NOTIFICATION OF PROPOSED RESEARCH CRUISE

PART A: GENERAL

1. NAME OF RESEARCH SHIP HMDS VÆDDEREN CRUISE NO. 1

2. DATES OF CRUISE From 1 August 06 To 31 August 06

3. OPERATING AUTHORITY: ROYAL DANISH NAVY
ADMIRAL DANISH FLEET

TELEPHONE: ADF HQ +45 8943 3099/ SHIPS GSM +45 2527 5944/ SHIPS SAT 008 70 76 3747 448

TELEFAX: ADF HQ +45 8943 3171/ SHIP +45 2521 1045

TELEX:

4. OWNER (if different from no. 3)

5. PARTICULARS OF SHIP:

Name:	HDMS VÆDDEREN
Nationality:	DANISH
Overall length: (in metres)	112,3
Maximum draught: (in metres)	6,0
Net tonnage:	3500 t
Propulsion e.g. diesel/steam:	diesel
Call sign:	OUEW
Registration port and number (if registered fishing vessel)	

6. CREW

Name of master:
Captain Carsten Schmidt

Number of crew: 99

7. SCIENTIFIC PERSONNEL

Name and address of scientist in charge:

1A: Prof. Katherine Richardson
Biological Institute, University of Aarhus, Finlandsgade 14
8200 Aarhus N, Denmark
1B: Stiig Markager, seniorscientist, adjuct professor.
National Environmental Research Institute, Denmark
1C: Lone Gram, Danish Institute for Fisheries Research
Department of Seafood Research
Søltofts Plads, DTU bldg 221
DK-2800 Kgs Lyngby, Denmark
1D: Henrik Skov, DMU, Frederiksborgvej 39, 4000 Roskilde, Denmark
1E: Jakob Strand, Ph.D.,
National Environemtal Research Institute,
Department of Marine Ecology,
Frederiksborgvej 399,
4000 Roskilde, Denmark
1F: Jakob Tougaard, National Environmental Research Institute, Box 358, Frederiksborgvej 399, 6000 Roskilde Denmark
1G: Niels Larsen, Danish Meteorological Institute
Lyngbyvej 100, DK-2100 Copenhagen, Denmark

Tel/telex/fax no.:	**1B**: +45 4630 1305 **1C**: +45 4525 2586/+45 4588 4774 **1D**: +45 4630 1162 **1E**: +45 4630 1865 ; Fax: +45 4630 1114 **1F**: +45 46301956 / +45 46301114 **1G**: +45 3915 7414/+45 3915 7460
No. of scientists:	**1A:** 6 **1B**: 2 **1C**: 6-8 **1D**: 4 **1E**: 1-2 **1F**: 2-3 at a time, Max 10 in total **1G**: 4 (1 on-board part of cruise)

8. GEOGRAPHICAL AREA IN WHICH SHIP WILL OPERATE (with reference to latitude and longitude) Between 5900N-00136E and 6130N-00340W.

9. BRIEF DESCRIPTION OF PURPOSE OF CRUISE

1A: To collect a multidisciplinary dataset describing the upper ocean processes controlling ocean-atmosphere carbon exchange on a global scale.
Objectives of the project:

- To quantify the marine carbon cycle in the upper ocean together with the air-sea exchange of CO2, trace gasses and particle deposition from Greenland to Antarctica.
- To compare the roles and contributions of different ocean regions in/to physical, chemical and biological processes in the global carbon and nutrient cycles.
- To take advantage of new technology and remote sensing to quantify the role of ocean mesoscale activity – "ocean weather" - on the spatial variability of air-sea gas exchange of CO2 on the global scale.

