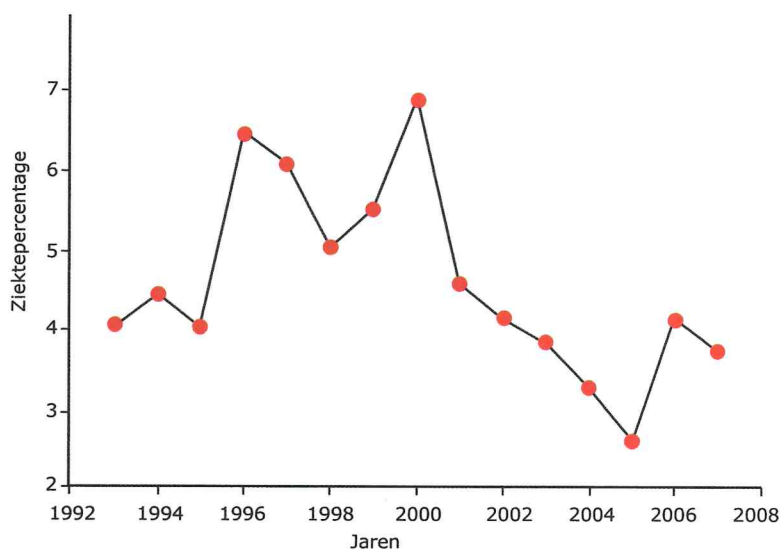
Ziekteverzuim

Na een lichte toename in 2006 ten opzichte van 2005 is het ziekteverzuim in 2007 met 0,4% wederom gedaald waardoor de afname die zich sinds het jaar 2000 ontwikkelde, zich heeft hersteld.

Ziektepercentages

	wp	man	vrouw	nwp	man	vrouw	totaal
1993	2.0	1.5	3.9	5.1	4.6	6.9	4.0
1994	2.4	1.5	5.5	5.4	5.6	4.7	4.4
1995	1.5	1.3	2.2	5.2	5.0	5.8	4.0
1996	2.0	1.7	4.5	8.4	7.2	12.1	6.4
1997	4.3	4.3	4.3	6.8	6.1	9.8	6.0
1998	4.5	4.0	12.8	5.3	3.5	13.4	5.0
1999	5.5	5.4	5.8	5.5	5.5	5.1	5.5
2000	5.6	5.8	4.9	8.6	6.9	15.6	6.8
2001	3.7	4.0	2.5	5.7	4.1	12.9	4.5
2002	3.5	3.5	3.4	5.0	3.1	13.9	4.1
2003	1.5	1.3	2.3	6.8	6.7	7.4	3.8
2004	2.5	1.8	4.6	4.3	4.2	4.9	3.3
2005	1.6	2.1	0.6	3.1	2.5	5.3	2.6
2006	2.1	1.8	2.7	5.4	5.0	7.1	4.1
2007	2.2	1.4	3.9	4.8	3.3	10.3	3.7

BHV organisatie



De organisatie bestaat uit een tweetal onderdelen, bedrijfsbrandweer en EHBO. Het EHBO team bestaat uit 12 leden. De bedrijfsbrandweer bestaat momenteel uit 12 manschappen. De formatie houdt rekening met 13 manschappen zodat er één vacature is.

Om de inzetbaarheid van de leden van de bedrijfsbrandweer en de EHBO te garanderen zijn er de afgelopen jaar diverse trainingen en cursussen gevolgd.

Verslag van de ondernemingsraad

De samenstelling van de or wijzigde ten opzichte van die van het jaar ervoor: Klaas Timmermans (voorzitter), Maarten Mulder (secretaris), Swier Oosterhuis (plv. voorzitter), Ruud Witte (plv. secretaris), Kees Veth, Klaas Kikkert en Piet van den Hout bleven aan, Sander Asjes trad in april toe als vertegenwoordiger van de ondersteunende diensten. In mei werden or-verkiezingen gehouden. Dit leidde niet tot veranderingen in de samenstelling van de raad.

Formeel en informeel overleg

De or en directie hebben zeven maal in een formeel overleg vergaderd, en wel op 25 januari, 22 maart, 24 mei, 19 juli, 21 september, 22 november en 20 december. Bij twee van die gelegenheden (maart en september) werd ook met het NIOZ-bestuur gesproken. De notulen van alle formele overleg-vergaderingen zijn gepubliceerd op de intranetpagina van de or. Verder is diverse malen (in principe om de twee weken) informeel overleg met de directie gevoerd.

Welke onderwerpen kwamen aan de orde?

De ondernemingsraad bracht maar liefst vijf keer (positief) advies uit met betrekking tot de benoeming van nieuwe leden in het NIOZ-bestuur. Op 15 januari betrof dit de heer G. van der Kamp in de functie van penningmeester, prof. dr. J.T.M. Elzenga als bioloog op basis van oude afspraken met de Dierkundige Vereniging en prof. dr. L.E.M. Vet om een brug te slaan naar het NIOO. Op 8 februari ging het om prof. dr. W.P.M. de Ruijter, die tevens benoemd werd tot voorzitter van de wetenschapcommissie. Tenslotte was er op 23 april het advies over de benoeming van Ir. A. Lubbes, die met name was aangetrokken om zijn deskundigheid op het gebied van de nautische wereld. Verder werd op 24 mei positief advies uitgebracht met betrekking tot de benoeming van dr. H. Ridderinkhof als adjunct directeur. Op 20 november werd instemming verleend met de vernieuwde uitvoeringsregeling 'Stagiaires'. Daarnaast werd op 17 december positief advies uitgebracht met betrekking tot het ontwikkelingsplan "Uitbreiding Biologische Oceanografie".

Op 6 september werd een achterbanbijeenkomst georganiseerd om met het personeel van gedachten te wisselen over de directie-notitie "Missie en Structuur". Deze notitie behelst aanpassingen in de organisatie, uit te voeren binnen het Sociaal Beleidskader. Naast overleg over de te volgen procedure is ook uitvoerig gesproken over de inhoud van de veranderingen binnen het NIOZ. Naar aanleiding van de bijeenkomst heeft de or schriftelijk gereageerd naar de directie (zie de intranet website van de or).

Hoewel het invoeren van een nieuwe CAO voor de bemanningsleden van de onderzoeksvaartuigen "Pelagia" en "Navicula" in beginsel geen aangelegenheid was voor de or, maar een zaak tussen directie en bonden, vormde het wel veelvuldig onderwerp van overleg.

Dit jaar werd een werknemersonderzoek georganiseerd. De uitkomsten van dit onderzoek, met name die over het functioneren van afdelingshoofden, de communicatie binnen het instituut en loopbaanperspectieven voor tijdelijke werknemers, ondersteunden de or in het overleg met de directie: deze onderwerpen stonden bij de or reeds lang boven aan de prioriteitenlijst.

Verslag van de activiteiten van de PV

In het voorjaar van 2007 zijn we met de kinderen van de NIOZ-medewerkers naar het schapentheater geweest. In de sfeervol aangeklede schapenschuur van De Noordkroon nam Renske ons mee in de wereld van het Texelse schaap. De theatervoorstelling 'Wolvet' is een unieke voorstelling van 1 boerin en 50 schapen en jong en oud vond dit erg leuk. Daarna hebben we de kinderen laten rennen op het speelschip in Oudeschild.



In de zomer hebben we het VOC-spel gedaan op Fort de Schans. In dit teamspel moesten we schapen roven, varen op de Texelse Rede en het opnemen tegen de VOC admiraliteit. Hierin moest goed samengewerkt worden door denkers en doeners wat niet altijd even goed verliep. Daarna sterke verhalen uitgewisseld tijdens de barbecue op het terras van de oude kantine.

In december hebben twee pieten alle brave PV-leden een goed gevulde zak van Sinterklaas gegeven, met daarin traditioneel 5-december snoepgoed. Het jaar is weer afgesloten met een geweldige kerstborrel in Oostenrijkse stijl met skihut en schnapps.



Dit jaar hebben Marian Keuning en Judith Bredewold het NIOZ en dus de PV verlaten; daarvoor in de plaats is Marcel Bakker gekomen.

Cruise Reports

- Brussaard, C.P.D. Virus control of the picophytoplankter *Micromonas pusilla* population dynamics in European waters (MICROVIR). R/V Pelagia, cruise 64PE271, 2–30 July.
- de Haas, H. and shipboard scientific party. Seismic, sedimentological, geochemical and biological studies of carbonate mounds, mud volcanoes and mud diapers in the SE Gulf of Cadiz. R.V. Pelagia cruise M2007 (64PE268), 28 April-17 May.
- de Haas, H. Pre-drilling topographic, biological, hydrographical and seismic surveying of cold water coral carbonate mounds at the Rockall Trough margins. R.V. Pelagia cruise M07II (64PE276), 30 September-22 October.
- de Stigter, H.C. and shipboard scientific party. Anthropogenic lead on the Portuguese continental margin. R/V Pelagia, cruise 64PE252, Cascais - Lisbon, 30 August – 21 September 2006.
- de Stigter, H.C. and shipboard scientific party. The benthic environment of submarine canyons of the Portuguese continental margin. R/V Pelagia, cruise 64PE236, Vigo - Lisbon, 27 April – 17 May 2005.
- de Stigter, H.C. and shipboard scientific party. The sedimentary environment of submarine canyons of the Portuguese continental margin and Gulf of Lions. R/V Pelagia, cruise 64PE225, Texel - Toulon, 24 April – 25 May 2004.
- Lavaleye, M.S.S and shipboard scientific crew. Biodiversity, ecosystem functioning and food web complexity of cold water coral reefs in the NE Atlantic (Mingulay Reef). HERMES, R/V Pelagia, cruise 64PE 270, 12 June - 1 July.
- Maier, C. & shipboard scientific party. Sponge diversity in cold water coral bioherms and calcification rate and prokaryote-coral associations of *Lophelia pertusa* (Skagerrak, North Sea). R/V Pelagia, cruise 64PE263, 7-13 March.
- Nauw, J.J. & H. Ridderinkhof. Navicula Cruise Report 2007/04/06 (AS49)
- Nauw, J.J. & H. Ridderinkhof. Navicula Cruise Report 2007/06/27 (AS50)
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- Cadée, G.C. Japanners aan zware shag gehecht. Het Zeepaard 67: 128.
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- van Gils, J. & W. Tijssen. Kleine zwanen die dineren op dichtstbijzijnde bietenakker trekken het snelst. *De Levende Natuur* 108: 213-214.
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Oral presentations

