

# Introduction

The year 2008 will remain in the memory of our institute as the year when our marine technician Willem Polman lost his life in a fatal helicopter accident in Antarctica. Full of enthusiasm for his first cruise to Antarctica, he left his home island of Texel for Cape Town in February, where he boarded the research vessel 'Polarstern' of the Alfred Wegener Institute for Polar and Marine Research (AWI, Bremerhaven, Germany) as part of a large Dutch (NIOZ/University of Groningen) team on board. As an experienced NIOZ technician, he had been in many parts of the world, but the Southern Ocean and the Antarctic continent were still missing on his long list of destinations. 'This will be my first and last trip to Antarctica', he told his wife Dalea and teen-age daughters Savannah and Brittany. How bitterly true this became.

Willem was born and grew up on Texel, where he was always attracted by the seas around the island. He started as a North Sea fisherman on the trawler TX 21. But resistance against sea-sickness was not his strongest point and he had to quit. The step to sea-research at NIOZ was an obvious one and Willem became responsible for the maintenance and operation of our equipment for sampling the seafloor and geophysical measurements. For the cruise with the Polarstern, Willem's task was to operate and to maintain the complex deep sea winch for the new ultra clean CTD-water sampler 'Titan' which has been designed and built by Willem's department Marine Technology for the determination of ultra-low concentrations of trace elements in the deep ocean.

After a few weeks of sampling on the Southern Ocean, the Polarstern moored alongside the icy margin of Antarctica in the early morning of March 2<sup>nd</sup>. Materials had to be transported by helicopter from the ship to the Polar Research Station Neumayer II. Willem was assigned to the first flight, in beautiful weather, sitting in front at the side of pilot Stefan Winter, to film the landscape with his new video camera.

When the helicopter crashed, both men died immediately. Sitting in the back, our PhD student Maarten Klunder and two colleagues were injured, but they have now fully recovered. The news of the accident struck NIOZ in full force later that day. The shock and the following sadness were immense. For weeks, until the bodies were repatriated and Willem was buried, the whole institute was in deep mourning. Nobody who attended them will ever forget the simultaneous ceremonies on board the Polarstern and in the church of Den Burg and the burial on the cemetery at the 'Hoge Berg', one of the highest places of the island, in a bitterly cold wind, where his colleagues from NIOZ carried the coffin to the grave and put him to rest. Willem will receive a lasting place in the portrait gallery that NIOZ is building but especially in the hearts of his colleagues and friends at NIOZ.



The growing international importance of our activities is driven by the fact that 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. The increasing use of the marine environment requires new national and international legislation and governance and this requires scientific knowledge that is often not yet available.

For NIOZ 2008 has been a year of both consolidation and expansion, a year of many exciting projects, some continuing from previous years and some starting. Major new grants were obtained with several new projects in the National Marine and Coastal Research Program ZKO, from ERC, the ESF and the EU. The discussions on the NIOZ Science Plan and on the cooperation with the Centre for Estuarine and Marine Ecology of the Netherlands Institute of Ecology resulted in the definition of several new positions, including two tenure tracks and four PhD positions.

### Scientific production

Scientific production was again excellent. A comparison of scientific output normalized to total staff that was done in the framework of a mid-term evaluation of the performance of the institute, showed NIOZ to be on top of a list of fifteen marine research institutions in Europe and the US both in terms of productivity in peer reviewed journals and in terms of publications in the top journals Science, Nature and PNAS. Three out of the five departments published a total of 28 top papers in the past five years out of a total of 762 peer reviewed papers of which 154 in 2008. Many outstanding results are reported in this annual report, covering a wide range of subjects. Each year, we report about one of our newly defined multi-disciplinary themes as introduced in our new Science Plan 2008-2012. The theme 'Open Ocean Processes' starts off with a story about the Polarstern cruise to Antarctica that was so tragically influenced by the death of two expedition members. In the departmental chapters, major new findings are reported on the Coriolis Force and the use of the thermistor string developed jointly by our Physical Oceanography and Marine Technology departments to measure the occurrence of internal waves which appear to be essential for the vertical mixing of the oceans. Our data management group finished the NODC-*i* project, allowing users for the first time to access the combined data holdings of the different NODC-*i* partners in a harmonized and uniform way. Our organic biogeochemists demonstrated the successful use of paleoproxies for the reconstruction of climatological and environmental changes in our geological history, the transport of soil organic material to the ocean by flood events, and the contribution of anaerobic ammonium oxidation to the nitrogen-cycle in the oceans, especially in biologically highly productive upwelling areas. Our nutrient laboratory performed very well in an international inter-calibration exercise. Two projects with strong societal relevance describe the occurrence of natural and anthropogenic lead in submarine canyons off Portugal and the fate of an experimental oil spill in the North Sea. We also report on two projects involving long-term monitoring series of bivalves and other macrobenthos species in the Wadden Sea; a specialty of our institute.

### Major new projects

NIOZ was successful in 2008 with new projects accepted for funding by the national marine and coastal research programme ZKO. Two new projects concerning monitoring and hypothesis testing research in the Wadden Sea on the factors explaining carrying capacity are lead by NIOZ researchers who participate in six more. These two will address the biomass and production of several species of algae and fish communities in the western Wadden Sea. Besides the Wadden Sea project also the Open Ocean call was very successful with NIOZ scientists covering projects on viruses, trace metals and the exchange between the Indian and Atlantic Ocean.

