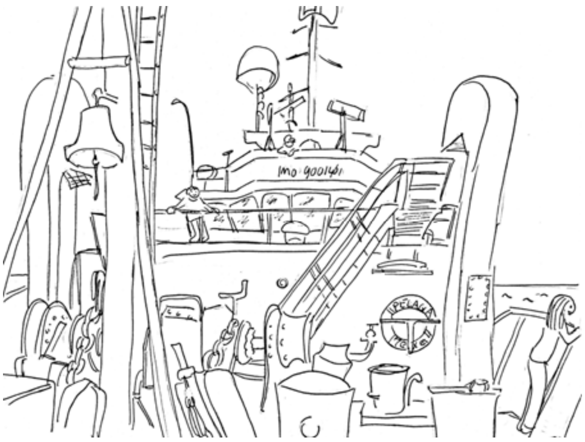
Cruise report

RV Pelagia cruise 64PE440

Netherlands Initiative Changing Oceans (NICO) leg 11

Henk de Haas and shipboard scientific crew

Royal Netherlands Institute for Sea Research



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Cover image: drawing by Anne Kruijt

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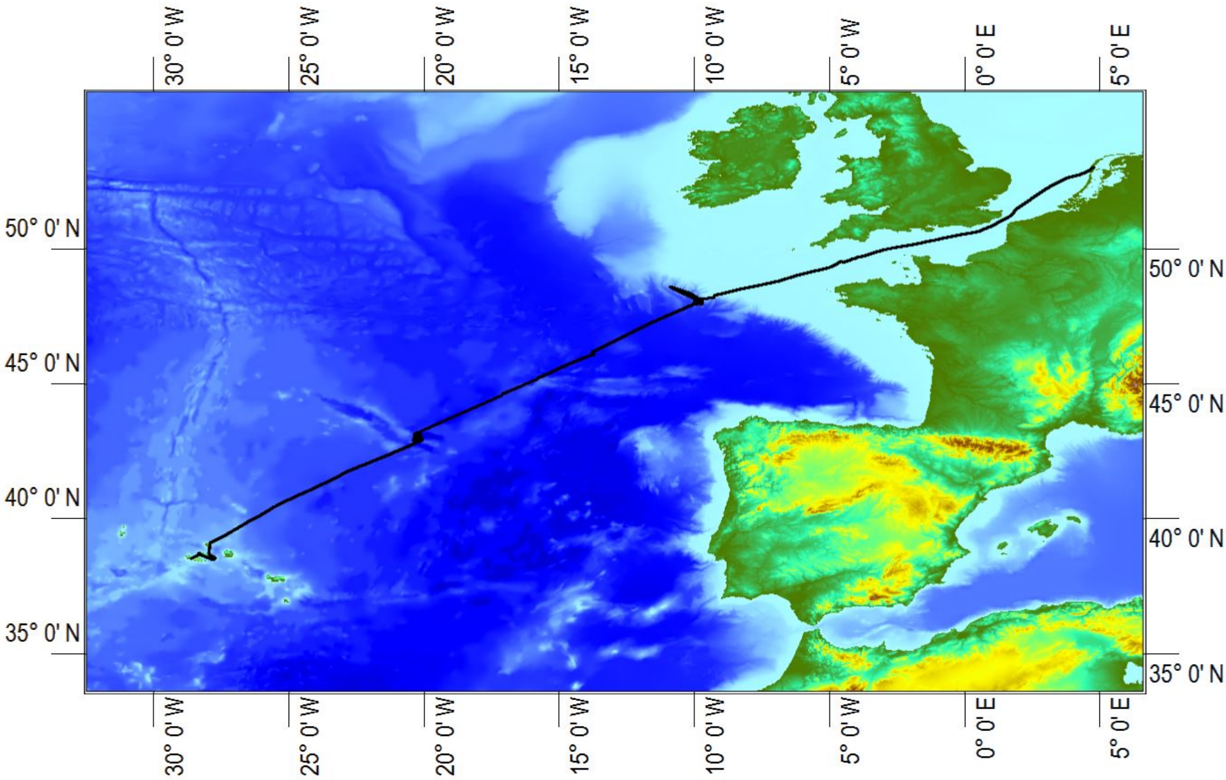
Introduction

The present cruise, RV Pelagia cruise number 64PE440, is leg 11 of the Netherlands Initiative Changing Oceans (NICO) expedition. The aim of this expedition was to gain insight into the threats and opportunities of the currently changing oceans. During a total of 12 legs about 100 scientists of over 20 organisations were trying to find (a part of the) answers to 40 research questions which form the scientific backbone of NICO. In addition to this many master students from Dutch Universities joined the various legs as part of their education to become future marine scientists.
Also participating in the cruises were journalists, writers, photographers and artists. They reported not only on the scientific work, but also on their personal on board experiences with the aim to inform the Dutch public on marine sciences, the scientific progress and the `art' of doing marine science,