- Agogué, H., M. Brink, J.-M. Arrieta & G. J. Herndl. Bacterial and archaeal diversity in the meso- and bathypelagic waters of the eastern North Atlantic basin. 38th CIESM Congress, Istanbul, Turkey, 8-14 April.
- Allan, I.J., B. Vrana, K. Booij, A. Paschke, G.A. Mills & R. Greenwood. Passive sampling in support of regulatory monitoring of non-polar organic substances in surface waters. SETAC-UK annual meeting, Norwich, UK, 5 – 6 September.
- Bak, R.P.M. Coral reef ecosystems (Master course limnology and oceanography) Lecture series, Amsterdam University, September.
- Bak, R.P.M. Variation in corals and coral reefs: what is relevant for reef aquarists and coral husbandry? 1st International Symposium of coral husbandry, Arnhem, 16-21 April.
- Bakker, K.M.J. "Data Correction With Tracking Standards". Nutrient Intercomparison Meeting, NOC Southampton, UK, 26-27 February.
- Balk, M., T. van Gelder, A. Klimiuk, S. Schouten, J.S. Sinninghe Damsté & A.J.M. Stams. Bacterial anaerobic methane oxidation in high temperature environments. Darwin Days 2007, Veldhoven, 26 – 27 April.
- Baltar, F., E. Sintés, J. Aristegui & G.J. Herndl. Dynamics of ectoenzymatic activity in the deep water masses of the northeast Atlantic Ocean. 10th Symposium on Aquatic Microbial Ecology, Faro, Portugal, 2-7 September.
- Baltar, F., J. Aristegui, G.J. Herndl, J.M. Gasol & S. Hernández-León. Surface-depth and coastal-ocean gradients in diversity and activity of prokaryotes in the Canary CTZ region. IMBER-GLOBEC meeting, Valencia, Spain, 28-31 March.
- Bergman, M.J.N. Offshore Windpark Egmond aan Zee (OWEZ): effects on recruitment of benthic fauna. Annual meeting NZW, NIOZ, 5 September.
- Boere, A.C., B. Abbas, W.I.C. Rijpstra, J.K. Volkman, J.S. Sinninghe Damsté & M.J.L. Coolen. A qualitative and quantitative comparison of sedimentary palynomorphs, lipid biomarkers and fossil DNA: Which tool provides the most detailed paleoecological and paleoenvironmental information? (invited speaker) AGU Fall Meeting, San Francisco, California, USA, 10 – 14 December.
- Boetius, A., J.P. Foucher, G. de Lange, S. Duperron, S. Dupre, S. Kholeif, J. Mascle, A. Stadnitskaia & C. Marfia. Fluid flow associated ecosystems of the Nile deep – sea fan, Eastern Mediterranean (MEDIFLUX). European Geosciences Union, General Assembly 2007, Vienna, Austria, 15 – 20 April.
- Booij, K., R. van Bommel, H.M. van Aken, H. van Haren, G.-J. Brummer & H. Ridderinkhof. Passive samplers on moorings at three deep-ocean sites. International Passive Sampling Workshop, Washington, USA, 24 – 26 April.
- Booij, K. & F. Smedes. Passive samplers for hydrophobic contaminants: concepts and interpretations. ICES Annual Science Conference, Helsinki, Finland, 17 – 21 September.
- Booij, K. Concepts in passive sampling. ICES Marine Chemistry Working Group Meeting, Hamburg, Germany, 19 – 23 March.
- Boumann, H.A., S. Schouten, E.C. Hopmans, M. Longo, P. Stroeve, M. Strous, M. Jetten, B. Poolman & J.S. Sinninghe Damsté. Biophysical properties of ladderane lipids derived from anammox bacteria, 48th International Conference on the Bioscience of Lipids, Turku, Finland, 4 – 8 September.
- Bouruet-Aubertot, P. & H. van Haren. Inertial convective subrange in the bottom boundary layer of Rockall Channel. 39th International Liège colloquium on Ocean Dynamics, Liège, Belgium, 7-11 May and IUGG-meeting, Perugia, Italy, 2-11 July.
- Brandsma, J., E.C. Hopmans, A.C. Boere, S. Schouten, J.S. Sinninghe Damsté, M.J.W. Veldhuis, A.A.M. Noorderloos & C.P.D. Brussaard. Reassessing intact phospholipids as biomarkers for living microbial cells. 23rd Intern. Meeting on Organic Geochemistry, Torquay, UK, 9 – 14 September.
- Brussaard, C.P.D. & L. Peperzak. Phytoplankton as indicators of oil pollution. Meeting Bioassays and Biomarkers for Pollution Monitoring, Amsterdam, 15 October.
- Brussaard, C.P.D., L. Oosterhuis & L. Peperzak. Algal-virus interactions in the presence of oil. FACEIT 4th meeting, Lanzarote, Canary Islands, 25-28 October.
- Buehler, D.M., F. Vézina, F. Encinas-Viso, M. Petit, I. Tieleman, & T. Piersma. Immune function in red knots faced with limited food availability. Wader Study Group, La Rochelle, France, September.
- Cadée, G.C. De zee tot leven gebracht, de geschiedenis van de popularisering van de mariene biologie. EcoMare, Texel, 19 February.
- Cadée, G.C. Kapotte schelpen interessanter dan hele, vroege tafonomie van schelpen. Strandwerkgroep KNNV Schiedam, 14 November.
- Cadée, G.C. Tropische drijfzaden langs de vloedlijn. KNNV Haarlem, 17 November.

- Camphuysen, C.J. Evaluación del impacto de las mareas negras sobre la fauna salvaje. Jornadas Fauna salvaje Petroleada: planificación y respuesta. A Coruña, Spain, 21 November.
- Camphuysen, C.J. Oil pollution and sensitive bird populations in Europe: is there a reason for concern? Sea alarm conference on oiled wildlife response planning, Oostende, Belgium, 3 October.
- Camphuysen, C.J. The importance of the Mauritanian continental shelf for holarctic and Antarctic seabirds. Mauritania workshop, NIOZ, 15 November.
- Camphuysen, C.J. Walvissen, dolfinen en bruinvissen in Nederland: van zeemonsters tot troeteldieren. Jaar van de Dolfijn Nationaal Comité, Kustvereniging (EUCC), Noordwijk aan Zee, 19 June.
- Camphuysen, C.J. Zeevogels en walvisachtigen in de Nederlandse kustzone. Bijeenkomst jachthavenorganisaties, Texel, 4 July.
- Cardoso, J.F.M.F., C. Kraan, R. Dekker, R. Daan, J.I.J. Witte & H.W. van der Veer. *Ensis americanus* in Dutch coastal waters: from invader to permanent resident. 10th International Conference on Shellfish Restoration (ICSR), Vlissingen, 12-16 November.
- Cardoso, J.F.M.F., J. Campos, V. Freitas, J.I.J. Witte & H.W. van der Veer. Growth in bivalves: a combination of field data with DEB model simulations. 3rd AquaDEB meeting, Rennes, France, 17-19 December.
- Castañeda, I.S., E. Schefuß, J. Pätzold, J.S. Sinninghe Damsté & S. Schouten. Paleoclimate of the Nile River Delta region based on multiple organic geochemical proxies. MARUM workshop on Response of North African ecosystems to abrupt climate change, Bremen, Germany, 14 November.
- Castañeda, I.S., E. Schefuß, J. Pätzold, J.S. Sinninghe Damsté & S. Schouten. Paleoclimate of the Eastern Mediterranean/North Africa during the past 26 cal ka based on organic geochemical investigations of a Nile River Delta sediment core, AGU Fall Meeting, San Francisco, California, USA, 10 – 14 December.
- Coolen, M., H. Talbot, B. Abbas, C. Ward, S. Schouten, J. Volkman & J. Sinninghe Damsté. Bacteriohopanepolyols in Holocene sediments of Ace Lake (Antarctica) and their possible biological origins as revealed by 16S rDNA stratigraphy. 23rd Intern. Meeting on Organic Geochemistry, Torquay, UK, 9 – 14 September.
- Daan, R. Monitoring the invertebrate benthic fauna in the Dutch sector of the North Sea. Symposium 'Food for thought: Dynamics of fish and fishers', IJmuiden, 19 April.
- Davies, A., M. Lavaleye, M. Bergman, J. Murray Roberts & G. Duineveld. Current regime within a *Lophelia pertusa* reef complex. Annual Meeting HERMES, Faro, Portugal, 24 March-1 April.
- de Bruin, T.F. & M.A. Parsons. IPY Data Management – Building the Legacy. JCADM-11 Meeting, Rome, Italy, 5-7 September.
- de Bruin, T.F. Chief Officer Report. JCADM-11 Meeting, Rome, Italy, 5-7 September.
- de Bruin, T.F. De Nederlandse Nationale Oceanografische Commissie: Het national platform voor oceanografisch data management. NODCI-meeting, Den Haag, 26 June.
- de Bruin, T.F. De Positie van de NODC in Internationale Netwerken. NODCI-phase 2 kick-off meeting, Den Haag, 8 February.
- de Bruin, T.F. JCADM: Highlights and Challenges. SCAR Executive Committee meeting, Washington DC, USA, 9-11 July.
- de Bruin, T.F. Oceanographic data management for the International Polar Year (IPY). IOC-IODE meeting, Trieste, Italy, 12-16 March.
- de Bruin, T.F. Status of data management for the International Polar Year (IPY). 1st ICES WG on Data and Information Management (WGDIM) meeting, Copenhagen, Denmark, 12-14 May.
- de Bruin, T.F. Sustained data management in support of the study of ocean sustainability and global change. The role of Marine Sciences in Ocean Sustainability and Global Change, Lisbon, Portugal, 8 October.
- de Bruin, T.F. The Joint SCAR/COMNAP Committee on Antarctic Data Management (JCADM). JCADM Capacity Building Workshop, Rome, Italy, 3-4 September.
- de Bruin, T.F., M. Parsons & F. Fetterer. The International Polar Year (IPY): An unique opportunity for the World Data Centres. WDC Directors meeting, Bremen, Germany, 7-9 May.
- de Haas, H., F. Mienis, N. Frank, T.O. Richter, R. Steinacher, H.C. de Stigter, C. van der Land & T.C.E. van Weering. Morphology and sedimentology of (clustered) cold water coral mounds at the south Rockall Trough margins, NE Atlantic Ocean. International Association of Sedimentologists Regional Meeting, 25th IAS Meeting of Sedimentology, Patras, Greece, 4-7 September.
- de Jong, M.F., W. Hazeleger, S. Drijfhout & H.M. van Aken. A comparison of model simulations and observations in two key areas in the North Atlantic Ocean. BSIK meeting, Driebergen, 16 May.
- de Leeuw, J.W. & colleagues Marine Board/ESF. Prospective views for European Cooperation in Geosciences and Environmental Sciences: Contributions in a global context. European Geosciences Union, General Assembly 2007, Vienna, Austria, 15 – 20 April.
- de Leeuw, J.W. De natuurlijk vastlegging van CO₂ sinds het ontstaan van de aarde. Museon, Den Haag, 30 November.

