

## NOTIFICATION OF PROPOSED RESEARCH CRUISE

### Part A: GENERAL

**1. Name of research ship: RV Pelagia Cruise number: 64PE440**

**2. Cruise dates: 3-17 July 2018**

**3a. Operating authority:** NIOZ Royal Netherlands Institute for Sea Research  
Telephone: (+31) (0)222-369300  
Telefax: (+31) (0)222-319674

**3b. Operating agent:** NIOZ Royal Netherlands Institute for Sea Research  
Telephone: (+31) (0)222-369300  
Telefax: (+31) (0)222-319674

**4. Owner:** NIOZ Royal Netherlands Institute for Sea Research

**5. Particulars of ship:**

name: Pelagia  
nationality: Dutch  
overall length: 66.00 meters  
maximum draught: 4.00 meters  
nett tonnage: 1553 NRT  
propulsion: 2 diesel electric Elliot White Gill  
Bow Truster  
call sign: PGRQ  
IMO nr: 9001461

**6. Crew:** name of master: J.C. Ellen / P. Kuijt  
number of crew: 11

**7. Chief scientist:** name: Dr. Henk de Haas  
addresses: Royal Netherlands Institute for Sea Research  
P.O. Box 59  
1790 AB Den Burg  
The Netherlands  
telephone: +31 222 369402  
e-mail address: haas@nioz.nl

**8. Geographical area in which the ship will operate:  
(with reference in latitude and longitude)**

The ship will operate along a transect which will run from Texel (The Netherlands), through the English Channel, via the Madeira Abyssal Plain (location 32°3'N 24°12'W) to Horta (Azores)

**9. Brief description of purpose of cruise:**

The proposed cruise is part of the Dutch NICO (Netherlands Initiative Changing Oceans) program.

The main aim of the present cruise is a transit of the vessel from Texel to Horta. During the transit measurements on the ship will be carried out by the Dutch hydrodynamic and nautical research institute MARIN (MARine Research Institute Netherlands). These measurements will include (propeller) noise, cavitation and fuel efficiency, all with the aim to increase ships efficiency and reduce noise pollution. At the Madeira Abyssal Plain four piston cores and several multicores will be collected for an ongoing research program on (bio)geochemical processes at the seabed by Utrecht University.

In addition to the above a group of students of various Dutch universities will be on board as part of a student training program related to the NICO program.

This training program will include water column profiling, surface water sampling and multibeam echo sounder surveying.

**10. Names and dates of intended ports of call:**

14 June 2018: Texel, The Netherlands

28 June 2018: Horta, Azores

**11. Any special logistic requirements at ports of call:**

None

**Part B:       DETAIL**

**1. Name of research ship:**       RV Pelagia

**2. Cruise dates:**                       **3-17 July 2018**

**3. Purpose of research and general operational methods:**

The proposed cruise is part of the Dutch NICO (Netherlands Initiative Changing Oceans) program.

The measurements on energy efficiency and noise pollution to be carried out by MARIN will include:

*Energy efficiency:*

Collect a dataset of all the relevant environmental and operational parameters of the RV Pelagia during the entire NICO program (December 2017 to July 2018). The dataset can be considered representative of RV Pelagia's usual operation and will serve as valid input into the simulation software that emulates the performance of Pelagia's 'digital twin'. The digital twin will, however, be equipped with a wind-assisted propulsion device and will therefore indicate how much fuel could be saved if Pelagia would be equipped with such a device.

*Noise pollution:*

Perform cavitation observations, noise measurements inside and outside of the ship, pressure and acceleration measurements on the hull above the propeller, cavitation nuclei size and concentration measurements and measurements of dissolved gas in the water below the ship at non-cavitating, transitional and cavitating regimes. These measurements should be performed at different geographic locations along the 11th leg of the expedition (Texel to Horta, Azores), anticipating a different water quality at different places.

The measurements for the MARIN project will be carried out by scientific equipment that is already as a standard present on the vessel (motion sensor, GPS, automatic surface water parameter sensors, meteorological sensors, etc.) and standard engine room parameter sensors (fuel flow, temperature sensors at various ships equipment, power sensors, etc.). Additional instruments will include a boroscope camera to observe propeller cavitation a dissolved gas sensor, and various sensors used inside the ship such as a noise meter and an accelerometer. A wave radar will be installed on the bow of the ship.

Deployment of a buoy with acoustic sensors to measure ships noise is foreseen. The buoy is a free floating device and will be retrieved immediately after the measurements have been completed.

At the Madeira Abyssal Plain the sampling for Utrecht University will be carried out using a standard (12 m long) piston corer and multicorer. Madeira Abyssal Plain (MAP) turbidites provide a classic example of the effects of oxygen exposure on sediment composition. Over the past decades various studies of the organic and inorganic sediment geochemistry and palynology of the MAP turbidites have highlighted the enhanced breakdown of organic material when oxygen is present and associated geochemical changes. With the advent of new techniques to study the chemical, mineralogical and microbial characteristics of sediments at high depth resolution, this is the perfect moment to revisit the MAP sites and resample them in detail to enhance