NICO leg 11 started on 4 July on Texel and ended in Horta, on the Azores, on 16 July. This leg was mainly meant as a transit leg. With adding just a few extra days of ships time it would be possible to carry out a few relatively small activities along the way. Due to technical problems (a burnt generator) the day of departure was delayed by one day and the expected average sailing speed was lower than would normally be the case with a fully functional engine room. This meant that less time for science would be available and unfortunately one of the aims of leg 11, piston and multicoring at several station on the Madeira Abyssal Plain, had to be cancelled.
The remaining activities during leg 11 included measurements on the ships noise measured by means of hydrophones suspended underneath a buoy, carried out by MARIN (Maritime Research Institute Netherlands), and an extended version of the NICO master student training program in which 6 students participated.
The scientific crew was accompanied by a writer reporting on the cruise in a Dutch national newspaper and a photographer/artist participating in S.E.A. (Science Encounters Art). The latter is a project which couples artists and NIOZ scientists with the aim to inform the public on how to make use of the sea in a sustainable manner.



Cruise track

Underwater sound

(Jos Koning, MARIN)

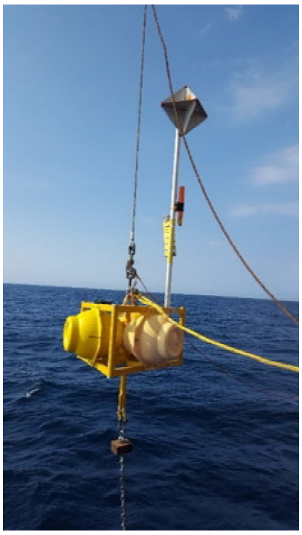
Aims and methods

During the voyage from Texel to Horta the sound that the ship generates was measured. Research into the underwater sound produced by ships takes place regularly, but the results are often not published due to military or commercial interests. Therefore, the research during the NICO expedition was an exceptional opportunity. The shared dataset can be jointly used by MARIN, TNO, NIOZ and Leiden University.
MARIN (Maritime Research Institute Netherlands) is interested in the underwater noise from the ship propeller and the engine and their effects on the ship. This information is important for the design of quieter and more efficient ships. MARIN was interested in how much noise a ship actually makes and which parts of the ship play a key role in this. All the measurements on board were carried out while the ship was moving. On this occasion, also the vibrations and sound close to the propeller and engine were registered. For the sound recordings outside of the ship, we used two hydrophones supplied by TNO (Dutch Organisation for Applied Sciences). TNO usually determines the effect of the ship noise by making measurements in the water of the noise from passing ships. During the NICO expedition, we combined both approaches.
Researchers from the Institute of Biology at Leiden University wanted to know the character of the noise that comes from the ship. Currently, our understanding of vessel sound and potential impact on marine animals is limited to a number of key measurements, such as the sound level and the frequency range. Now, however, we were able to explore the nature of vessel sound in much more detail and relate it to ship manoeuvres and angles of approach. This information may turn out to be relevant for behavioural disturbance of fish or marine mammals and, if so, we may also be close to finding the key to mitigation.

We travelled through the English Channel and made the first measurement at the edge of the continental plate. Halfway through the voyage to Horta and just off the Azores, the measurements were repeated. The noise that the ship generates when it travels at different power levels was recorded. The aim was to establish how that sound varies under different weather and water conditions, and we wanted to compare those measurements with the background noise at the location concerned.

Measurements carried out:

- Sound recordings with buoy at two depths
- Pressure sensors near the propeller
- Vibration sensors inside the ship (engine room)
- Propeller images



Buoy used to measure the ships sound away from the ship

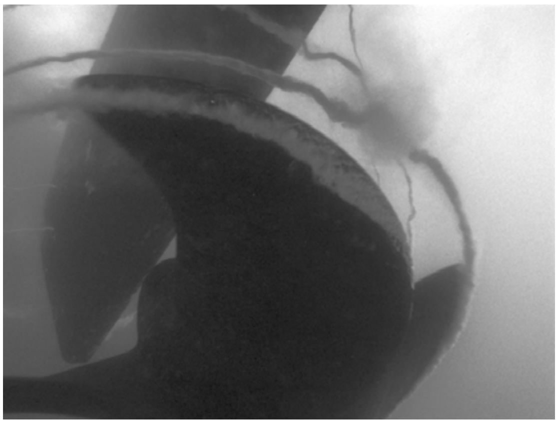


Image showing cavitation at the ships propeller

Initial results

We had hoped to experience many different types of weather during the two-week cruise. Then we could have investigated the effect of the swell on the underwater sound, for example. However, during the entire period we only had fair summer weather, and now we only have "fine weather" measurements.

Another question was whether in the very broad sound spectrum, other sound sources could be heard besides those of the ship. For example, can you detect whales? Initially, that appeared not to be the case. If the ship is in the vicinity, then you only hear the ship because it makes a considerable amount of noise. During the measurements near the Azores, we did, however, take measurements at an increasingly greater distance from the ship. Nevertheless, we still kept hearing the ship. You have to make a considerable effort to cut out the noise from the ship.