- de Leeuw, J.W. Nieuwe ontwikkelingen in het resistente bio- en geopolymeren onderzoek in verband met natuurlijke CO₂ sequestratie. Talk KNAW, discipline Earth sciences, Amsterdam, 17 December.
- de Leeuw, J.W. Van oerknal tot energiecrisis en daarna. Dagthema Klimaatverandering, de zin en de onzin, Utrechts Universiteitsfonds Alumnibureau, Alumninetwork Arnhem, Doetinchem, 6 October.
- de Stigter, H.C., W. Boer, C.C. Jesus, G.D. van den Bergh & T.C.E. van Weering. Sediment dynamics of the submarine canyons of Nazaré and Lisbon-Setúbal, Portuguese continental margin. HERMES 2nd Annual Meeting, Carvoeiro, Portugal, 26-30 March.
- Epping, H.G. The impact of climate change on ecosystem processes. The Wadden Sea Ecosystem and Climate Change. Common Wadden Sea Secretariat workshop, Wilhelmshaven, Germany, 30 August.
- Frade, P.R. & R.P.M. Bak. Functional diversity of Symbiodinium in closely related coral species with large depth distributions. Dutch Coral Research Symposium, Amsterdam, 17 December.
- Frank, N., D. Blamart, C. van der Land, C. Colin, A. Foubert, D. van Rooij & T.C.E. van Weering. Carbonate Mound evolution and coral diagenesis viewed by U-series dating of deep water corals, AGU San Francisco, December.
- Freitas, V., J.F.M.F. Cardoso, S. Santos, J. Campos, H.W. van der Veer. Bivalve food conditions along the Northeast Atlantic coast: implications of climate change on bivalve productivity. 42th EMBS, Kiel, Germany, 17-21 August.
- Gerkema, T. Current topics in Physical Oceanography: from large-scale circulation to small-scale mixing. WL/Delft Hydraulics, Delft, 9 October.
- Gerkema, T. Geophysical flows. NCK Summer School, NIOZ, Texel, 26 & 28 July.
- Gerkema, T. Internal-wave theory beyond the Traditional Approximation. Applied Physics Laboratory, University of Washington, Seattle, USA, 20 March and University of Alaska, Fairbanks, USA, 23 March.
- Gerkema, T. Theoretical results on abyssally trapped near-inertial waves. IUGG/IAPSO, Perugia, Italy, 3 July.
- Gerkema, T. Internal tides in the Bay of Biscay: conversion rates, beams and solitons. School of Earth and Ocean Sciences, University of Victoria, Victoria BC, Canada, 28 March.
- Herndl, G.J. Bacterial and archaeal diversity and function in the major deep water masses of the North Atlantic. European Geosciences Union General Assembly, Vienna, Austria, 15-20 April.
- Herndl, G.J. Functional diversity in marine prokaryotic communities: is there a role for the 'rare biosphere'? American Society for Microbiology, Toronto, Canada, 24-28 May.
- Herndl, G.J. Potential of Microbial Oceanography to understand oceanic biogeochemical cycles. EurOceans annual meeting, Athens, Greece, 27-29 April.
- Herndl, G.J. Regulation of aquatic microbial processes: the 'microbial loop of the sunlit surface waters and the dark ocean dissected. 10th Symposium on Aquatic Microbial Ecology, Faro, Portugal, 2-7 September.
- Herndl, G.J. Shedding light on the dark ocean: recent advances and gaps in our knowledge on microbes as main drivers of deep-water column biogeochemistry, 38th CIESM Congress, Istanbul, Turkey, 8-14 April.
- Huguet, C., G. de Lange, J. Kim, J. Sinninghe Damsté & S. Schouten. Impact of long term oxygen degradation on organic proxies. Invited talk at Organic Matter Degradation workshop, University of Bremen, Germany, 27-30 August.
- Ivanov, M., V. Blinova, E. Kozlova, L. Pinheiro, T. van Weering & A. Stadnitskaia. Natural gas hydrates from mud volcanoes in the Gulf of Cadiz. European Geosciences Union, General Assembly 2007, Vienna, Austria, 15-20 April.
- Jauniaux, T.P., H. Bergerie, C.J. Camphuysen, P.Y. Daoust, O. Drouguet, M.F. Leopold, J. Schnitzler & F. Coignoul. Lesions observed on harbor porpoises (*Phocoena phocoena*) stranded on the Dutch coast in 2006. 17th Biennial conference on the biology of marine mammals, Cape Town, South Africa, 29 November-3 December.
- Kraal, P., C.P. Slomp, A. Forster & H.-J. Brumsack. Phosphorus burial in marine sediments during the Cenomanian – Turonian Oceanic Anoxic Event (OAE-2). General Assembly 2007, Vienna, Austria, 15-20 April.
- Lavaleye, M., G. Duineveld & S. Schulting. The molluscan fauna of a deep-water coral community at Rockall Bank (NE Atlantic). World Congress of Malacology, Antwerpen, Belgium, 15-20 July.
- Lavaleye, M., S. Schulting & G. Duineveld. Biodiversity of the macrobenthos of a deep-water coral community at Rockall Bank. Annual Meeting HERMES, Faro, Portugal, 24 March-1 April.
- Lavaleye, M.S.S. & G.C.A. Duineveld. Maerl in Mauritania. Meeting Mauritania MER, IMARES, Yerseke, 8 November.
- Lavaleye, M.S.S. & G.C.A. Duineveld. NIOZ-BIOFUN research program. BIOFUN kickoff meeting, Barcelona, Spain, 26-27 September.
- Lavaleye, M.S.S., G.C.A. Duineveld & S. Schulting. Deep-water coral communities (NE Atlantic): hotspots for biodiversity, biomass and activity. EURODEEP meeting, Taormina, Italy, 26-29 November.
- Lavaleye, M.S.S. Koudwaterkoralen. OSG Den Burg, Texel, 13 September.

- Jakobsson, J. Backman, K. Moran & J.S. Sinninghe Damsté. A 26 Myr gap in the central Arctic Cenozoic record; Why and how? The Arctic Conference Days, Tromso, Norway, 3-5 September.
- Sangiorgi, F., H.-J. Brumsack, S. Schouten, H. Brinkhuis, D.A. Willard, G.-J. Reichart, C.E. Stickley, M.A. Kaminski & J.S. Sinninghe Damsté. A ~25 Ma gap in the central Arctic Cenozoic record, Why and how? National IODP Symposium 2007, Utrecht, 30 March and European Geosciences Union, General Assembly 2007, Vienna, Austria, 15 – 20 April.
 - Schouten, S. & J.S. Sinninghe Damsté. Introduction to Darwin Research at NIOZ for PhD-students from the Darwin Institute for Biogeology, NIOZ, 23 November.
 - Schouten, S. Tetraether lipids: From microbial ecology to ancient temperatures. Invited talk for Nature of Life lecture series, Vrije Universiteit Amsterdam, 9 October.
 - Schouten, S., J. Kim, E.C. Hopmans & J. Sinninghe Damsté. Progress in tetraether lipid based proxies. Invited talk at Red Sea workshop, Tübingen, Germany, 25 – 26 October.
 - Schouten, S., J.W.H. Weijers, E.C. Hopmans, F. Peterse & J.S. Sinninghe Damsté. A new proxy for continental paleotemperature reconstructions. Invited talk at the Big Horn Basin Drilling Project workshop, Powell, Wyoming, USA, 25 – 28 June.
 - Schouten, S., J.W.H. Weijers, F. Peterse, M.T.J. van der Meer & J.S. Sinninghe Damsté. Development and application of novel organic proxies. Invited talk at Goldschmidt Conference, Cologne, Germany, 20 – 24 August.
 - Schouten, S., L. Herfort & J.S. Sinninghe Damsté. Archaeal carbon fixation and burial and terrestrial organic matter input in the coastal system as revealed by tetraether membrane lipids. LOICZ workshop, The Hague, 17 December.
 - Sinninghe Damsté, J.S., J. Ossebaar, R. van Houten, M. van der Meer, S. Schouten, B. Plessen, C. Wolff, G.H. Haug & D. Verschuren. Continental climate change in tropical Africa since the last glacial: organic proxy records from the Mt. Kilimanjaro area. 23rd Intern. Meeting on Organic Geochemistry, Torquay, UK, 9 – 14 September.
 - Sinninghe Damsté, J.S. Al Gore en daarvoor? Public lecture sponsored by Plukker, Slot Schagen, Schagen, 8 November.
 - Sinninghe Damsté, J.S. Archaeal and bacterial lipids as tools in microbial ecology and palaeoclimatology, Invited Kluyver lecture at Delft University of Technology, Delft, 15 June.
 - Sinninghe Damsté, J.S. Lipids of bacteria, archaea and algae as tools in (palaeo)ecological research. Invited lecture at the NECOV symposium, Nijmegen, 17 January.
 - Sinninghe Damsté, J.S. Organic proxies for reconstruction of microbial evolution, past climatic and palaeoenvironmental conditions (Vladimir Ivanovich Vernadsky Medal Lecture) (solicited). European Geosciences Union, General Assembly 2007, Vienna, Austria, 15 – 20 April.
 - Sinninghe Damsté, J.S. Organic proxies for reconstruction of microbial evolution, past climatic and palaeoenvironmental conditions: A brief introduction of the biomarker work at NIOZ and UU. Meeting with Shell, Utrecht, 5 July.
 - Sinninghe Damsté, J.S. Organic proxies for reconstruction of past climate change in the tropics. ESF summer school. Nairobi, Kenya, 21 August.
 - Sinninghe Damsté, J.S., J. Ossebaar, S. Schouten & D. Verschuren. Organic proxies in Lake Challa, East Africa: An update. Challacea workshop, Challa, Kenya, 23 August.
 - Sinninghe Damsté, J.S., J.W.H. Weijers & S. Schouten. A new continental palaeo-thermometer based on bacterial tetraether membrane lipids in soils: Proxy validation and application. Invited lecture at Darwin Days 2007, Veldhoven, 26 – 27 April.
 - Sluijs, A., S. Schouten, J.C. Zachos, P.K. Bijl, G. Reichart, J.S. Sinninghe Damsté, M. Huber, P.N. Pearson & H. Brinkhuis. Pole-to-pole sea surface temperatures from the Paleocene-Eocene thermal maximum using organic and inorganic paleothermometers: the ultimate test case for climate models. AGU Fall Meeting, San Francisco, California, USA, 10 – 14 December.
 - Sluijs, A., S. Schouten, U. Röhl, G. Reichart, J.S. Sinninghe Damsté, F. Sangiorgi, S. Krishnan, M. Pagani & H. Brinkhuis. Fresh and warm Arctic Ocean surface waters during Eocene thermal maximum 2. AGU Fall Meeting, San Francisco, California, USA, 10 – 14 December.
 - Smallegange, I.M. & J. van der Meer. Distributions of ideal, free but unequal predators are not necessarily (semi)truncated. Symposium on Mathematical Models in Evolution and Ecology (MMEE). University of Sussex, Brighton, UK, 21 September.
 - Smit, M.G. Instrument Development at Royal NIOZ. OFEG-TECH conference at IMR, Bergen, Norway, 24-25 October.
 - Smit, M.G. Marine Technology and Moorings at Royal NIOZ. KM-3 WP-3 conference, at National Institute of Nuclear Physics, Catania, Italy, 17-19 September.
 - Smit, M.G. Marine Technology at Royal NIOZ. OFEG-TECH conference at IMR, Bergen, Norway, 24-25 October.