1B: Analysis of dissolved organic matter in seawater, including bacterial degradation and effects of virusis
1C: The purpose of this particular project (as part of the Galathea3 cruise) is to isolate antagonistic microorganisms from water and algal samples. We will focus on isolation of bacteria from the Roseobacter clade but will also at selected locations isolate filamentous fungi. These micro organisms will be further characterized after the cruise and we will study their physiology and elucidate their role in oceanographic environments as well as their biomedical potential
1D: Measurements of the global distribution of mercury in the atmosphere
1E: 1. To study the distribution and levels of organic and inorganic pollutants in the marine environment in various parts of the Earth with special focus on near-coastal areas along international ship lanes and pristine areas by collecting and analyzing a large number of environmental samples (sediment, epifaunal invertebrates, fish), to estimate the contribution of the international ship traffic to pollution of the marine environment
2. To collect representative invertebrates from the selected study areas and store them to allow molecular genetic characterization of their capacity for metabolizing xenobiotics. This part of the research program is a continuation of an ongoing characterization of cytochrome P450 genes and enzymes in mainly polychaetes and crustaceans.
1F: Recording of underwater sounds from marine animals. Recording of undisturbed natural background noise.
1G: Global atmospheric measurements and investigations of cirrus clouds, stratospheric ozone, water vapor and ultraviolet (UV) radiation by installment of a micro-lidar, a SAOZ-spectrometer, an optical depth sensor, and a UV radiometer. During the passage through the inter-tropical convergence zone observations by lidar measurements and launches of balloon-borne ozone-, temperature-, and humidity sensors. The objective of the measurements will be investigations of the formation of high altitude decks of cirrus clouds in the tropics. The measurements will take place in connection with the formation of strong tropical convective systems (tropical thunderstorms) which at high altitudes generate outflows of thin layers of cirrus particles, made up of ice particles. In addition measurements of surface UV radiation for atmospheric chemistry investigations, biological process studies, and validation of satellite based measurements to derive UV radiation.

10. DATES AND NAMES OF INTENDED PORTS OF CALL

11. ANY SPECIAL REQUIREMENTS AT PORTS OF CALL

NOTIFICATION OF PROPOSED RESEARCH CRUISE

1. PART B: DETAILS

1. NAME OF RESEARCH SHIP HDMS VÆDDEREN CRUISE NO. 1

2. DATES OF CRUISE From 1 August 06 To 31 August 06

3. a) PURPOSE OF RESEARCH

1A: The oceanic carbon reservoir is about 50 times greater than the amount of carbon stored in the atmosphere as carbon dioxide (CO_2). Due to the intense gas-exchange through the air-sea interface, oceanic carbon storage will ultimately determine the future atmospheric CO_2-concentration. Today, oceanic carbon uptake amounts to about one fourth of the anthropogenic carbon emissions and, therefore, the ocean helps reduce the rate of atmospheric CO_2 increase. As CO_2 is a strong greenhouse gas, this oceanic carbon uptake counteracts the climatic influence from anthropogenic carbon emissions. Predicting future rates of oceanic CO_2 uptake requires knowledge relating to the magnitude of oceanic carbon uptake today and processes regulating this uptake. The project proposed will provide important information on these processes.

The marine carbon cycle is regulated through interplay between physical, chemical and biological processes. The fate of the biological fixed carbon depends on the complexity of the succeeding food web. Large phytoplankton cells are normally efficiently transferred up a short classical food chain, while small phytoplankton cells on the other hand fuel a much more complex microbial food web. However, few studies combine measurements of all three types of processes in order to describe atmospheric-ocean carbon exchange and no such studies have been carried out on a global scale. Thus, carrying out the study proposed here over the entire route of the Galathea route will provide a unique contribution to our understanding of the role of the ocean in climate change.

The project integrates a number of activities which involve the expertise from different research teams and the results from each of the activities are expected to provide new and important information related to processes influencing the cycling of carbon and the climate on Earth. However, the ambition of this project is to combine and coordinate all these activities from different scientific disciplines to develop a comprehensive understanding of the interaction between the processes involved in the carbon cycle.

1B: Basic science about concentrations, composition and dynamics of dissolved organic matter in marine systems.

1C: The purpose of this particular project (as part of the Galathea3 cruise) is to isolate antagonistic micro organisms from water and algal samples. We will focus on isolation of bacteria from the Roseobacter clade but will also at selected locations isolate filamentous fungi. These micro organisms will be further characterized after the cruise and we will study their physiology and elucidate their role in oceanographic environments as well as their biomedical potential

1D: To measure the global distribution of mercury in the atmosphere.

1E: 1. To study the distribution and levels of organic and inorganic pollutants in the marine environment in various parts of the Earth with special focus on near-coastal areas along international ship lanes and pristine areas by collecting and analyzing a large number of environmental samples (sediment, epifaunal invertebrates, fish), to estimate the contribution of the international ship traffic to pollution of the marine environment

2. To collect representative invertebrates from the selected study areas and store them to allow molecular genetic characterization of their capacity for metabolizing xenobiotics. This part of the research program is a continuation of an ongoing characterization of cytochrome P450 genes and enzymes in mainly polychaetes and crustaceans.

1F: Recording of sounds from marine animals and background noise at depths up to 100m

b) GENERAL OPERATIONAL METHODS (including full description of any fish gear, trawl type, mesh size, etc.)

