

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-

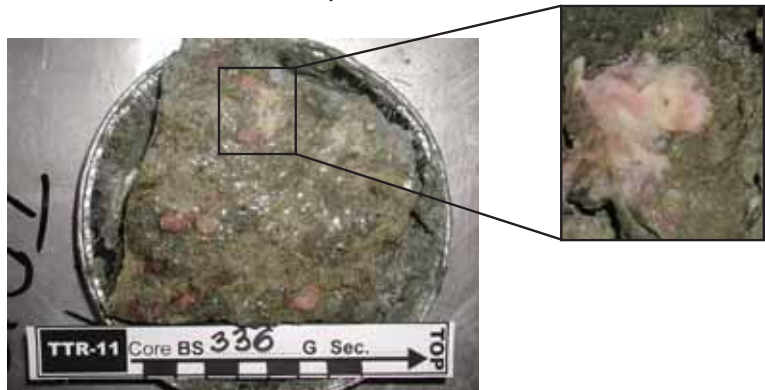
mate change. Although there can be no certainty regarding the precise nature and rate of future climate change, even the more moderate of the predicted scenarios is expected to further alter the marine environment.

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.

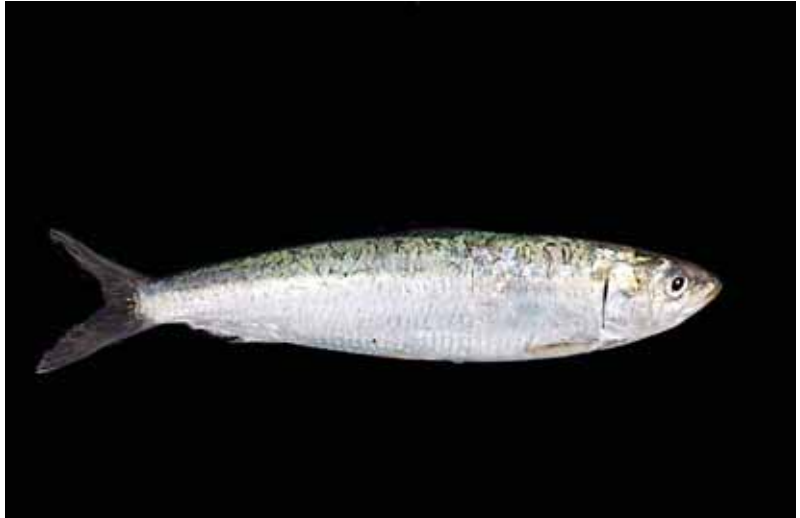
Management and Organization

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*).



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