What next? A considerable amount of data has been collected, but we will not be able to process that until next year. MARIN and TNO funded the measurement methods during the NICO expedition, but a budget for further analysis was not immediately available. That will now happen in 2019.

NICO student program

(Eirini Tsartsali, Wessel van der Sande, Werna, Imke Smeets, Reinier Groeneveld, Anne Kruijt)

The NICO students program during leg 11 forms part of the student program as it was carried out during the entire duration of the NICO project. Most of the time on this leg was spent on continuously (1) taking surface water samples by means of a pump (intervals 1-2 days), (2) surface water CTD casts to be treated and prepared by all NICO-students for further lab analysis, (3) noting observations regarding plastics and in the water while sailing. The overall coordination of the student program was done by Corina Brussaard and Geer-Jan Brummer (both NIOZ) and Maria van Leeuwe (University of Groningen).
Because NICO leg 11 was mostly a transit cruise, there was time to do some additional measurements to the standard student program. Also the students were introduced into working with a multibeam echo sounder and how to process and interpret the data, made observations on floating plastic, collected plastic from surface water samples and analysed this plastic on board means of a microscope and infrared light using a Raman spectrometer put at our disposal by NIOZ colleague Erik Zettler. The microscopes were also used to study plankton found in various water samples.

Name – Study – University	On-board task
Anne Kruijt, Marine sciences, UU	PAM, POC, HPLC
Eirini Tsartsali, Climate Physics, UU	PAM, POC, HPLC, DMSP
Wessel van der Sande, Water Engineering and Management, UT	POC, HPLC, DMSP
Werna, Marine sciences, UU	Phytoplankton, bacteria, viruses abundances
Imke Smeets, Earth, Life and Climate, UU	Inorganic nutrients, microscope analysis
Reinier Groeneveld, Marine Sciences, UU	Molecular filtration

Table showing the activities of the students involved in the student program during leg 11

During the cruise CTD deployments were carried out at 7 stations with the aim to sample water at various depths to be used for the analyses belonging to the NICO student program.

Station	Cast	Date	Depth of seafloor (meters)	Latitude	Longitude	Abundance /nutrients	Molecular	POC	HPLC	PAM	DMSP	Microscope
1	1	06/07	79	49 40.90 N	003 55.67 W	x	x	x	x	x	x	
5	1	08/07	?	48 02.99 N	009 47.17 W	x	x	x	x	x	x	x
7	1	10/07	4441	45 12.23 N	015 47.11 W	x	x	x	x	x	x	x
9	1	11/07	4600?	43 18.67 N	020 15.77 W	x	x	x	x	x		x
11	1	12/07	4200?	42 54.47 N	020 03.93 W	x	x	x	x	x	x	x
12	1	13/07	4080	41 36.77 N	023 05.64 W	x	x	x	x	x		x
13	1	14/07	2852	40 30.60 N	025 24.10 W	x	x	x	x	x	x	

Table showing an overview of CTD stations sampled during the cruise and types of samples taken per CTD station. Stations are ranked according to date of sampling. DMSP is short for dimethyl-sulfonio-propionate; PAM for the photosynthetic ability, POC for particulate organic carbon; HPLC for high pressure liquid chromatography.

Plankton pump

The plankton pump collects surface water microplankton in the >0.1 mm range along the entire cruise transect, using the ships deck-wash system, or ‘clean seawater system’. From a hose water continuously passes through a plankton net. Every six hours (at

09:00, 15:00, 21:00 and 03:00 ship-time) the net is drained and its content washed into the cod-end beaker attached to the net. The content from the beaker is transferred onto a sieve, then rinsed with Milli-Q and finally stored in a -80°C freezer in a zip-lock plastic bag. Simultaneously a water sample is taken for nutrient, alkalinity, DIC and water isotope analysis. This sample is stored in two pony vials, one at 4°C for dissolved Si analysis, and the other at -20°C for phosphate and nitrate analysis. These samples will later be analysed in the NIOZ lab.

During this cruise a total number of 37 plankton samples was taken. We faced no difficulties in the sampling process. There was however a discrepancy between the flowmeter attached to the inflow and the flowmeter attached to the outflow, the (white) inflow flowmeter reading going up and down. The (blue) outflow flowmeter readings seemed reliable, as also confirmed by the ships engineer. Both both flowmeter readings for every sampling moment were noted in the logbook.