1A: **Sampling strategy**

Over the entire cruise track, continuous measurements of salinity, temperature and chlorophyll a and fast repetition rate fluorescence (for determination of photosynthetic capacity) will be carried out on surface water. Atmospheric CO2 fluxes, particle concentrations and concentration of nitrogen containing gases will also be measured continuously along the route. In addition, point measurements of nutrients, and plankton composition will be made and analyzed in the laboratories. On deck, air- and optical measurements will be carried. These measurements will not require stopping the ship. At selected intervals, CTD-casts with concurrent collection of water chemistry and plankton sampling will be taken.

These will provide information on the hydrographic conditions and the biological activity deeper in the water column. Net and pump collection of zooplankton as well as trawl fishing for after zooplanktivore fish will also be carried out at selected intervals. These sampling programs require the stopping of the ship and their frequency can be decided in cooperation with other activities on board. On some transects an undulating platform carrying different instruments will be towed after the ship collecting measurements from 0-400 m.
1C: Water samples will be collected using Niskin bottles. The samples will be separated into algal/particulate samples (retained by a 5 µm filter) and water samples. Each of these will be analysed for content of culturable, antagonistic bacteria and fungi. Also, procaryotic DNA will be isolated from the samples. A copy of all samples will be stored in glycerol at -80°C for analyses after the cruise. In terms of equipment, the project depends on a number of standard laboratory facilities (autoclave, incubator, freezer, microwave oven etc.) and a number of reagents.
1D: Measuring Hg in the atmosphere in all cases based on cold vapour atomic fluorescence spectroscopy.
1E: 2 m wide bottom dredge (mesh size: ~1 cm),
Sediment box core or haps (diameter: ~30 cm),
Baited traps (boxes with dead fish as bait): 10 stk (40*30*25 cm each), marked with flagboyo, se figure in 6.
Manual sampling of invertebrates onshore.
1F: Recording of sounds by single hydrophones from small boats and small arrays (5 m aperture) towed or deployed from boat.
1G: automatic optical remote sensing measurements of atmospheric composition and UV radiation, scientist-operated balloon-borne in-situ measurements of ozone, temperature, and pressure (classified as LIGHT free balloons according to international air traffic regulations which do not require launch authorizations).

4. ATTACH CHART showing (on an appropriate scale) the geographical area of intended work, positions of intended stations, tracks of survey lines, positions of moored/seabed equipment, areas to be fished
1A: See the attached Appendix of project activities along the Galathea route.

a) TYPES OF SAMPLES REQUIRED (e.g., geological/water/plankton/fish/radionuclide)

5. **1A**: Air, water, plankton, fish.
1B+C: samples of seawater
1E: Surface sediment: ~1 kg per station,
Invertebrates: ~10 kg per station,
Fish: ~20 individuals per station
1F: Sound recordings.

b) METHODS OF OBTAINING SAMPLES (e.g., dredging/coring/drilling/fishing, etc. When using fishing gear, indicate fish stocks being worked, quantity of each species required, and quantity of fish to be retained on board).
1A: The air is monitored online
Water samples are collected using a CTD rosette system at depths between 0 and 4000m.
Continuous measurements are done on the surface ocean water using the bow intake of the ship. On stations, a separate peristaltic pump will be used to obtain clean, undisturbed surface water for analysis.
The properties of the mixed layer and upper thermocline are continuously monitored at selected sections using a towed undulating vehicle capable of reaching a depth of 500m (SeaSoar Mk II form Chelsea Tech. Group, UK). The vehicle carries physical and bio-optical sensors only.
Acoustic Doppler current measurement of the upper ocean current shear will be carried out throughout the cruise. In addition, acoustic echo sounding for fish stocks is carried out.
Samples of zooplankton are obtained using a towed net.
Small mesopelagic fish (Myctophidae etc.) and Crustaceans will be collected using a mid-water trawl.
Fish are collected for the purpose of stomach analyses and tissue stable isotopic samples.
1B: CTD-rosette.
1C: Niskin bottles.
1E: 2 m wide bottom dredge: invertebrates (e.g. molluscs, polychaetes, crustaceans, ~10 kg) and bottom fish (~20 individuals).
Sediment box core: surface sediment (~1 kg)
Baited traps: Gastropods and crustaceans (~5 kg)
Manual sampling of invertebrates (~5 kg) onshore.

