

NOTIFICATION OF PROPOSED RESEARCH CRUISE

PART A: GENERAL

1. NAME OF RESEARCH SHIP
Le Commandant Charcot CRUISE NO.
ELENO I

2. DATES OF CRUISE From 26/08/2023 To 10/09/2023

3. OPERATING AUTHORITY: Ponant, France

TELEPHONE: +33 (0)488 91 14 86

TELEFAX:

TELEX:

4. OWNER (if different from no. 3)

5. PARTICULARS OF SHIP:

Name:	LE COMMANDANT CHARCOT
Nationality:	FRANCE
Overall length:	150 m
Maximum draught:	10 m
Gross tonnage:	31,283
Propulsion e.g. diesel/steam:	Liquefied natural gas (LNG) and low-sulphur marine gasoil (LSMGO)
Call sign:	FMNB
Registration port and number (if registered fishing vessel)	Mata Utu

6. CREW
Name of master: Unknown at
the time of submitting the
"Notification of proposed
research Cruise"

Number of crew: 187

7. SCIENTIFIC PERSONNEL
Name and address of scientists in charge:
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No. of scientists: 4

8. GEOGRAPHICAL AREA IN WHICH SHIP WILL OPERATE (with reference to latitude and longitude)
Svalbard Islands– North Pole – Iceland (Reykjavik)
Coordinates from Svalbard to the North Pole: 77°N - 90°N / 0°E - 30°E
Coordinates from the North Pole to Iceland: 64°N - 90°N / 0°E - 30°W
9. BRIEF DESCRIPTION OF PURPOSE OF CRUISE
ELENO project seeks to quantify the present state of the physical, chemical, biological and biogeochemical systems of two transects of stations from the Svalbard Islands to the North Pole and from the latter to Iceland. As part of the Synoptic Arctic Survey 2020/23 (SAS), ELENO will operate with a multidisciplinary approach, making use of common protocols. Emphasis of the project will be also devoted to understanding the major ongoing transformations on the water masses, the marine ecosystem and the carbon cycle.
10. DATES AND NAMES OF INTENDED PORTS OF CALL
26/08/2023, Longyearbyen (Svalbard Islands)
10/09/2023, Reykjavik (Iceland)
11. ANY SPECIAL REQUIREMENTS AT PORTS OF CALL
Dry Ice availability at the port of arrival (Reykjavik, Iceland)

NOTIFICATION OF PROPOSED RESEARCH CRUISE

1. PART B: DETAILS

1. NAME OF RESEARCH SHIP: Le Commandant Charcot CRUISE NO.: ELENO I

2. DATES OF CRUISE From 26/08/2023 To 10/09/2023

3. a) PURPOSE OF RESEARCH

ELENO overarching goal is to contribute to the evaluation of the current state and major ongoing transformations of the Arctic marine system. To achieve this scope ELENO will pursue 3 key foci: A) Physical and biogeochemical state; B) Ecosystem response; C) Carbon cycle. The aims of the focal areas are: A1) Characterize the thermo-aline properties and the biogeochemistry of water masses; B1) Evaluate microbial abundances and diversity; B2) Quantify how remineralization processes varies in relation to the nutrients availability; B3) Estimate the biomass flux in the analyzed ecosystems; B4) monitor Arctic mammals populations to assess their conservation status; C1) Quantify the input and fate of organic carbon.

ELENO will train a young researcher and create opportunities to promote the next generation of polar researchers. Knowledge of how the Arctic system works will allow risk assessment and development of policies enabling effective management

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

Physical, chemical, biogeochemical and biological measurements on the ELENO I cruise will follow the recommendations of both the GO-Ship programme and Synoptic Arctic Survey.

Bioaerosol: population/diversity in marine environment (molecular analyses and cultivable).

Underway measurements: thermosalinograph.

CTD: Ponant has an RBR CTD with C, T, P, Oxygen optode and Turbidity.
Seawater sampling with Niskin.

Chemistry of seawater: nutrients (NO₃/NO₂, PO₄, SiOH₄, auto--analyser); Microplastics (Micro-FTIR is a nondestructive spectroscopic technique).

Water column ecosystem measurements: Viral component (Cytometry); Prokaryotic (Bacteria plus Archaea) abundance (also including Live/Dead; cultivable bacteria) and biomass (Cytometry, Epifluorescence Microscopy), activity (Bacterial carbon production; respiring cells CTC+; Metabolic profiles - Biolog), molecular detection of the prokaryotic phylogenetic composition and metabolic potential (next generation sequencing); Phytoplankton: Size fractionated chlorophyll (spectrofluorimetric analysis), taxa community composition by microscopy, optical detection (fluorimeter); Activity in planktonic communities: Microbial community respiration (ETS assay), Enzymatic activities (leucine aminopeptidase, beta-glucosidase and alkaline phosphatase; Fluorimetric assays).