Seawater filtration – molecular work

Analysis for (meta)genomics of micro-organisms were performed on water samples retrieved by a CTD. Subsamples were collected from two depths: (1) 15m depth (mixed layer) and (2) the depth that coincided with the deep chlorophyll maximum (DCM). After retrieval, the water content of the two CTD bottles were used to rinse two 5L bottles three times (for corresponding depth) prior to filling them. Next, the bottles were transferred to the lab where they were placed in a tray with ice overlain by a plastic cover. Water content from the 5L bottles were flushed through a filtration set-up by using a Peristaltic pump (Masterflex console drive with Easy-Load II pump head). The set-up consisted of (in order of connections):

(1) A Grey rod connected to 'normal' tubing;
(2) Tube-tube connector;
(3) Masterflex tubing;
(4) Tube-tube connector;
(5) 'Normal' tubing;
(6) Tube connected to Filter (Sterivex or Anotop);
(7) Filter (Sterivex or Anotop) connected to tube that goes into a filtrate container/bottle.

Prior to each run, and after the last, the grey rod was cleaned with a tissue containing a little bit 70% ethanol whereas the *whole* system, including beaker glasses and bottles, were rinsed with milliQ. Next, the subsample from the 5L bottle was used to rinse the system, and the Sterivex filter would be connected.
For each depth two runs were performed. The first run for each depth consisted of a Sterivex filter (0.22μm pore size) connected to the filtration set-up (for prokaryotic and eukaryotic micro-organisms). Filtrate from the first Sterivex filtration was used subsequently as subsample filtration for the second run which included an Anotop filter (0.02 μm; for viruses) instead. It should be noted that prior to this second run, the system was cleaned and rinsed as described above as well, and that at the start of each filtration the air was removed as much as possible from the Sterivex or Anotop filter. Furthermore, filtration speed was set to maintain a velocity just a little faster than dripping speed, and the filtration was stopped once leakage occurred from a tube-tube connector and insufficient (to no) filtrate was produced anymore.

Once filtration finished, the remaining water content in the filters were pushed out by using a syringe, the filter was sealed with parafilm at both ends, wrapped in aluminium foil, covered with a piece of tape containing the station-cast-bottle number and volume filtered. Next, the package was wrapped in a second aluminium foil layer, freezed in liquid nitrogen and immediately stored in a freezer set for -80 ^{o}C.
The Anatop filters were clogged relatively fast (mostly around 100 mL). Upon extra sealing the Anatop filters would not produce sufficient drips either, leaks occurred even more and the water in the tubes remained almost 'still'.

Inorganic Nutrients: Silicate, Nitrogen and Phosphorus

In order to analize the inorganic nutrient content of silicate (Si), nitrogen (N), and phosphate (P) in the seawater, water was subsampled from the CTD Niskin bottles from 3m, 15m, DCM start(DCM top), DCM peak, DCM bottom, and 200 m into 50 mL Greiner tube. Water for this analysis was again subsampled from the Greiner tubes to ponyvial tubes. Ponyvials tubes and the caps were rinsed using filtered samples with the help of a 20 ml syringe and acrodisc filter which have been rinsed with the sample beforehand. For each depth, 2 ponyvials were filled with filtered sample from the Greiner tubes; one for Si, the other one for N and P. Ponyvials were numbered from 1 onwards on the lids of the tubes per independent station and depth, where the same number was used for both nutrient variable. Samples for silicate analysis were stored in the 4 ºC freezer, while samples for N and P were placed in the -20 ºC freezer.

Abundance sampling for flow cytometry (fixing phytoplankton, bacteria, and viruses)

The same sample from the same Greiner tubes for inorganic nutrient analysis per depth were subsampled into cryovials and fixed for flowcytometry to estimates the abundances of phytoplankton, bacteria, and viruses (5 ml for phytoplankton, 2 ml for bacteria and viruses). Formaldeyde/ hexamine was added to the sample used for phytoplankton fixing, while glutaraldehyde was added for bacteria and viruses. Mixed sample were left in the dedicated fixative refrigerator for 15-30 minutes and followed by a snap freeze in liquid nitrogen. Finally, samples were put in labelled (station-cast-bottle number-dates-depth) plastic bags for each fixing variable and stored in a -80 ºC freezer.

DMSP

Some comments will be stated below on the execution of the protocol during this leg. We increasingly got a grip on how to treat the sample such that it is least shaken as to account for the volatility of the gas. The filling of the DMSP sampling bottles was done at first with the Niskin tap on full force, but was later (after 2 samplings) done at a slow discharge rate. Also the 10ml pipet was put increasingly close to the 20ml vial's bottom. The first time sampling one vial was incorrectly pipetted, this was solved by putting the sample to the correct vial. The same problem was solved with the last sample by correcting the labels.

The 20ml vials were not kept in-situ temperature during the first sample: after sampling, the bottles were stored at room temperature until further processing. The 20ml vials were stored in the blue cooling box from the 2nd sample on. Hence, the 20ml vials were further processed together, and put in the freezer at the same time.

Filling the vials without touching its inside with the 10ml pipet is not possible with even a slightly moving ship. The pipet was kept as clean as possible to avoid contamination as much as possible.

The calibrations of the Gilson pipets have long been expired, hence the volume of the standard pipetted might deviate from the desired volume (50µl).