One major success was the ERC grant of 2.5 M€ awarded to Jaap Sinninghe Damsté that aims at improving the current climate models by checking the accuracy of simu-

lations of past climate changes by reconstruction of the climate of the geological past. The approach advocated by Damsté is to look at chemical fossils, highly specific membrane lipids from soil bacteria. The structure of these molecules depends on temperature and they can therefore be used to estimate temperature even millions of years ago.

A third major grant of 10.5 M€ of which more than 2 M€ for NIOZ was obtained by our new head of the department Biological Oceanography Marcel Veldhuis in the Interreg IVb programme of the EU, focusing on the on board treatment of ballast water to prevent the spread of organisms through maritime transport. Besides several research institutes, also the authorities of several North Sea states and industry are strongly involved.

### RV Pelagia

The RV Pelagia left in September for a long series of research cruises that will take the vessel 'around Africa', following a route via the Mediterranean, the Indian Ocean and the Atlantic Ocean. The first cruise brought the ship to the Galicia Bank, West of Spain for the BIOFUN cruise, an ESF EURODEEP project, whilst during passage the last tests of the multibeam echosounder and the mobile sediment sampler MOVE were performed. After BIOFUN, Pelagia sailed into the Mediterranean Sea, starting mid-October, for the ALW project MOCCHA of Utrecht University. Early November the science team changed in Heraklion on Crete for the IfM-GEOMAR team from Kiel to start the Charter cruise in the West Nile Delta. Also the ROV "Genesis" of Ghent University was on board. When the WND team left the ship in Port Said, the Pelagia entered the Suez Channel to sail via the Red Sea and the Gulf of Aden to Muscat in Oman. This was a moment of high tension on board and at NIOZ headquarters as the ship came within reach of the Somali pirates who have become very active in 2008. Pelagia had to wait for a few days in Djibouti to join a convoy guarded by a French military fregate. Fortunately nothing happened and in December a team from NERC embarked for a barter cruise to do geophysical and geological observations in the East Arabian Sea. In the summer of 2009 the Pelagia is planned to be back at its home harbour at Texel.

### Prices

The Deputy Minister for Traffic and Water Management Huizinga awarded a price to the captain and crew of Pelagia for their contribution to meteorology.

Measurements on board Pelagia are used for the day to day weather forecasting in Europe and worldwide via the Royal Netherlands Institute of Meteorology. As Pelagia is often in water without much, or even any, commercial traffic, these data are very important for adequate weather forecasting.

### PhD theses

Four PhD promotions were noted in 2008. Jayne Rattray worked on ladderane lipids as biomarkers for the occurrence of Anammox Bacteria and defended her thesis at the Utrecht University. Furu Mienis studied cold-water coral growth and carbonate mound formation in the eastern Atlantic Ocean and defended her thesis at the Vrije Universiteit Amsterdam. Tanya Compton addressed the question why there are much more bivalve species on the intertidal flats in tropical areas compared to our temperate Wadden Sea, and Deborah Buhler studied changes in the strength of the immune system of knots as model migratory birds during their annual migratory cycle. Both Tanya and Deborah defended their theses at the University of Groningen.

### FOKUZ

On 20 November NIOZ and the Netherlands Institute of Ecology NIOO organized a very successful symposium 'FOKUZ on Sea Research' in Amsterdam to officially start the cooperation programme 'FOKUZ' (Dutch for Fundamental Research on Coasts and Seas), signed between the umbrella organisations of NIOZ and NIOO, Netherlands Organisation for Scientific Research NWO and the Royal Netherlands



Academy of Arts and Sciences KNAW. The ties between the two marine institutes have been strong since many years and FOKUZ is a logical step further towards a strong institute for fundamental marine research in the Netherlands and Europe.

### International Cooperation

Most research at NIOZ is done in cooperation with research groups outside the institute. Most papers from NIOZ therefore have multi institute affiliation.

Oceanography is an international science 'par excellence' and funding from the EU and the ESF has been a major driver in assuring the international position of our institute. Just as examples, we want to mention NIOZ's participation in the EU Integrated Project HERMES (Hot Spot Ecosystem Research on the margins of Europe) which greatly expanded our knowledge of peculiar ecosystems such as cold seeps, mud volcanoes, canyons and cold water coral reefs in Europe. HERMES was elected one of the 40 top projects from FP6, out of over 10,000 projects (and over 50,000 proposals). Likewise, NIOZ was very active in the Network of Excellence MarBEF on Marine Biodiversity and Ecosystem Functioning.

### Management

The function of head of department was redefined and will now be a temporary position for four years. Two new heads of department were appointed under the new regime, Geert-Jan Brummer as interim in Marine Geology and Hendrik van Aken in Physical Oceanography. Gerhard Herndl left the department of Biological Oceanography and moved to the University of Vienna at the end of 2008. In the coming years, the cooperation with Gerhard will continue.

In 2008 the labs and offices of the department of Biological Oceanography were completely renovated, a major operation that was completed without major hindrance to the department and that will serve as example for other renovations in the coming years. Somewhat coupled to this renovation was the start of a first supporting laboratory on plankton, which also serves as a prototype for similar changes in the organization in the next few years.

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