- Smit, M.G., H. van Haren, M. Laan, D.J. Buijsman and E. Keijzer. NIOZ Fast Thermistor String Model 3 for measuring internal waves, Oceans 2007, IEEE/OES Conference on Marine Technology, Aberdeen, UK, 19-21 June.
- Spaans, B. Onderzoek aan individueel herkenbare rosse grutto's van ons Wad tot in West Afrika. Annual meeting SOVON/FFF, Grou, 14 November.
- Spaans, B. The significance of female body stores for egg laying and incubation in dark-bellied brent geese *Branta bernicla bernicla*. NIOO/KNAW-Alterra startup meeting Brent Arctic, De Krim, Texel, 22 November.
- Speelman, E.N., G-J. Reichart, H. Brinkhuis, J.S. Sinninghe Damsté, J.W. de Leeuw, J. Barke & M. van Kempen. Biomarker constraints on surface water conditions in the Eocene Arctic Basin. 14th Annual Symposium NSG, Amsterdam, 6 December.
- Speelman, E.N., G-J. Reichart, J. Sinninghe Damsté, H. Brinkhuis, J. Barke, M. van Kempen, J. Sewall & A. Von der Heydt. The DARWIN Azolla-project: a biogeochemical perspective on the Eocene arctic Azolla bloom. Darwin Days 2007, Veldhoven, 26 – 27 April.
- Stadnitskaia, A., D. Nadezhkin, B. Abbas, V. Blinova, M.K. Ivanov & J.S. Sinninghe Damsté. Carbonate formation by anaerobic oxidation of methane: evidence from lipid biomarker and fossil 16SrDNA. 1st Annual EuroDIVERSITY Conference, Marne-la-Vallée, France, 3 – 5 October.
- Stadnitskaia, A., E. Omeregic, A. Boetius & J.S. Sinninghe Damsté. A novel association of methanotrophic archaea and bacteria in a cold seepage location: significance of aerobic methane utilization. European Geosciences Union, General Assembly 2007, Vienna, Austria, 15 – 20 April.
- Stadnitskaia, A. Methane-related carbonate development in the sediments from the North Alex mud volcano. Nile deep-sea fan, Eastern Mediterranean (invited lecture). IFM-GEOMAR, Leibniz-Institute of Marine Sciences at Kiel University, Germany, 16 November.
- Templer, S.P., A. Stadnitskaia, L. Maignien, C. Vasconcelos & J.A. McKenzie. Geomicrobiology of carbonate mounds in the Gulf of Cadiz off Morocco: Biogeochemistry, mineralogy and microbial community composition. AGU Fall Meeting, San Francisco, California, USA, 10 – 14 December.
- ten Hallers-Tjabbes, C.C. Ballast water treatment & Active Substances, option or deadlock? MAPO – Marine Pollutions - Workshop, AMRIE, Brussels, Belgium, 21 February.
- ten Hallers-Tjabbes, C.C. Guidelines and procedures for antifouling wastes. SAFEMED Seminar on the AFS Convention, Cairo, Egypt, 24 – 26 April.
- ten Hallers-Tjabbes, C.C. Land-based testing of a BWT system using natural organisms; a first impression of testing according Regulation-D2 and future developments. MEPC 56, Marine Environment Protection Committee 56th Meeting, International Maritime Organisation, London, UK, 9 – 13 July.
- ten Hallers-Tjabbes, C.C. Maritime policies - Decision processes where science and technology come in. IUCN Maritime Strategy Workshop, IUCN, Gland, Switzerland, 27 – 28 February.
- ten Hallers-Tjabbes, C.C. Problems arising from harmful anti fouling systems. SAFEMED Seminar on the AFS Convention, Cairo, Egypt, 24 – 26 April.
- ten Hallers-Tjabbes, C.C. Sound environmental policies and strategies for the sea, by integrating science into policy processes. Orchestra, 2nd stakeholder workshop, German Bight pilot. Hamburg, Germany, 23 January.
- ten Hallers-Tjabbes, C.C. Underwater noise from maritime sources and impact on marine life. ICCMI 2008 Preparatory Workshop, World Maritime University, Malmö, Sweden, 7 – 8 June.
- van 't Hof, P. Benthic biology: seabed observations and new developments. NIOZ-NIKHEF meeting, NIOZ, 12 March.
- van Aken, H.M. De oceanische lopende band, diepe oceanicirculatie en klimaat. Ecomare winterlezingen, Ecomare, 5 February.
- van Aken, H.M. Ocean currents and current measurements. Utrecht University, IMAU, 29 February.
- van Aken, H.M. Processing of current meter data: with examples form the INSTANT Lifamatola mooring. INSTANT Training, Bogor, Indonesia, 7 November.
- van Aken, H.M. Variability of the salinity in the western Wadden Sea on tidal to centennial timescales. Jet-Set, NIOZ, 6 February.
- van Aken, H.M., INSTANT: Observations in Lifamatola Passage. INSTANT workshop, Bogor, Indonesia, 5 November.
- van Aken, H.M., The oceanic thermohaline circulation. Seminar Utrecht University, IMAU, 25 April – 13 June.
- van Bentum, E., J.S. Sinninghe Damsté, G-J. Reichart & ODP 207 Scientific Party. Reconstructing water column anoxia across the Cenomanian – Turonian boundary at Demerara Rise; results from ODP Leg 207. National IODP Symposium 2007, Drilling Future Climates, Utrecht, 30 March.
- van den Hout, P.J., B. Spaans & T. Piersma. Non-lethel top-down control: wintering condition of shorebirds on the Banc d'Arguin affected by their avian predators. NIOZ/MEE Mauritania Workshop, NIOZ, 15 November.
- van den Hout, P.J., K.J. Mathot & T. Piersma. Differential phenotypic adjustments of shorebirds to raptor intimidation. Workshop: Anti-predator adaptations in shorebirds, NIOZ, 22 November.