There were not enough vials to sample at all the stations. This is because the frequency of CTD sampling was increased (there was time left). Therefore, 2 stations (9 and 12) have not been sampled.

Throughout the whole cruise, the reserve standard was used instead of the one designated for leg 11. This was simply because this vial was on top in this white container. This was discovered just before the last sample, for this sample also the reserve standard was used. Also the control sample contains the reserve standard.

POC and HPLC

Regarding the pump: the 20L tank couldn't stand the pressure, so it would always crumble and as such drastically lower its volume. This required the bottle to be emptied and sometimes it caused a rapid increase of the pressure (due to water entering the tube from large tank to overflow bottle) which, at some occasions, led to the pressure exceeding -0.2 bar for a short period of time.

The POC and HPLC samples were sub-bagged per station in the large bag after 2 stations, because we realized it would be very difficult to sort all the samples back in the lab if they are just all in the same bag.
We kept account of unwanted input by thorough cleaning of the materials and closing the doors. The cylinders and input-beakers were sealed off after cleaning with aluminum foil.

PAM

The samples were taken from the HPLC (4L) bottles. Before sampling, the bottles were put in black trash bags so as to avoid affection by light. After sampling they stored in the blue box, in which there was water and some ice so as to keep the bottles cool and kept closed.
Using a Gilson pipet, 3ml sample were added in the PAM vials. The filtered sea water was taken after the filtering process of DMSP or if not enough was left, from the filtration of POC analysis. After placing the samples in the dark for 10 minutes, the measuring process started. The gain settings were kept the same value. Till station 11, everything seems to work fine. At the last two stations (12 and 13), the ft at 3m and 15m was too low even after adjusting the gain settings to 12. There was no opportunity to set both gain settings at higher value, (only 54 could get higher values). Thus, it was decided to keep the same gain settings and make a note of the ft. At station 12, the ft was low but higher than 100. Finally, at station 13 the ft was even lower and at some cases 'Error', instead of Yield value was appeared.

Plastic observations

Plastic pollution is an increasingly recognised problem in the world's oceans. During this transit plastic counting has been done twice daily, to gain a qualitive insight into the amount of plastic to be encountered as you travel the Atlantic Ocean. As expected, the amount of plastics observed per hour was highest in the sea lanes of the English Channel and quickly decreased as we travelled further into the Atlantic. However, the fact that bits of plastic have been observed even far out at sea, outside the main sea lanes (once at 48 3.0N 9 47.0W and once at 42 56.8N 20 12.8W) supports the notion that plastic pollution is occurring in the Atlantic and should be dealt with.

CTD-measurements: microscope analysis

The aim of the microscope analysis was to qualitatively assess the presence of organisms, minerals and microplastics, not to quantitatively determine and compare amounts. At stations 5 (3 meters), 7 (3 meters, deep chlorophyll maximum at 40 meters, 4441 meters), 9 (2000 meters), 11 (deep chlorophyll maximum at 40 meters, 784 meters, 2000 meters) and 12 (780 meters, 2000 meters), approximately 2 to 2,5 Niskin bottles per depth were filtered through a 0,090 mm sieve. The residue was transferred on small petri glasses and analysed under the microscope.
The most interesting results could be found in the deep chlorophyll maximum (40 meter depth for both station 7 and 11) and 2000 meter depth. Especially the deep chlorophyll maximum at station 11 contained a multitude of copepod species, dinoflagellates (figure 1g), an unidentified wheel-like organic form (1f), a form that might be a diatom (1h), and many unrecognizable pieces of organic material. However, the other deep chlorophyll maximum that was sampled, at station 7 (also 40 meter depth), contained very little in comparison, apart from an intricate structure of hollow, tube-like stalks that might be a piece of sponge (figure 1b and c). This difference between the deep chlorophyll maxima remains unexplained.
At 2000 meter at station 9, many copepods and dinoflagellates were found (figure 1d and e). To determine if this was a purely local phenomenon this depth was again sampled at stations 11 and 12. At station 12, but not at station 11, dinoflagellates (figure 1j) and a few copepods were found again, although they showed different morphologies compared to station 7. Some copepods showed signs of degradation, but not all. The same dinoflagellates were found in the deep chlorophyll maximum at station 11. It therefore appears that certain species or genus of dinoflagellates can live at multiple depths in the

water column. Copepods are mainly found in the surface water, but occasionally species can be found at greater depths, although these might be different, deep-specific species. Filtered samples of 4441 meter depth at station 7 and 780 meter depth at station 11 and 12 were also analysed, but apart from tiny, unidentifiable specks of (degraded) organic material nothing of interest could be seen.
Microplastics were only found at 3 meter depth at station 5 in the form of human-made fibres (figure 1a). Under the microscope, fibres found in the filtered water samples were similar to fibres pulled from clothing on board. This adds to the observation that more plastic was seen in/near the European coast than in deeper, non-shelf areas.