6. DETAILS OF MOORED EQUIPMENT

Dates Laying	Recovery	Description	Depth	Latitude	Longitude

7. ANY HAZARDOUS MATERIALS (chemicals/explosives/gases/radioactives, etc.)
(Use separate sheet if necessary)
1C: For laboratory work, the project will need absolute ethanol.
If possible, extractions of algal samples will be done. This will require a limited amount of organic solvents (e.g. ethylacetate)
1G: -no hazardous material
-lidar of type Nd-Yag (wavelength 532 nm, pulse energy less than 2 micro-Joule at pulse frequency of 1 kHz, regarded of no hazard to air traffic).

a) Type and trade name

1A: 14CO2 for primary production determination, purchased at Danish Hydrology Institute, Hørsholm, Denmark
N2 gas, AirLiquid A/S
CO2 (402 ppm) gas, AGA
1C: Ethanol, anhydrous 99.9% (V&S Distillers)
Ethyl acetate (VWR)
1D: Messer Griessheim, CO Standard cylinders 40 Litre, NO standard cylinders 40 Litre
Ar cylinders

b) Chemical content (and formula)

1A: Aqueous solution of sodium bicarbonate with radionecleotide, $NaH^{14}CO_{3,\ N2,\ CO2\ in\ N2}$
1B: ^{3}H-labels thymidine, radioactive, total activity 5 mCi
^{14}C-labels leucin, radioactive, total activity 250 µCi
1C: C_2H_5OH (Ethanol)
$CH_3COOCH_2CH_3$ (Ethylacetate)
1D: 99.99999 % synthetic air with trace of CO
99.999999 % N_2 with trace of NO
99.998 % Ar

c) IMO IMDG code (reference and UN no.)

1A: UN no 2910
1D: CO UN 1002 or UN1956
NO UN 1066
Ar UN 1006

d) Quantity and method of storage on board

1A: 1000 1 ml bottles with activity 20.67 µCi per cm3, Total activity: 20670 µCi, stored in locked and radioioactivity marked cupboard
20 x 250 l cylinders (200bar)
CO2: 250 l cylinder (200bar)
1C: 2-4 litres of each
1D: 3 CO Standard cylinders 40 Litre.
3 NO standard cylinders 40 Litre. 8 Ar cylinders of 40 Litre, quality 4.8.

e) If explosives give dates of detonation

- Method of detonation
- Position of detonation
- Position of detonation
- Frequency of detonation
- Depth of detonation
- Size of explosive charge in kg.

8. DETAIL AND REFERENCE OF

a) Any relevant previous/future cruises

1B: Stedmon, C. & S. Markager (2003) Behaviour of the optical properties of CDOM under conservative mixing. *Estuarine and Coastal Shelf Science*, **57**, 973-979.
Stedmon, C.A., S. Markager & R. Bro (2003) Tracing dissolved organic matter in aquatic environments using a new approach to fluorescents spectroscopy. *Marine Chemistry*, **82**, 239-254.
Kowalczuk, P., C. A. Stedmon, & S. Markager (accepted) Modelling absorption by CDOM in the Baltic Sea from season, salinity and chlorophyll. *Marine Chemistry*, **xx**, xxx-xxx.

b) Any previously published research data relating to the proposed cruise

9. NAMES AND ADDRESSES OF SCIENTISTS OF THE COASTAL STATE(S) IN WHOSE WATERS THE PROPOSED CRUISE TAKES PLACE WITH WHOM PREVIOUS CONTACT HAS BEEN MADE

10. STATE

UNITED KINGDOM

a) Whether visits to the ship in port by scientists of the coastal state concerned will be acceptable (Yes/No)
No

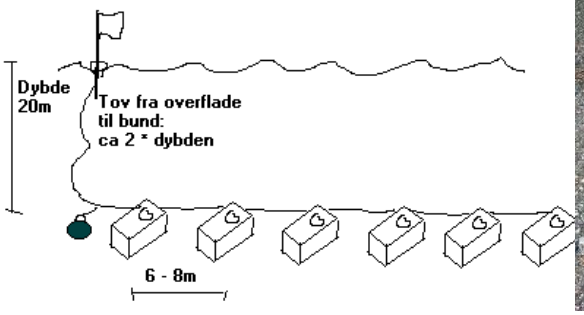
b) Participation of an observer from the coastal state for any part of the cruise together with the dates and the ports for embarkation and disembarkation
No

c) When research data from the intended cruise are likely to be made available to the coastal state and by what means
After publication, data will in general be available upon request. Data will be published in international scientific journals.