- van den Hout, P.J., K.J. Mathot & T. Piersma. Phenotypic responses of shorebirds to predation danger. Integrating experimental and field observational results. International Wader Study Group Annual Conference, La Rochelle, France, 28 September-1 October.
- van der Geest, M. Production et consommation dans un écosystème dominée par des herbiers marins, le Banc d'Arguin, Mauritanie. Lecture at the office of the Parc National du Banc in Nouakchott, Mauritania. 16 March.
- van der Geest, M. Secondary production at the Banc d'Arguin, Mauritania. Lecture Mauritania-symposium, NIOZ, 15 November.
- van der Meer, J. & I.M. Smallegange. Interference among a finite number of predators: a stochastic version of the Beddington-DeAngelis functional response model. Symposium on Mathematical Models in Evolution and Ecology (MMEE). University of Sussex, Brighton, UK, 21 September.
- van der Meer, J. Design and analysis of ecological field experiments. Lecture series in NEBROC Advanced PhD Course, AWI-Wattenmeerstation Sylt, Germany, 9-14 September.
- van der Meer, J. Dynamic Energy Budgets. Lecture series in PhD Course Mathematical Modelling in Ecology. Department of Ecology, Environment and Geology, University of Umeå, Sweden, 8-11 May.
- van der Meer, J. Seasonal timing of reproduction in the bivalve *Macoma balthica*: a model study of fitness consequences, AquaDEB meeting, Nantes, France, 17 December.
- van der Meer, M., M. Baas, I. Rijpstra, G. Marino, E. Rohling, J.S. Sinninghe Damsté & S. Schouten. New proxy for paleosalinity based on the stable hydrogen isotopic composition of C₃₇ alkenones. European Geosciences Union, General Assembly 2007, Vienna, Austria, 15 – 20 April.
- van der Meer, M., M. Baas, I. Rijpstra, G. Marino, E. Rohling, J.S. Sinninghe Damsté & S. Schouten. New proxies for paleosalinity based on stable hydrogen isotopic composition of algal biomarkers. Red Sea workshop, Tübingen, Germany, 25 – 26 October.
- van der Meer, M.T.J., M. Baas, W.I.C. Rijpstra, G. Marino, E. Rohling, F. Sangiorgi, H. Brinkhuis, J.S. Sinninghe Damsté & S. Schouten. New proxy for paleosalinity based on the stable hydrogen isotopic composition of C₃₇ alkenones. Paleosalt Meeting, Barcelona, Spain, 4 – 5 June and ACS Fall Meeting, Boston, USA, 19 – 23 August.
- van der Meer, M.T.J., M. Baas, W.I.C. Rijpstra, G. Marino, E.J. Rohling, F. Sangiorgi, H. Brinkhuis, J.S. Sinninghe Damsté & S. Schouten. New proxies for paleosalinity based on stable hydrogen isotopic composition of algal biomarkers. 23rd Intern. Meeting on Organic Geochemistry, Torquay, UK, 9 – 14 September.
- van der Meer, M.T.J., S. Schouten & J.S. Sinninghe Damsté. Biomarkers for photic zone euxinia. ACS Fall Meeting, Boston, USA, 19 – 23 August.
- van der Veer, H.W. Impact of latitude on population regulation. Symposium 'Food for thought: Dynamics of fish and fishers'. IJmuiden, 19 April.
- van der Veer, H.W. Physiological effects of temperature: applying the DEB theory. EU RECLAIM Meeting, Hamburg, Germany, 23 October.
- van Duyl, F.C., J.M. de Goeij & L. Moodley. Food for sponges. EU project meeting, MPI, Bremen, Germany, 5 October.
- van Duyl, F.C. CO₂ fixation and DOC incorporation by cold water corals in the dark ocean. Dutch Coral Symposium, Amsterdam University, 17 December.
- van Duyl, F.C. Microbial ecology of coral reefs. I. Pelagic-benthic coupling. Invited speaker, Amsterdam University, 9 October.
- van Duyl, F.C. Microbial ecology of coral reefs. II. Microbes in coral reefs. Invited speaker, Amsterdam University, 9 October.
- van Gils, J. Effects of predation risk on the aggregative response in red knots: preliminary results from the spring 2007 expedition to Banc d'Arguin. Workshop: Anti-predator adaptations in shorebirds, NIOZ, 22 November.
- van Gils, J. Physiological and behavioural decision-making in avian long-distance migrants. KNDV-symposium for the presentation of the Dutch Zoology Prize 2007, NIOZ, 29 June.
- van Gils, J. Prooi- en plaatskeuze van kanoeten en zwanen: optimal foraging theory in de praktijk. Lectures, Amsterdam University, 15 February.
- van Gils, J. The significance of the Banc d'Arguin for wintering waterbirds: an overview of research conducted by NIOZ in the past, today, and in the future. Lecture Mauritania-symposium, NIOZ, 15 November.
- van Gils, J. Trekvogels en hun voedsel in de Waddenzee. Visit RWS to NIOZ, 24 August.
- van Haren, H. Internal wave propagation 'mixing' in marginally stratified waters: the Mediterranean laboratory. IUGG-meeting, Perugia, Italy, 2-11 July.
- van Haren, H. Internal waves and cross-equatorial transport. Labomar (Instituto de Ciências do mar), Fortaleza, Brazil, 17 December.
- van Haren, H. Monthly periodicity in acoustic reflections and vertical motions in the deep ocean. Antares collaboration meeting, Bari, Italy, 25-28 September.

- van Haren, H. North Sea [internal wave] shear and diapycnal mixing: an observational perspective. Colloquium in the honour of the scientific life of Hans Ulrich Lass, Institut fuer Ostseeforschung Warnemuende, Germany, 4 October.
- van Haren, H. Using fast-sampling ADCP for observing vigorous processes above sloping [deep] ocean bottoms. 39th International Liège colloquium on Ocean Dynamics, Liège, Belgium, 7-11 May.
- van Oevelen, D., K. Soetaert, M. Lavaleye, G. Duineveld & C. Heip. WP Ecosystem modeling: 1) A preliminary carbon budget from a cold-water coral reef, 2) a dynamic energy budget (DEB) model of a cold-water species and 3) an improved implementation of stable isotope data in ecosystem models. Annual Meeting HERMES, Faro, Portugal, 24 March-1 April.
- van Ooijen, J.C. "Development of an Automated TP/TN Analysis". First Sino-German Automated Analysis Conference, Qingdao, China, 25-28 October.
- van Ooijen, J.C. "On Board Analysis of Nutrients". First Sino-German Automated Analysis Conference, Qingdao, China, 25-28 October.
- van Weering, T. "Methane cycling" in course "Biogeochemical cycles". Vrije Universiteit Amsterdam, March.
- van Weering, T. Sedimentary systems, Course Vrije Universiteit Amsterdam, Febr-March.
- van Weering, T.C.E. & MOUNDFORCE partners: Moundforce; Forcing of carbonate mounds and deep water coral reefs along the EU margin, Meeting Geolitalia /SEECAM Workshop, Rimini, Italy, 10-12 September.
- Varela, M.M. & G.J. Herndl. Abundance and activity of the Chloroflexi-type SAR202 bacterioplankton in the meso- and bathypelagic waters of the North Atlantic. 10th Symposium on Aquatic Microbial Ecology, Faro, Portugal, 2-7 September.
- Varela, M.M., H.M. van Aken & G.J. Herndl. Distribution and activity of Bacteria and Archaea in the deep North Atlantic ocean. 38th CIESM Congress, Istanbul, Turkey, 8-14 April.
- Veldhuis, M.J.W. & K.R. Timmermans. Natural iron fertilization in the Southern Ocean (KEOPS2005). NECOV winter symposium, Nijmegen, 17-19 January.
- Veldhuis, M.J.W. Ballast water test facilities in the EU. MAPO workshop for SME's, Brussels, Belgium, 21 February.
- Veldhuis, M.J.W. Counting particles and living cells; from scientifically sound to legal defendable. Great Ships Initiative Protocol Conference, Washington, USA, 7-9 February.
- Veldhuis, M.J.W. Invasive Organisms by ships. Roscoff, France, 17 March.
- Veldhuis, M.J.W. Invasive species originating from ballast water and how to solve this problem? Environmental Team of NYK shipping, Texel, 17 October.
- Veldhuis, M.J.W., A. Noordeloos, J.P. Boon, F. Fuhr & C. ten Hallers-Tjabbes. Counting viable phytoplankton and bacteria in ballast water. 15th International Conference on Aquatic Invasive Species, Nijmegen, 23-27 September.
- Veldhuis, M.J.W., H. Nelson, K.A. Peterson & N.J. Poulon. Using a continuous imaging particle analyser (FlowCam) as an integrated system for ballast water analysis and regulatory compliance. 15th International Conference on Aquatic Invasive Species, Nijmegen, 23-27 September.
- Vézina, F. & T. Piersma. Acclimation in long-distance migrant birds that routinely move between contrasting temperature regimes: experimental studies on red knots. Symposium "Beneficial acclimation: how do physiological responses to temperature contribute to fitness?" Society for Experimental Biology, Glasgow, UK, March.
- Vézina, F. Looking beyond the mean: interindividual variation in reproductive effort shapes stage-specific metabolic rate. Symposium on the causes and consequences of individual variation in metabolic rate. University of Groningen, January.
- Vézina, F. Phenotypic adjustments to periods of high energy demands: the case of breeding and wintering birds. University of Waterloo, Waterloo, Canada, July.
- Vézina, F. Thermogenic capacity in wintering shorebirds is driven by body mass-related changes in organ size. 3^{èmes} Rencontres Ecologie et Comportement, Montpellier, France, July.
- Vézina, F., K. Jalvingh, A. Dekinga & T. Piersma. Thermogenic capacity in wintering and migratory shorebirds is driven by body mass-related changes in organ size. Society for Integrative and Comparative Biology (SICB), Phoenix, Arizona, USA, January.
- Weijers, J.W.H., S. Schouten & J.S. Sinninghe Damsté. Bacterial tetraether membrane lipids in soils and their application in palaeoenvironmental studies. Invited talk at the Goldschmidt Conference, Cologne, Germany, 20 - 24 August.
- Weijers, J.W.H., S. Schouten, E.C. Hopmans, F. Peterse & J.S. Sinninghe Damsté. Novel proxies for continental Palaeo - temperature and soil pH reconstruction based on tetraether membrane lipids of soil bacteria (Invited). AGU Fall Meeting, San Francisco, California, USA, 10-14 December.
- Weijers, J.W.H., S. Schouten, H. Brinkhuis & J.S. Sinninghe Damsté. High latitude continental temperatures during the early Cenozoic - results from analysis of soil - derived bacterial membrane lipids in IODP Hole 302 - 4A (ACEX) and ODP site 913. National IODP Symposium 2007, Drilling Future Climates, Utrecht, 30 March.

- Witbaard, R. Benthic ecology of the Frisian Front: Wind as controlling factor of shell growth. Minisymposium Utrecht University, 11 January.
- Witbaard, R., H. de Baar, H. Lindeboom, H. van de Woerd & A. Rijnsdorp. Climate related shifts in the NCP ecosystem and consequences for future spatial planning. International conference 'Climate changes Spatial Planning' (CcSP). Den Haag, 12-13 September.
- Witbaard, R., H. van de Woerd, A. Rijnsdorp, H. de Baar & H. Lindeboom. Climate related shifts in the NCP ecosystem and consequences for future spatial planning. Second Workshop Synergy in CcSP Research, Driebergen, 16 May.
- Witte, J.IJ. Bloemen van de Zee. KNNV, Alkmaar, 24 April.
- Witte, J.IJ. Vissen in de Waddenzee. Week van de zee. Den Burg, Texel, 23 May.
- Witte, J.IJ. Zeeanemonen. Jozefschool Den Burg, Texel, 19 November.
- Yokokawa, T., Y. Yang, C. Motegi & T. Nagata. Full-depth distributions of prokaryotic production and abundance in the Southern Ocean. 10th Symposium on Aquatic Microbial Ecology, Faro, Portugal, 2-7 September.

