

## NOTIFICATION OF PROPOSED RESEARCH CRUISE

### Part A: GENERAL

1. Name of research ship: **RV Pelagia** Cruise number: **64PE366**

2. Cruise dates: 15 – 26 March 2013

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

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

7. Chief scientist: name: Dr. C Brussaard  
addresses: NIOZ Royal Netherlands Institute for Sea  
Research  
P.O. Box 59  
1790 AB Den Burg  
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e-mail address: corina.brussaard@nioz.nl

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

North Sea, mostly EEZ of The Netherlands. **One station, however, is located in the EEZ of the UK: 56.58N, 2.17E**

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

These cruises are the last of 4 spring and summer cruises in 2011-2013 with RV *Pelagia*, covering a transect in the North Sea. The cruises are part of a larger project, CHARLET, with main goal to determine the limiting factors for phytoplankton growth in the North Sea and how changes in limiting resources affect the cellular composition, ecological stoichiometry and species composition of the plankton community.

Primary production by phytoplankton provides the basis of marine food webs and is strongly determined by nutrient and light availability. Measures against eutrophication have mainly led to a reduction in phosphorus inputs into coastal seas like the North Sea, whereas nitrogen and silica loadings were much less reduced. This has resulted in major changes in the relative availability of different nutrients, and there is currently substantial disagreement whether phytoplankton growth in coastal waters is limited by nitrogen, phosphorus, or light. Furthermore, resource-mediated changes in the cellular composition of phytoplankton will have major implications for their nutritional quality for zooplankton, with effects that may cascade throughout the entire aquatic food web.

What are the shifts in primary production and species composition of the phytoplankton that we may expect in future years? And how will this affect the efficiency by which the solar energy captured by these primary producers is transferred to higher trophic levels in the marine food web?

In this project, we will determine the limiting factors for phytoplankton growth in the North Sea, and how these limiting factors affect the food quality and species composition of the phytoplankton. We will develop novel approaches to assess in-situ resource limitation using stable isotope labeling, and implement the results of these studies in competition models describing phytoplankton growth in the North Sea. Furthermore, we will investigate how the transfer of primary production to the classical zooplankton-based food web versus the viral loop is affected by shifts in the phytoplankton community and their food quality. The project combines mathematical models, laboratory studies and field work during cruises with the R/V *Pelagia* in two contrasting areas of the North Sea: the productive coastal area with relatively high nutrient inputs from rivers and the central North Sea with much reduced nutrient levels especially during summer. The proposed work will offer key insights into the impact of changes in resource limitation on the carrying capacity of the North Sea.

The project is funded through the Netherlands Organisation for Scientific Research (NWO) and the NIOZ.

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

Texel - Texel

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

n/a

## **Part B:       DETAIL**

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

**2. Cruise dates:**                **15 – 26 March 2013**

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

Study the limiting factors for phytoplankton growth in the North Sea and how changes in limiting resources affect the primary production and species composition of the phytoplankton in future years. Moreover, we will study how will this affect the efficiency by which the solar energy captured by these primary producers is transferred to higher trophic levels in the marine food web.

Stations will be samples for physical parameters (temperature, salinity, turbulence etc), chemical parameters (nutrient concentrations, dissolved organic matter etc) and biological parameters (abundance and community diversity of algae, grazers and microbes (bacterial and viral community). The main stations will have a more extensive sampling program, including process assays; production and health of phytoplankton, grazing and viral lysis mortality.

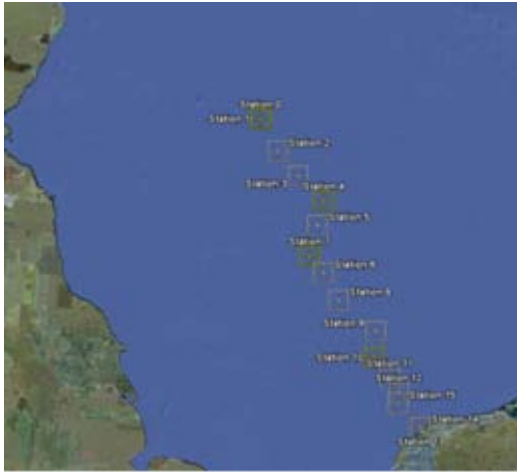
Sampling gear will involve mainly CTD, aquapump and multinetts. Additionally instruments to measure light will be used.