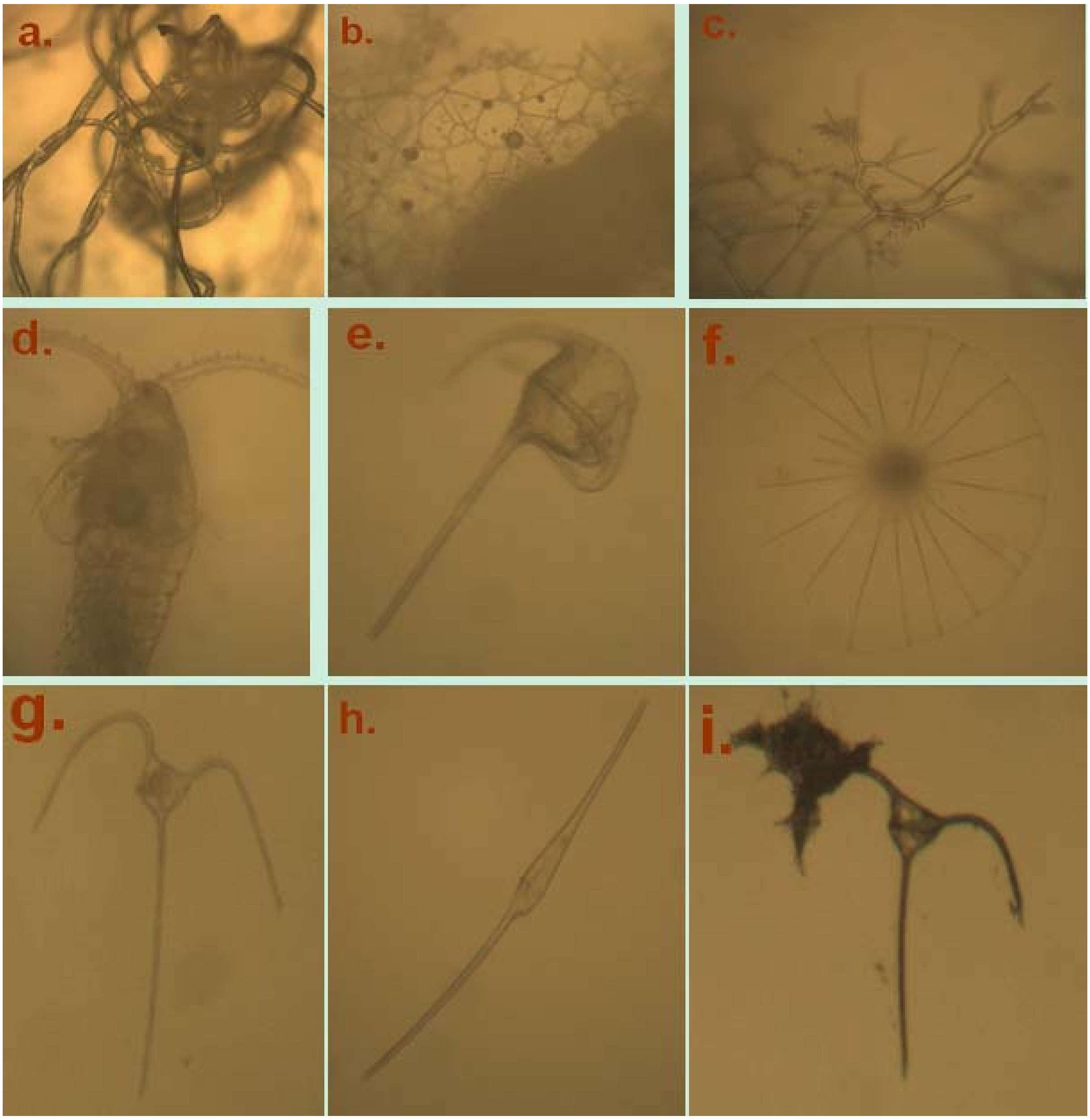


Figure showing highlights of the microscope analysis. A. Station 5, 3 meters, fibres, probably human-derived. B. Station 7, DCM, intricate structure, might be a piece of sponge. C. Station 7, DCM, zoom-in on the edge of the sponge-like structure. D. Station 9, 2000 meters, copepod. E. Station 9, 2000 meter, dinoflagellate. F. Station 11, DCM, unidentified wheel-like organism. G. Station 11, DCM, dinoflagellate. H. Station 11, DCM, elongate organism that might be a diatom. I. Station 12, 2000 meters, dinoflagellate, similar to G.