Sampling with Nets

Phytoplankton and Zooplankton: sampling will be carried out by vertical tows of Phytoplankton and WP2 nets; on board samples will be split for qualitative (taxa community composition) and quantitative (abundance and biomass) analysis.

It is planned to do a hydrological station (epi and mesopelagic layers, 0-1000 m; 7 hydrological depths) per day when the vessel is stationary for passenger activities (4h). It reserves the opportunity to do one more station per leg (One station of up to 7h) in addition to the 4h daily stations. At the North Pole it is planned to use the Station time up to 12h for scientific activities also repeating them over time.

Researchers will collect data on marine mammal presence continuously by applying the Fixed Line Transect method, used onboard line ferries worldwide. Each observer will focus primarily on a 130° arc ahead of the ship and continuously scan the area by naked eye and with occasional binocular scans.

Information concerning the presence of cetaceans or other Arctic mammal species, their behavior and position over time will be recorded using dedicated data collection sheets. All data concerning ship track (position, speed and heading) will be recorded by a dedicated GPS along the route. In addition, the observation of other marine macro-fauna will be registered for presence monitoring only.

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



Map of the sampling stations to be carried out during the ELENO I oceanographic cruise and the Vessel's journey from the Svalbard Islands to the North Pole and from the latter to Iceland. The red dots are the stations that you would like to sample. The vessel will allow us to make one station a day but the stations are purely indicative depending on the distribution of the ice, the weather conditions and the availability of the captain.

5. a) TYPES OF SAMPLES REQUIRED (e.g., geological/water/plankton/fish/radionuclide)
- Bioaerosol;
 - Seawater;
 - Phytoplankton and Zooplankton
 - Sea ice.
- 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).
- Bioaerosol: Coriolis micro – microbial air sampler.
 - Seawater: sampling will be carried out by Niskin bottles (CTD and hydrological casts running to 0-1000 depth on 12/14 stations); Sampling will also be done using a pump that draws surface water from the sea.
 - Phytoplankton and Zooplankton: sampling will be carried out by vertical tows of Phytoplankton and WP2 nets.
 - Sea ice: Ponant Ice Corer.

6. DETAILS OF MOORED EQUIPMENT

<u>Dates Laying</u>	<u>Recovery</u>	<u>Description</u>	<u>Depth</u>	<u>Latitude</u>	<u>Longitude</u>
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7. ANY HAZARDOUS MATERIALS (chemicals/explosives/gases/radioactives, etc.)
(Use separate sheet if necessary)

a) Type and trade name

1. ACETONE
2. 4-METHYLUMBELLIFERYL PHOSPHATE
3. 4-METHYLUMBRRIFERIL β -D-GLUCOPYRANOSIDE
4. L-LEUCINE-7-AMIDO-4-METHYLCOUMARIN HYDROCHLORIDE
5. ETHYLENE GLYCOL MONOMETHYL ETHER
6. 7-AMINO-4-METHYLCOUMARIN
7. 4-METHYLUMBELLIFERONE
8. FORMALDEHYDE
9. ETHANOL
10. 5-CYANO-2,3-DITOLYL TETRAZOLIUM CHLORIDE
11. SYTO® 9 GREEN-FLUORESCENT NUCLEIC ACID + RED-FLUORESCENT NUCLEIC ACID STRAIN, PROPIDIUM IODIDE

b) Chemical content (and formula)

1. C_3H_6O
2. $C_{10}H_9O_6P$
3. $C_{16}H_{18}O_8$
4. $C_{16}H_{20}N_2O_3 \cdot HCl$
5. $CH_3OCH_2CH_2OH$
6. $C_{10}H_9NO_2$
7. $C_{10}H_8O_3$
8. CH_2O
9. CH_3CH_2OH
10. $C_{16}H_{14}C_1N_5$
11. $C_{27}H_{34}I_2N_4$

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

1. UN number or ID number
ADR/RID/ADN: UN 1090
IMDG-Code: UN 1090
ICAO-TI: UN 1090 14.2
UN proper shipping name
ADR/RID/ADN: ACETONE IMDG-
Code: ACETONE
ICAO-TI: Acetone 14.3
Transport hazard class(es)
ADR/RID/ADN: 3
IMDG-Code: 3
2. Transport information: NONE
3. Transport information: NONE
4. Transport information: NONE
5. Transport information: NONE
6. Transport information: NONE
7. Transport information: NONE
8. UN number: 1198
UN proper shipping name: FORMALIN
solution,
CLASS 3, Packing group III
9. UN number: 1170,
UN proper shipping name ETHANOL,
CLASS 3, Packing group III
10. Transport information: NONE
11. Transport information: NONE

d) Quantity and method of storage on board

1. Keep container tightly closed in a dry, well-ventilated environment. Carefully close open containers and store them upright to prevent leakage. Store in a cool place.
2. Store in a cool place. 100 ml glass bottle, stored on board at -20°C.
3. Store in a cool place. 100 ml glass bottle, stored on board at -20°C.
4. Store in a cool place. 100 ml glass bottle, stored on board at -20°C.
5. Store in a cool place. Keep container tightly closed (100 ml glass bottle) in a dry, well-ventilated environment.
6. Store in a cool place. 10 ml tube, stored on board at -20°C.