External professional functions

R.P.M. Bak

- Professor Tropical Marine Biology, University of Amsterdam
- International Society for Reef Studies Council Member
- International Advisory Board Member. Center for Tropical Ecology, Bremen
- Editorial Advisor Marine Ecology Progress Series

M.J.N. Bergman

- Member ICES Working Group on Benthos Ecology
- Member ICES Working Group on Ecosystem Effects of Fishing Activities
- Member Raad van Overleg voor het fysisch-oceanografisch onderzoek Noordzee - overleggroep Bodem

K. Booij

- Member ICES Marine Chemistry Working Group

G.C. Cadée

- Editor Journal of Sea Research
- Associate editor ICHNOS
- Associate editor Senckenbergiana Maritima
- Editorial board Natura, KNNV
- Member commissie voor de geschiedenis der aardwetenschappen, KNAW
- Member board Historie van de Oceanografie Club, HOC

G.C.A. Duineveld

- Member ICES Study Group on the North Sea Benthos Project

M.S.S. Lavaleye

- Member ICES Study Group on the North Sea Benthos Project

C.J.M. Philippart

- Editor-in-chief Journal of Sea Research
- Coordinator international research project MarPACE (Marine Propagation Along the Coasts of Europe)
- Chair of the Climate Change Working Group of the Marine Board of the European Science Foundation
- Member of the PRLT14 advisory panel of the Higher Education Agency of Ireland
- Lecturer of the Marine Sciences Courses I and II (Utrecht University)

T. Piersma

- Professor in Animal Ecology at the Centre for Ecological and Evolutionary Studies (CEES) at the Groningen University
- Vice-chairperson of the International Wader Study Group (IWSG)
- Chairman of the Biologysk Wurkferbân of Fryske Akademy, Ljouwert
- Editor of Journal of Avian Biology
- Member Editorial Board Current Ornithology, Plenum Press, New York
- Editorial board of Journal of Ornithology
- Board member of the Centre for African Wetlands, University of Ghana, Accra, Ghana
- Member of Committee of Experts for Natuurmonumenten
- Member of Membership Board It Fryske Gea
- Member of the Conseil Scientifique of the Parc National du Banc d'Arguin, Mauritania
- Chairman of the Global Flyway Network, an international foundation

P. van den Hout

- Secretary Netherlands Ornithologists' Union (NOU)

J. van der Meer

- Professor in Marine Population Ecology, Vrije Universiteit Amsterdam, Faculty of Earth and Life Sciences
- Member of the Scientific Advisory Board SOVON (Co-operative Ornithological Field Research in the Netherlands)
- Honorary Research Fellow of the School of Biological Sciences, University of Aberdeen
- Member of the Advisory Board for Nature Conservation and Education, Prins Bernard Cultuurfonds

H.W. van der Veer.

- Associate professor of Zoology, North Carolina State University, Raleigh, USA
- Adjunct associate professor of Marine Science, University of South Carolina, Columbia, USA
- Member of the ICES working group on recruitment processes
- Member Organizing Committee 7th International Symposium on Flatfish Ecology, Lisbon, Portugal
- Guest editor Proceedings 6th International Symposium on Flatfish Ecology

C.J. Camphuysen

- Member editorial board Marine Ornithology
- Editor Atlantic Seabirds
- Editor Lutra
- Coordinator EC project on Impact of oil spills on seabirds, DG Environment
- Member of the ICES Working Group on Seabird Ecology
- Chairman European Seabirds at Sea database co-ordinating group

H.G. Epping

- Editor Journal of Sea Research
- Appointed reviewer Marine Ecology Progress Series
- Chairman Users Advisory Group Nutrients Analyses, national Marine Research Facilities

T. van Weering

- Professor Paleoceanography, Vrije Universiteit Amsterdam
- Adjunct Professor Marine Geosciences, Jacobs University, Bremen
- Member Editorial Board Marine Geology
- Member Editorial Board Boreas
- Member Editorial Board International Journal of Earth Sciences/Geol. Rundschau
- Guest editor Special Issue Marine Geology Canyons
- Chairman GAG Bodem systemen en seismiek (NWO/ALW)
- Chair joint GebruikersAdviesgroepen MRF
- Lid commissie "East Kalimantan Programme for Coastal Zone Research Netherlands/ Indonesia" (NWO/KNAW)
- Lid beoordelingscommissie Promotiebeurzen IWT, Brussel
- Lid beoordelingscommissie Promotiebeurzen Ministry of Science and Technology, Portugal
- Lid beoordelingscommissie VIDI beurzen, NWO/ALW

J.W. de Leeuw

- Member Board of European Association of Organic Geochemistry (EAOG)
- Member Editorial Advisory Board Organic Geochemistry
- Professorship in Geochemistry University of Cataluna
- Part-time professor Molecular Palaeoecology, Faculty of Biology, Utrecht University
- Part-time professor Organic Geochemistry, Faculty of Geosciences, Utrecht University
- Member of the Royal Dutch Academy of Sciences (KNAW)
- Secretary Earth Sciences Section KNAW
- Member of the Forsight committee Energy conversion (KNAW)
- Chair ECOS/BOA committee (KNAW)
- Chair Partnership Observation of the Global Oceans (POGO)
- Chair Club du Soleil (RAK/KNAW)
- Member of the Council Earth and Climate (RAK/KNAW)
- Member of the Programme Committee VLANEZO
- Member of the Scientific Advisory Committee Plymouth Marine Laboratory (PML)
- Co – PI International Census of Marine Microbes (ICOMM)
- Chair Foundation "Zee in Zicht"/"Sea on Screen" (ZiZ/SoS)

- Geochemical Fellow ACS
- Member of the Scientific Advisory Council Naturalis
- Member of the Review panel Helmholtz Gemeinschaft

S. Schouten

- Associate editor Organic Geochemistry
- Member of the editorial board of Geology
- Member of the steering committee International Census of Marine Microbes
- Member of the scientific committee of NEBROC.
- Member of review panel BioGeosphere, Open Competition Program, NWO-ALW
- Member of the Netherlands Integrated Ocean Drilling Program Committee

J.S. Sinninghe Damsté

- Part-time professor Utrecht University, Faculty of Geosciences
- Member of the Royal Dutch Academy of Science (KNAW)
- Member of the scientific steering committee of the Darwin Centre for Biogeology
- Member of the Science Committee of the NIOO
- Member of the VICI selection committee of ALW-NWO
- Associate editor Geochimica et Cosmochimica Acta
- Member of the Vernadsky medal election committee of the EGU
- Member of the Heineken Prijs election committee of the KNAW.

A. Stadnitskaia

- Coordinator of the cooperative NWO/Dutch-Russian project (2005-2008) between the Royal NIOZ and the UNESCO/MSU Center for Marine Geology and Geophysics entitled "Evolution and Ecology of Cold Seep Structures in the Gulf of Cadiz" (project Number: 047.017.003)

C.C. ten Hallers – Tjabbes

- Advisor to IUCN for the London Convention 1972
- Advisor to IUCN for the International Maritime Organization, London (IMO)
- IUCN Representative for the Ballast Water Workgroup, BLG and MEPC of the IMO
- Lady Chairman Animal Navigation Group, Royal Institute of Navigation, London, UK
- Member of the Scientific Advisory Committee ICCMI2008, World Maritime University, Malmö, Sweden

T. F. de Bruin

- Chair - Netherlands National Oceanographic Data Committee (NL-NODC)
- Chair - Joint SCAR/COMNAP Committee on Antarctic Data Management (JCADM)
- Co-Chair – International Polar Year (IPY) Data Policy and Management Subcommittee (IPY-SCDPM)
- IODE national coordinator for data management
- Member – ICES Working Group on Data and Information Management (ICES-WGDIM)
- Member - Steering Committee of the Marine Metadata Interoperability (MMI) project
- Member - Ad Hoc SCAR Advisory Committee on the International Polar Year (IPY)
- Member - National IPY Committee of the Netherlands
- Member - World Climate Research Programme (WCRP) Data Management Task Force
- Member - Planning Group IODE/JCOMM Forum on Oceanographic Data Management and Exchange Standards

T. Gerkema

- Associate member SCOR Working-Group 121 on Deep-ocean mixing.