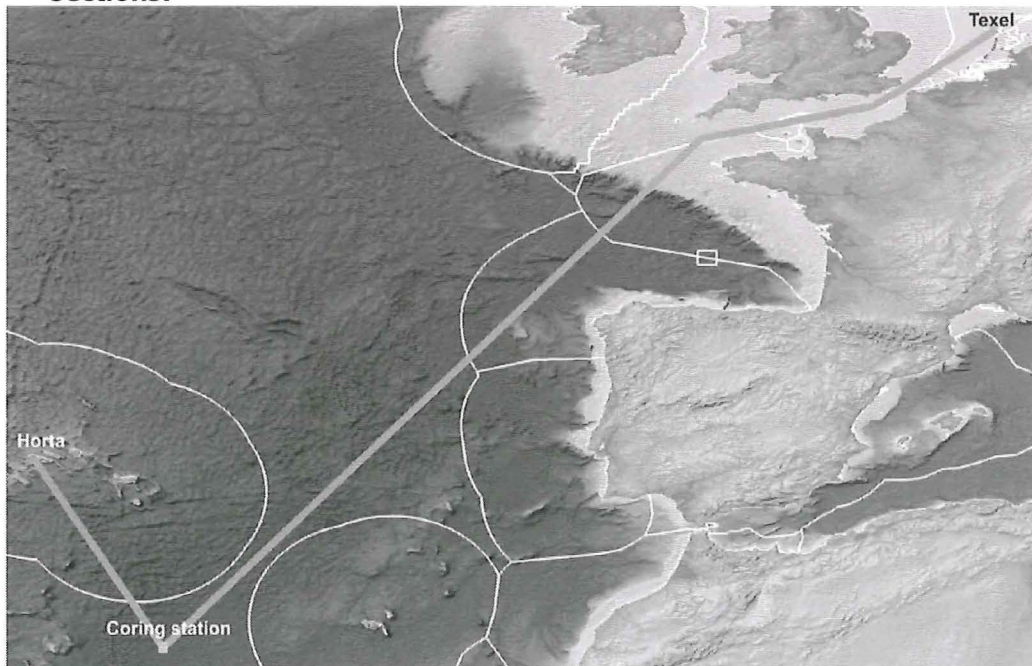
our understanding of the effects of oxygen exposure on sediment and porewater composition.

We plan to sample two closely spaced sites that have been studied in previous studies for their organic and inorganic sediment geochemistry and palynology. The sites are located in ca. 5000-5500 m water depth. Two piston cores per site are planned. If time permits, porewater samples will be taken with rhizon samples from one piston core. The piston core will then be opened and samples from the ancient redox interface (oxidized versus unoxidized turbidite) will be sampled under nitrogen in high depth resolution. These discrete samples will be stored anoxically at -20 C for later geochemical and microbiological analyses. If time permits, aluminum tray samples will be taken across the redox interface and will be stored anoxically for later resin embedding and high resolution geochemical analyses. One piston core will be kept closed and the relevant sections containing the redox interface will be sealed in an aluminum bag filled with nitrogen.

The water column profiling and surface water sampling and measurements for the NICO student training program will be carried out using a Seabird CTD with rosette sampler, the ships `aguaflow` continuous surface water pumping system and the ships deck wash pump. The exact locations will be determined during the cruise and have to fit in with the other two programs on board. CTD profiling and water sampling will never be carried out while the ship is in busy shipping lanes like the Southern North Sea and English Channel.

Multibeam surveying for the student training will be carried only in deep water. Locations will be determined during the cruise. Timing and thus location depends on the progress of the main program.

**4. Attach chart showing (on an appropriate scale) the geographical area of the intended work, positions of intended stations/hydrographic sections:**



**5a. Type of samples required:**

- Water samples
- Sediment samples

**5b. Methods by which samples will be obtained (including dredge/core/drill techniques):**

- Piston coring
- Multicoring
- CTD-rosette sampler
- Surface water pump ("aquaflo")

**6. Details of moored equipment:**

None

**7. Explosives:**

None

**8. Detail and reference of:**

**a. Any relevant previous/future cruises:**

In relation to the MARIN research on ships noise and fuel efficiency: all preceding cruises in the Dutch NICO program (RV Pelagia cruises in the period December 2017 to June 2018).

**b. Any previous published research data relating to the proposed cruise:**

**(Attach separate sheet if necessary)**

None

**9. Names and addresses of scientists of the coastal state in whose waters the proposed cruise takes place with whom previous contact has been made:**

None

**10. State:**

**a. Whether visits to the ship in port by scientist of the coastal state concerned will be acceptable:**

Yes

**b. Whether it will be acceptable to carry on board an observer from the coastal state for any part of the cruise and dates and ports of embarkation/-disembarkation:**

Yes

**c. When research data from intended cruise is likely to be made available to the coastal state and if so, by what means:**

Cruise report, available within 6 months after the cruise is completed

**SCIENTIFIC EQUIPMENT**

**11. Complete the following table - include a separate copy for each coastal state (indicate "Yes" or "No" if applicable)**

Marine scientific equipment used	water depth (m)	fisheries research	distance of research to coast in nautical miles			
				<b>&lt; 3</b>	<b>3-12</b>	<b>12-50</b>
CTD (+water)	>300m	no	no	no	yes	yes
Surface water (pump)	>0	no	no	no	yes	yes

**List of intended sampling stations during Pelagia cruise**

Water samples and water column profiling: along cruise track, locations to be determined during cruise. Depends on progress in MARIN program.

Multibeaming: along cruise track, locations to be determined during cruise. Depends on progress in MARIN program.

**References**

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