7. Store in a cool place. 10 ml tube, stored on board at -20°C.
8. 10 Liters. Keep container tightly closed in a dry, well-ventilated environment. Carefully close open containers and store them upright to prevent leakage. Store in a cool place.
9. 10 Liters. Keep container tightly closed in a dry, well-ventilated environment. Carefully close open containers and store them upright to prevent leakage. Store in a cool place.
10. Store in a cool place. 50 ml tube, stored on board at -20°C.
11. Store in a cool place. 50 ml tube, stored on board at +4°C.

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

The ELENO team is currently leading or participating in several international and national projects (Italian National Research Antarctic Programme - PNRA: MICROPOLARS, CryoCarb, IPECA, RESTORE, SIGNATURE, ICEtoFLUX, EXPLORA; INTERACT-EU: CIRCE, SNOW-BALL; Italian Arctic Research Programme - PRA: Ecoclimate, CASSANDRA, MICROTRACER.

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

- 1) Azzaro M., Aliani S., Maimone G., Decembrini F., Caroppo C., Giglio F., Langone L., Miserochi S., Cosenza A., Azzaro F., Rappazzo A.C., Cabral A.S., Paranhos R., Mancuso M., La Ferla R. (2021) Short-term dynamics of nutrients, planktonic abundances, and microbial respiratory activity in the Arctic Kongsfjorden (Svalbard Islands). *Polar Biology*, <https://doi.org/10.1007/s00300-020-02798-w>.
- 2) Caroppo C., Pagliara P., Azzaro F., Miserochi S., Azzaro M. (2017) Late Summer Phytoplankton Blooms in the Changing Polar Environment of the Kongsfjorden (Svalbard, Arctic). *Cryptogamie, Algologie*, 38 (1), 53-72.
- 3) Caruso G., La Ferla R., Azzaro M., Zoppini A., Marino G., Petochi T., Corinaldesi C., Leonardi M., Zaccone R., Fonda Umani S., Caroppo C., Monticelli L., Azzaro F., Decembrini F., Maimone G., Cavallo R.S., Stabili L., Todorova N.H., Karamfilov V.K., Rastelli E., Cappello S., Acquaviva M.I., Narracci M., De Angelis R., Del Negro P., Latini M., Danovaro R. (2016) Microbial assemblages for environmental quality assessment: Knowledge, gaps and usefulness in the European marine strategy framework directive. *Critical Reviews in Microbiology*, doi: 10.3109/1040841X.2015.1087380.
- 4) Papale M., Caruso G., Maimone G., La Ferla R., Lo Giudice A., Rappazzo A.C., Cosenza A., Azzaro F., Ferretti R., Paranhos R., Cabral A.S., Caccia M., Odetti A., Zappalà G., Bruzzone G., Azzaro M. (2023) Microbial Community Abundance and Metabolism Close to the Ice-Water Interface of the Blomstrandbreen Glacier (Kongsfjorden, Svalbard): A Sampling Survey Using an Unmanned Autonomous Vehicle. *Water (Switzerland)*, 15 (3), Article number 556.
- 5) Papale M., Rappazzo A.C., Mikkonen A., Rizzo C., Moscheo F., Conte A., Michaud L., Lo Giudice A. (2020) Bacterial diversity in a dynamic and extreme sub-arctic watercourse (Pasvik river, norwegian arctic). *Water (Switzerland)*, 12 (11): 1-19.

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

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10. STATE

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

All datasets will be documented through metadata compliant 19115 standard, and stored in the CNR (<http://iadc.cnr.it/cnr/>) data center, which are First Level Nodes of the IADC funded by PRA. IADC and its CNR node will provide IT platforms and software (as GeoNetwork and OpenDAP) to assure discovery and access to data by any user following FAIR principles. IADC will offer tools also for integration and deep analysis of acquired datasets.

PART C. SCIENTIFIC EQUIPMENT

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

Coastal state: Iceland

Port of call

Dates

Indicate "YES" or "NO"

				DISTANCE FROM COAST		
<u>List scientific work by function</u> e.g.	Water column including sediment sampling of the seabed	Fisheries research within fishing limits	Research concerning the natural resources of the continental shelf or its physical characteristics	Within 4 nm	Between 4-12 nm	Between 12-200 nm
Magnetometry						
Gravity						
Diving						
Seismics						
Seabed sampling						
Bathymetry						
Trawling						
Echo sounding						
Water sampling	Yes		Yes	Yes*	Yes*	Yes
U/W TV						
Moored instr.						
Towed instr.	Yes		Yes	Yes*	Yes*	Yes

* We have marked this possibility, but we would not count on making stations within 12 nautical miles.

M. M. 20 2222

Dated 28/04/2023

(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