CTD measurements: temperature, salinity and oxygen concentration

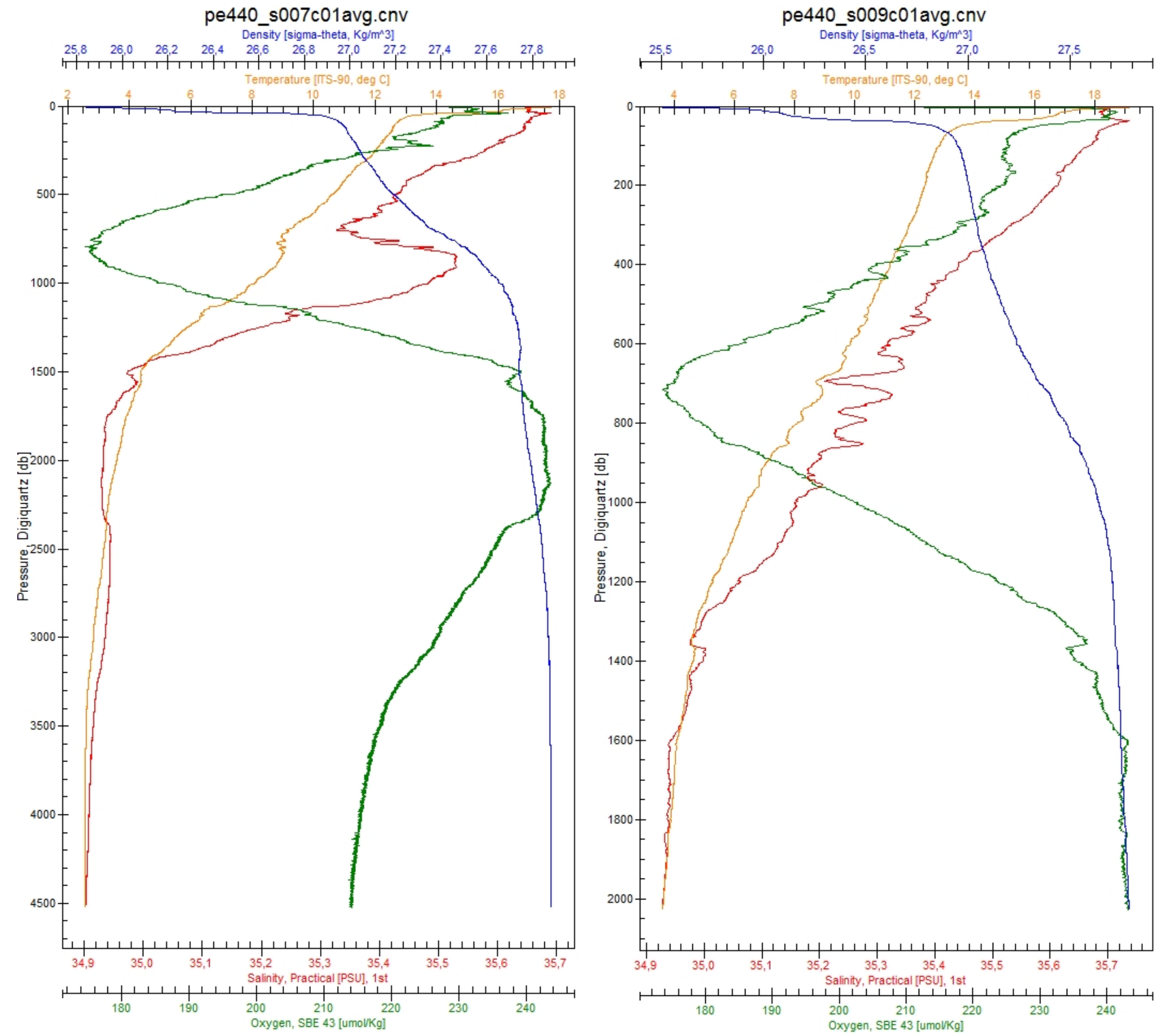
When the CTD is lowered into the water column to retrieve water samples, it simultaneously measures temperature, salinity, oxygen concentration, fluorescence and density. As fluorescence is mainly used to determine the amount of chlorophyll as a function of depth but apart from the deep chlorophyll maximum doesn't exhibit patterns, and density is a combination of temperature and salinity, the most interesting patterns could be found in temperature, salinity and oxygen concentration.

At station 1 and 2 (shelf area, 70 and 250 meters depth,) temperature and oxygen concentrations simply decreased with depth, except for an oxygen peak in the deep chlorophyll maximum due to high primary production. Salinity values are relatively similar trough the water column, except for the fact that surface salinity was considerably higher at station 2 compared to 1.

At the deep-sea stations (5, 7, 11, 12 and 13), surface temperatures varied between 15-19°C, surface salinity between 35,6-36‰ (salinity was somewhat higher at stations 12 and 13 than at 7, 9 and 11) and oxygen concentrations between 220 -240 µmol/kg. Interestingly, oxygen concentrations at great depth were similar to those at the surface, with a zone of lower oxygen between 500 and 1500 meter depth and the minimum at approximately 1000 meters. In the minimum, oxygen values were only 170-180 µmol/kg. This interval also saw high salinities of approximately 35,5‰ at the oxygen minimum. This salinity "peak" was somewhat disturbed at station 9 and 13, resulting in wiggles in the salinity curve at that depth and most likely related to some mixing with another water mass. Temperature in this interval was generally between 5 and 10°C. Beneath this interval (1500 meter and deeper), values stabilize at 35 for salinity and 240 µmol/kg for oxygen concentration. Temperatures drop to 3 or 4°C.