L.R.M. Maas

- Professor Oceanography, Utrecht University
- External examiner of PhD thesis committee of M. Buijsman, V. Palastanga, J. van de Berg
- Member of Hydralab scientific committee

H. Ridderinkhof

- Member 'Programma commissie NCK'
- Member 'Raad voor Aarde en Klimaat (RAK – KNAW)'
- Member 'commissie Milieu Effect Rapportage (MER)'

H.M. van Aken

- Member ICES Oceanography Committee
- Member ICES Working Group on Oceanic Hydrography
- Chairman ALW "gebruikersadviesgroep CTD-systemen"
- Member OCEANSITES International Time Series Science Team

H. van Haren

- Member editorial board Journal of Sea Research
- Topic editor Ocean Science
- Co-convenor 39th International Liège colloquium on Ocean Dynamics, session 'Turbulence and waves', Liège, Belgium
- Chairman "ALW gebruikersadviesgroep Verankerde Instrumentatie"

M. Wernand

- Examiner/Jury member of Malik Chami to obtain his Habilitation à diriger des Recherches. Université Pierre et Marie Curie. Laboratoire d'océanographie de Villefranche, France
- Member of the planning committee of the Ocean Optics conference
- NIOZ-representative European Association of Remote sensing Laboratories
- Member of the Light and Water working group The Netherlands
- Member of the Historical Oceanography Club The Netherlands
- Member of the European Science Foundation, Marine Board working group on The Remote Sensing of Shelf Sea Ecosystems

G.J. Herndl

- Professor of Biological Oceanography, Department of Marine Biology, Groningen University
- Member of the IMBER/SOLAS working group on Carbon Research
- President of the Microbiology Section of the CIESM (Commission of the Scientific Exploration of the Mediterranean Sea)
- Appointed Reviewer for and Adviser to the Research Council of Norway for Terrestrial and Aquatic Microbial Ecology and Biotechnology (2000-2003, 2004-2007)
- Member of the VENI review panel for ALW/NWO
- Member of the organizing committee of the First IMBER IMBIZO workshop- "Biogeochemical and Ecosystem Interactions in a Changing World" held in Miami, USA, 10-13 November 2008
- Organizer of the EurOceans Workshop 'Shedding light on the dark ocean' (planned at Noordwijkerhout, 4-8 February 2008)
- Associate member of the SCOR working group 126: Role of viruses in marine ecosystems
- Associate Editor of Aquatic Microbial Ecology
- Associate Editor of Marine Ecology
- Associate Editor of Limnology & Oceanography: Methods

M.J.W. Veldhuis

- Member flow cytometer working group NL
- Associate member SCOR working group 120 Phaeocystis
- Member ICES/IOC/IMO Working Group on Ballast Water and other Ship Vectors (WGBOSV)
- Member ICES/IOC/IMO Working Group on Introduction and Transfer of Marine Organisms
- Member working group IMO-Globalballast working group on Ballast water issues
- Member external advisory board Northeast Midwest Institute, Washington D.C., USA

M.A. Baars

- Member board Sir Alister Hardy Foundation Ocean Science (SAHFOS)
- Member remote sensing discussion group ToRSMoN (National Program GO)

F.C. van Duyl

- Member board Treub-mij
- Member European Scientific Diving Committee
- Appointed reviewer for the International Science Foundation (IFS)
- Appointed reviewer Marine Ecology Progress Series

C.P.D. Brussaard

- Member Committee Polar Research (Commissie Pool Onderzoek Nederland)
- Member of the Dutch Scientific Committee on Ocean Research (SCOR)
- PI European network of excellence for ocean ecosystem analysis (EUROCEANS; EU-FP6)
- Core member of the SCOR working group 126: Role of viruses in marine ecosystems
- Member of the section Ecologie van Aquatische Micro-organismen (EAM) of the NECOV (Nederlands Vlaamse Vereniging voor Ecologie)

K.R. Timmermans

- Member Board WG Aquatic Ecology, Nederlands-Vlaamse Vereniging voor Ecologie (NECOV)

H.J.W. de Baar

- Professor of Oceanography and Chair Ocean Ecosystems Department, Groningen University
- Associate editor Marine Chemistry
- Member international Scientific Steering Committee GEOTRACES
- International coordinator GEOTRACES initiative, International Polar Year
- Member International Joint SCAR/SCOR Expert Group for Oceanography
- Chairman Netherlands SCOR Committee, Royal Netherlands Academy of Sciences (KNAW) national delegate to SCOR
- Member Netherlands SCAR Committee, Royal Netherlands Academy of Sciences (KNAW)
- Member Global Change Committee, Royal Netherlands Academy of Sciences (KNAW)
- Member Scientific Steering Committee Netherlands-Bremen Oceanography (NEBROC-2)
- Vice-chair Scientific Steering Committee CarboOcean Integrated Project, EU Framework Program VI
- External adviser BELgian research Carbon uptake in the ANTarctic Ocean (BELCANTO)
- Chairman Users Advisory Group Nutrients Analyses, national Marine Research Facilities
- Member Users Advisory Group CTD systems, national Marine Research Facilities
- Life member Clare Hall College, Cambridge

M.J. Rietveld

- Member International research Ship Operators Meeting (ISOM)
- Member Ocean Facilities Exchange Group (OFEG)
- Member European Research Vessel Operators (ERVO)
- Member ESF Marine Board Ocean Research Fleets Working Group (OFWG)
- Member Interdepartementaal Overleg Zeegaande Vaartuigen (IOZV)

Colloquia

- 19 January. E.J. Rohling (University of Southampton). Late Quaternary rates of sea-level change: a warning for the future.
- 25 January. F. Peeters (Vrije Universiteit Amsterdam). Experiences and opportunities in Marine Geology: present day processes and past experiences.
- 22 February. H. van Haren (NIOZ-FYS). Measuring particle (including moonstruck plankton) motions in the deep ocean using ADCP.
- 15 March. I. Klaucke. Cold seeps and environmental change: interactions and consequences.
- 15 March. H. van Aken (NIOZ-FYS). Common misunderstandings and the Thermohaline Circulation (THC).
- 22 March. J. van den Broek (Ecomare). NIOZ and Ecomare: science for the public.
- 29 March. M. Veldhuis (NIOZ-BIO). Phytoplankton viability.
- 3 May. H. de Vriend (WL Delft Hydraulics / TU Delft). New Orleans, what went wrong?
- 10 May. L. Maas (NIOZ-FYS). Is fair-weather drowning caused by dead-water?
- 24 May. P. Ruardij (NIOZ-BIO). Modelling the North Sea ecosystem.
- 18 June. S. Bohaty (NOC, Southampton). Critical Events in the Cenozoic Greenhouse to Icehouse Transition: A Southern Ocean Perspective.
- 10 July. S. Dittmann (Flinders University, Adelaide). Temperate coastal ecology down under.
- 18 September. J.O. Grimalt (CSIC, Barcelona). Surface and deep water processes during abrupt change in the North Atlantic over the past 420,000 years.
- 27 September. E. Bard (CEREGE, Collège de France, Aix-en-Provence). The last deglaciation.
- 4 October. D. Olbers (AWI, Bremerhaven). How the ocean circulation works - physics without equations.
- 10 October. A.-C. Baudoux (NIOZ-BIO, Scripps UCSD). The role of viruses in marine phytoplankton mortality.
- 11 October. T. Nagata (Center of Ecological Research, Kyoto University). Dynamics and distributions of viruses in the oceans.
- 18 October. K.-U. Hinrichs (University Bremen). Subsurface archaea: an unseen majority?
- 15 November. J. van Gils (NIOZ-MEE). On ecological studies at the Banc d'Arguin.
- 20 November. M. Klunder, R. Middag, C-E. Thuroczy, P. Laan & H.J.W. de Baar (NIOZ-BCO). GEOTRACES, preliminary results of the Arctic Polarstern cruise (28/7/07-10/10/07).
- 22 November. J. Rattray (NIOZ-MBT). Controls and distributions of ladderane lipids in Anammox bacteria.
- 29 November. B. Spaans (NIOZ-MEE). Demographic studies of waders using colour rings.
- 6 December. F. Vezina (NIOZ-MEE). Adaptive body mass adjustments in wintering red knots: responses to thermal treatments and temporal food limitation.
- 11 December. H. Heijnis (Institute for Environmental Research, NSW, Australia). Coastal research in the Galapagos. Coastal Evolution during the Late Holocene.
- 13 December. J. Greinert (RCMG at Ghent University, Belgium). Monitoring of temporally and spatially transient bubble release and the extrapolation of methane fluxes: Use of hydroacoustic methods in the Black Sea.

Symposia & Meetings

Symposium 'In the footsteps of Jan Verwey' / Dutch Zoology Prize 2007 for Jan van Gils

The Royal Dutch Zoological Society (KNDV) awarded the Dutch Zoology Prize 2007 to our ornithologist Dr. Jan van Gils. Jan received this prize for his work on foraging decisions by flexible long-distance migratory birds. He carried out this work during his PhD period at NIOZ and the Groningen University and during his post-doc-work at the Netherlands Institute of Ecology (NIOO-KNAW). The award ceremony took place during the symposium, *'In the footsteps of Jan Verwey: How flexible phenotypes reflect ambient ecological conditions'*, which was specially organised jointly by KNDV and NIOZ as an important part of the Zoology Prize. The symposium was held on 29 June at NIOZ, of which Dr. Jan Verwey was director from 1931 to his retirement in 1965. Until 1990, the KNDV was also the umbrella organization of NIOZ and its predecessor, the Zoological Station in Den Helder.



KNDV president prof. dr. J.J. Bolhuis congratulates Jan van Gils with the Dutch Zoology Prize 2007 after the laudatio.

Mauritania Symposium

At 16 November, a Mauritania Symposium was organized at NIOZ by Kees Camphuijsen, Marc Lavaleye, Jan van Gils and Theunis Piersma. The main goal of the symposium was to present an overview of the current research results as the seed for the formulation of new research in the years to come. A main result of the current work is that the secondary production by bivalves at the Parc National du Banc d'Arguin at the coast of Mauritania is of great importance for the wintering migratory birds. These birds also visit the Wadden Sea to re-fuel on their flyway to the northern tundra's that serve as their breeding-grounds. Similar to the Wadden Sea before 1930, the Banc d'Arguin in Mauritania contains large intertidal sea-grass meadows. These areas are more productive than the naked sand-banks next to them. The current research project started in December 2006. It is subsidised by WOTRO of the Netherlands Organisation for Scientific Research (NWO). Offshore research with RV Pelagia showed the richness of the benthic fauna, a result of the high primary production induced by the strong upwelling. In between the intertidal and offshore area dense (commercially exploitable) banks of Venus shells that overlap highly vulnerable maerlbeds are situated. Future plans are to study the connection between the different ecosystems, from intertidal to deepsea, and the influence of the upwelling on these ecosystems.



At the end of a successful Mauritania symposium, director Prof. Dr. Sidi Mohamedould Moine of the Parc National du Banc d'Arguin (PNBA) and NIOZ director Prof. Dr. Carlo Heip signed a 'Convention' for a fruitful cooperation during the current research project, which clearly satisfied prof. Theunis Piersma as principal NIOZ scientist.