1E:

6. DETAILS OF MOORED EQUIPMENT

Description of baited traps: Used at depths from 10 - 100 m; traps/boxes on a 200 - 400 longline, marked with flagboyo, se figure



Dates Laying	Recovery	Description	Depth	Latitude	Longitude
1-2	by ship of by hand	longline marked with flagboyo	between 10 - 100 depending on the site		

7. ANY HAZARDOUS MATERIALS (chemicals/explosives/gases/radio actives, etc.)
(Use separate sheet if necessary)

a) Type and trade name

Ethanol (CH_3CH_2OH): 10 litre
Formalin (CH_3CHO): 10 litre
liquid nitrogen (N_2): 20 litre
dry ice: (CO_2): 20 litre
Magnesium sulfate ($MgSO_4$): 1 kg
WILL BE UPDATED IN DUE TIME

b) Chemical content (and formula)

c) IMO IMDG code (reference and UN no.)

d) Quantity and method of storage on board

e) If explosives give dates of detonation

- Method of detonation
- Position of detonation
- Position of detonation
- Frequency of detonation
- Depth of detonation
- Size of explosive charge in kg.

8. DETAIL AND REFERENCE OF

a) Any relevant previous/future cruises

Various research cruises in Danish waters and at Greenland

b) Any previously published research data relating to the proposed cruise

some examples:

Kim Rewitz, Bjarne Styrishave and Ole Andersen (2003) CYP330A1 and CYP4C39 Enzymes in the Shore Crab Carcinus maenas: Sequence and Expression Regulation by Ecdysteroids and Xenobiotics. Biochemical and Biophysical Research Communications. 310:252-260.

Vorkamp, K., Christensen, J.H. & Riget, F.F. 2004: Polybrominated diphenyl ethers and organ chlorine compounds in biota from the marine environment of East Greenland. Science of the Total Environment 331(1-3): 143-155.

M. Beck, J.A. Jacobsen & J. Strand (2002b). Development of imposex and accumulation of butyltin in the tropical muricid Thais distinguenda transplanted from a clean to a TBT contaminated site. Environmental Pollution 119: 253-260.

J. Strand & J.A Jacobsen (2002a). Imposex in two sub littoral neogastropods from the Kattegat and Skagerrak: the common whelk Buccinum undatum and the red whelk Neptunea antiqua. Marine Ecology Progress Series 244: 171-177.

Christensen, J.H., Hansen, A.B., Andersen, O., Mortensen, J. (2000). Development and application of a hyphenated analytical and chemo metric method in petroleum characterisation, identification and degradation studies. In Rodriguez, G.R., Brebbia, C.A. (Eds.): Oil and Hydrocarbon Spills, Modelling, Analysis and Control II. WIT Press. Water Studies 8, 189-198.

PART C. SCIENTIFIC EQUIPMENT

Complete the following table using a separate page for each coastal state

Coastal state UNITED KINGDOM

Port of call NONE

Dates

Indicate ”YES” or ”NO”

				DISTANCE FROM COAST		
List scientific work by function e.g.	Water column including sediment sampling of the seabed	Fisheries research within fishing limits	Research concerning the natural resources of the conti-nental shelf or its physical characteris-tics	Within 4 nm	Between 4-12 nm	Between 12-200 nm
Magnetometry	no	no	no	no	no	no
Gravity	yes	no	no	no	yes	yes
Diving	Yes	no	Yes	Yes	Yes	Yes
Seismics	no	no	no	no	no	no
Seabed sampling	Yes	Yes	Yes	Yes	Yes	Yes
Bathymetry	Yes	Yes	no	Yes	Yes	Yes
Trawling	Yes	Yes	no	Yes	Yes	Yes
Echo sounding	Yes	Yes	no	Yes	Yes	Yes
Water sampling	Yes	no	Yes	Yes	Yes	Yes
U/W TV	Yes	no	no	Yes	no	no
Moored instr.	Yes	Yes	no	Yes	Yes	Yes
Towed instr.	Yes	Yes	Yes	Yes	Yes	Yes
Fishing with dip net	At the surface	Yes	No	Yes	Yes	Yes
Remote sensing measurements	Down to 20 m	no	no			
Balloon-borne in-situ measurements				Atmosphe-ric composition & UV radiation	Atmospheric composition & UV radiation	Atmospheric composition & UV radiation

_____ Dated_____

(On behalf of the Principal Scientist)

NB IF ANY DETAILS ARE MATERIALLY CHANGED REGARDING DATES/AREA OF OPERATION AFTER THIS FORM HAS BEEN SUBMITTED, THE COASTAL STATE AUTHORITIES MUST BE NOTIFIED IMMEDIATELY