Operational methods upon sampling: (ultra)filtration to concentrate samples for diversity analysis, direct counting, fixation of samples for analysis at home lab, primary and secondary production and mortality assays, autoanalysis for nutrient concentrations and incubations for bioassays.

This is the 3<sup>rd</sup> and 4<sup>th</sup> cruise of 4 in total.

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

We will sample along a transect from nutrient-rich coastal waters to more nutrient-poor central North Sea. The figure below shows the stations during the 1<sup>st</sup> longer cruise of the 4 cruises in total. About 10 stations distributed over the cruise track were sampled, of which 5 main stations with a more extensive sampling program. The second cruise in 2012 and also those planned for 2013 sampled fewer, but characteristic, stations than the first orientating cruise. Stations 1, 2, 4, 7, 8, 10, 11 and 13 were sampled (in bold in Table).



Number	Latitude (deg, min, sec)	Longitude (deg, min, sec)	Latitude (decimal deg)	Longitude (decimal deg)
0	56° 34' 43.889"	2° 9' 53.165"	56.578858	2.164768
<b>1 (UK EEZ)</b>	<b>56° 34' 44.015"</b>	<b>2° 9' 54.49"</b>	<b>56.578893</b>	<b>2.165136</b>
2	56° 14' 59.806"	2° 30' 0.835"	56.249946	2.500232
3	55° 59' 59.806"	2° 54' 0.353"	55.999946	2.900098
4	55° 44' 40.78"	3° 22' 51.15"	55.744661	3.381708
5	55° 29' 29.098"	3° 16' 29.687"	55.491416	3.274913
6	55° 0' 1.966"	3° 24' 5.324"	55.000546	3.401479
7	55° 10' 11.935"	3° 9' 0.112"	55.169982	3.150031
8	54° 43' 12.176"	3° 41' 1.075"	54.720049	3.683632
9	54° 24' 9.76"	4° 2' 3.732"	54.402711	4.351037
10	54° 7' 48.173"	4° 19' 48.364"	54.130048	4.330101
11	53° 55' 5.156"	4° 36' 10.102"	53.918099	4.602806
12	53° 46' 1.636"	4° 46' 1.571"	53.767121	4.767103
13	53° 24' 2.614"	5° 8' 58.895"	53.400726	5.149693
14	53° 24' 8.503"	5° 8' 41.6"	53.402362	5.144889
15	53° 39' 15.365"	4° 44' 54.362"	53.654268	4.748434

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

water samples

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

CTD rosette sampling, aquaflo pump system of the ship, vertical nets for zooplankton, light sensor

**6. Details of moored equipment:**

na

**7. Explosives:**

No explosives.

**8. Detail and reference of:**

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

within the CHARLET project we had 2 earlier cruises in 2011 (summer) and 2012 (end spring). Within the present request we ask for permission for the March cruises of 2013. A fourth cruise will be held in April/May 2013.

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

**(Attach separate sheet if necessary)**

Not yet in peer-reviewed scientific publications, but in cruise reports yes. Cruise reports (64PE343 and 64PE353) were send to involved parties within one month of ending of cruises.

**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:**

Na

**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:**

Depending on maximum number of participants, yes.

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

The data will be made available through cruise report and scientific publications.

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			
			< 3	3-12	12-50	50-200
CTD-rosette sampler	Full depth	no	no	no	no	yes
Light meter	Upper 50 m	no	no	no	no	yes
Aquapump	5 m	no	no	no	no	yes
Multinets	Full depth	no	no	no	no	yes

List of intended sampling stations during Pelagia cruise 64PE372

Main stations in bold

Number	Latitude (decimal deg)	Longitude (decimal deg)
1	<b>56.578893</b>	<b>2.165136</b>
2	<b>56.249946</b>	<b>2.500232</b>
4	<b>55.744661</b>	<b>3.381708</b>
7	<b>55.169982</b>	<b>3.150031</b>
8	<b>54.720049</b>	<b>3.683632</b>
10	<b>54.130048</b>	<b>4.330101</b>
11	<b>53.918099</b>	<b>4.602806</b>
13	<b>53.400726</b>	<b>5.149693</b>

References

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