Guest Scientists

- Argyres Kaiserli, Hellenic Center for Marine Research, Athens, Greece, 1-31 May, 1 October – 15 December.
- Bouruet-Aubertot, Dr. P. LOCEAN, University Paris VI, France, 6-8 March.
- Escala, M., Barcelona Graduate School of Economics, Spain, 21 May – 18 June.
- Baltar, F., University of the Canary Islands, Las Palmas, Spain, 1 June– 20 October.
- Fuhr, F., KiTe Consulting, Kiel, Germany, April – December.
- Spyres, G., Hellenic Center for Marine Research, Athens, Greece, 1-31 May, 1 October – 15 December.
- Kaiser, Dr. E. 19 Juli-31 December
- Kaiser, Dr. J. 19 Juli-31 December
- Kuijpers, A. DGU, Copenhagen, Denmark
- Mertens, K., Gent University, Belgium, 5 – 26 February.
- Moros, M. Institut fur Ostsee Forschung, Warnemunde, Germany
- Martínez, L.F. Dept. of Chemical and Environmental Engineering, University of Oviedo, Spain, October – 14 December
- Rohling, E. University of Southampton, UK
- Salvienty Makarim, BSc. Research Center for Maritime Territories and Non-Living Resources, Jakarta, 1 May-31 July
- Staller, T., Forschungs- und Technologiezentrum (FTZ), Kiel, 20 August - 21 September.
- Terney, J., Brown University, USA, 5 February – 11 February, 18 June – 2 July.
- Tokarev, M. Moscow State University, Russia
- Staller, T., 15 August – 17 September.
- Woltering M., Large Lakes Observatory, University of Minnesota Duluth, USA, 3 – 6 January, 11 – 21 June.

Undergraduate University Students

- Beaumont, T.F.B., University of Otago, Dunedin, New Zealand, 15 November – 31 December.
- Blokker, J., Hogeschool InHolland, Alkmaar, 1 September – 31 December.
- Bouwe, R., NOVA-college Beverwijk 1 January-12 April.
- Chiguer, A., Rabat University, Faculty of Sciences, Rabat, Marocco, 3 March-13 June
- Claus, M., Groningen University
- Costa, A., Lisbon University & INETI-IGM, Lisbon, 20 May – 13 July.
- de Meulenaer, B., Gent University, Belgium, 15 January - 1 October.
- Dorhout, D., Hogeschool Leiden 1 November-31 December.
- Dorresteyn, I., Amsterdam University, 26 February-31 December.
- Exarchou, E., UU, 1 January – 10 October
- Faria, J., University of Lisbon, Portugal, 1 January - 1 March.
- Freiling, E., Hogeschool Emmen
- Ganzevles, S., Vrije Universiteit Amsterdam, 1 February- 30 June
- Gomez-Carreno Sanchez, B., University Cadiz, Spain, 1 February-1 June
- Gullit, R., University of Porto, Portugal, 1 April – 30 September.
- Kolganova, J., Moscow State University, 2 June – 23 August.
- Lopes dos Santos, R., Unesco IHE, Delft, 1 October – 31 December.
- Ogier, J., Groningen University, 1 February-1 May.
- Prick, A., Instituut voor Aardwetenschappen, Vrije Universiteit Amsterdam.
- Reyes-Nivia, M.C., Amsterdam University, 1 February - 1 August.
- Scholten, J., Instituut voor Aardwetenschappen, Vrije Universiteit Amsterdam, January-March.
- Slagter, H., Groningen University.
- Stehouwer, P-P., Groningen University, March – July.
- Sterken, M., Hogeschool Emmen.
- Swieringa, D.W., Groningen University, 1 August – 29 February.
- Thomas, H., University of Otago, Dunedin, New Zealand, 15 November – 31 December.
- Tsimiiri, C., University Utrecht, 1 July- 31 December.
- van Assen, C., Amsterdam University, 1 February-31 July.
- van Breevoort, P., University Utrecht, 1 January – 30 April.

- van der Kolk, N., Berkeley, USA, 18 June-30 July.
- van Eerbeek J., Van Hall Instituut, 12 March – 12 July.
- van Nuland, F., Vrije Universiteit Amsterdam, 1 February- 30 June.
- van Nus, T. Hogeschool Larenstein Velp, 15 April - 15 October
- van Slooten, C., Groningen University
- Vogels, S., Vrije Universiteit Amsterdam, July-August and November-December
- Weritz, S., University of Applied Sciences, Bremen, Germany, 1 September – 31 December.
- Wiebosch, S., Hogeschool Utrecht, 1 February-30 June.
- Wijnbergen, K. Saxion Hogeschool Deventer, 1 March-31 July
- Witte, J., Technical University Delft, 29 January-20 February
- Zarzycka, B., Socrates- Erasmus program, Utrecht University, 1 September – 31 December.

Visitors

- Amaro, T., National Oceanographic Centre Southampton, UK, August.
- Baker, A.J., University of Toronto, Canada, September.
- Bard, E., College de France, Aix-en-Provence, 26 – 27 September.
- Bohaty, S., National Oceanography Center, Southampton, UK, 18 June.
- Boïng, S. Utrecht University, on board RV Pelagia, 20 Augustus-28 September.
- Chikaraishi, N., JAMSTEC, Japan, 5 September
- Davies, A., Scottish Association of Marine Science, Oban, Scotland, 10-13 December.
- Diefendorf, A., Pennsylvania State University, USA, 21 – 28 May.
- Ebbesen, H. Geological Survey of Denmark and Greenland, Copenhagen, Denmark, 5-8 February.
- Faas, R., Utrecht University, 19-26 November.
- Fruergaard, M. University of Copenhagen, Denmark, 2-7 September
- Grimalt J., CSIC, Barcelona, Spain, 18 September.
- Gunvald, A., University of Aarhus, Denmark, 3-6 December.
- Handley, L., University of Bristol, UK, 13 – 20 November.
- Hattink, M., S. van der Laan, N. Steenstra, Corus IJmuiden, 13 April.
- Jessen, C., University of Copenhagen, Denmark, 3-6 December.
- Klof, S., Independent consultant, 31 October.
- Kroon, M.J.A. Utrecht University, on board RV Pelagia, 20 Augustus-28 September
- Malkoc, M., Institut für Geologie, University of Bochum, Germany, 17–28 September.
- Manzur A., CSIRO Petroleum, Australia, 19 September.
- Marino, G., Utrecht University, 12–16 February.
- Moodley, L., NIOO-CEME, 28-29 November
- Moros, M, T. Leipe, K. Perner, Institute for Baltic Sea Research (IOW), Rostock-Warnemünde, Germany, 15-18 October.
- Neto, C., Instituto Nacional de Engenharia, Tecnologia e Inovacao, (INETI), Amadora, Portugal, 12-19 November.
- New, A., Southampton Oceanography Center, UK, 23-24 January
- Niemeijer, C., Imares Wageningen, 5-9 November.
- Obaidullah, F., Greenpeace, 31 October.
- Olbers, D., AWI - Bremerhaven, Germany, 30 September – 26 October
- Olsen, J., University of Aarhus, Denmark, 17-28 September.
- Pairaud Dr. I. LEGI, Grenoble, France, 3-7 September.
- Pancost, R.D., University of Bristol, UK, 9 – 12 May.
- Pedersen, J.T., University of Copenhagen, Denmark, 2-7 September, 10-14 December.
- Rehmeier, J., AWI, Bremerhaven, Germany, 17-20 December.
- Saenz, J., Woods Hole Oceanographic Institute, USA, 8–29 January.
- Seki, O., University of Bristol, UK, 25 February – 7 March.
- Sidri, M., WUR, Wageningen, 25 October
- Sliggers, B., Teylers Museum, Haarlem, 24 October.
- Summons, R., MIT, USA, 25 April.
- Tjallingii, R., University of Kiel, Germany, 8-15 August.
- Trommer, G. and Siccha, M., Institut für Geowissenschaften, Eberhard Karls Universität Tübingen, 1 – 11 May.

- Trommer, G., Institut für Geowissenschaften, Eberhard Karls Universität Tübingen, 16 – 20 July.
- van Oevelen, D., NIOO-CEME, Yerseke, 30 October.
- Veen, C., Groningen University, 10-11 May.
- Volkman J., CSIRO, Australia, 18 – 19 September.
- Yamamoto, M., Hokkaido University, Japan, 4–9 March.
- Ydenberg, prof. dr. R.C., Fraser University, Vancouver, Canada, 22 November.
- Zhang, Z., University of Massachusetts Amherst, USA, 27 – 31 August.
- Ziegler, M., Utrecht University, 12-23 February, 17-24 August.

Journal of Sea Research

C.J.M. Philippart*, B. Bak-Gade, J.J. Beukema, G.C. Cadée and H.G. Epping

The Journal of Sea Research is an international and multidisciplinary periodical on marine research, with an emphasis on the functioning of marine ecosystems in coastal and shelf seas, including intertidal, estuarine and brackish environments. As several subdisciplines add to this aim, papers are published from the fields of marine biology, marine chemistry, marine sedimentology and physical oceanography, provided they add to the understanding of ecosystem processes. In addition to its regular issues, the Journal publishes special issues which bundle articles addressing, and often reviewing, a specific scientific theme.

In 2007, the Journal published volumes 57 and 58, each consisting of four issues and together comprising 43 research papers. Three issues, viz. 57(2-3) and 58(1), were special issues comprising the proceedings of the sixth international symposium on flatfish ecology. This symposium was held at Maizuru, Kyoto, Japan, in October 2005, and dedicated to the relationship between habitats and recruitment variability in flatfish.

On November 21, Elsevier Science and NIOZ signed a new contract to publish the Journal for a period of another 5 years (2008-2012). The Journal of Sea Research has been published by Elsevier since 1996, but the editorial responsibilities still lie with NIOZ. The articles published in the Journal are gaining interest; the most recent impact factor of the journal in 2006 was 1.765.



NIOZ director Prof. Dr Carlo Heip (on the right) and Elsevier's Publishing Director Dr Patrick Jackson sign the new contract at NIOZ to jointly publish the journal for another 5 years on November 21.

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NIOZ Royal Netherlands Institute for Sea Research is part of the Netherlands Organization for Scientific Research (NWO).

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The mission of NIOZ is to gain and communicate scientific knowledge on seas and oceans for the understanding and sustainability of our planet, and to facilitate and support marine research and education in the Netherlands and Europe.



Royal Netherlands Institute for Sea Research