Emery (2001), in the chapter Water Types and Water Masses in the Encyclopedia of Ocean Science, provided a list of all Atlantic water masses. The only intermediate water mass to match the salinity and temperature of the 500-1500 meter interval found here is Mediterranean Water (2,6-11°C, 35-36,2‰), while the salinity and temperature of the water mass below match the values for North Atlantic Deep Water (1,5-4°C, 34,8-35‰). Further evidence comes from the similar oxygen concentration of these intermediate waters and the oxygen concentration of the Mediterranean Water as found by Ambar et al. (2002), and also from an almost-match between the deeper oxygen concentrations and the oxygen concentrations of North Atlantic Deep Water as provided by figure 1 in Gottschalk et al. (2016) (the oxygen concentration given there is, however, 20 µmol/kg above the value found here).

The fact that we can trace this pattern in all deep-sea stations across the transect shows how far the Mediterranean Water from its outflow though the Gibraltar Strait can reach. Considering the slight mixing at station 9 and 13, however, it is possible that the transect of Leg 11 was situated near the edge of the outermost reach of this water mass.

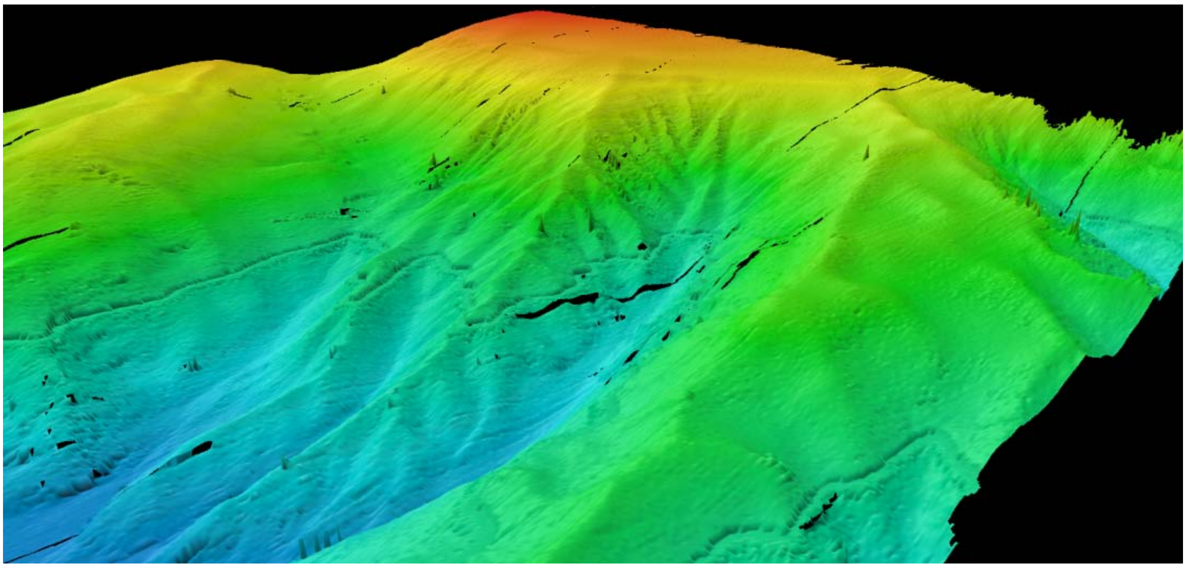


Figures showing examples of temperature, salinity and oxygen profiles at the deep-sea stations. Left: Station 7, showing the oxygen minimum from 500-100 meters (interpreted as Mediterranean Water) and salinity peak in the same interval. Right: Station 9, showing again the oxygen minimum zone but wiggles in the salinity curve instead of a peak, likely due to mixing with another intermediate water mass.

Multibeam echo sounder surveys

At various locations characterised by contrasting local bathymetric features small multibeam echo sounder surveys were carried out. The aim of these observations was solely to introduce the students in recording, processing and interpretation of multibeam echo sounder data.

The Kongsberg EM 302 multibeam echosounder as presently installed on board the Pelagia is a 30 kHz echo sounder with a one degree opening angle for the transmitter and a two degree angle for the receiver. It uses 288 beams with 2-3 depth measurements per beam. The system is equipped with a dual swath, resulting in a maximum number of depth measurements of 864 per ping. The maximum swath opening angle is 150°. Under favourable conditions this can result in a swath width in the order of 5 times the water depth. Under favourable conditions a reasonable swath width can be reached at depths of over 8 km. The transmit fan is split into at maximum 9 individual sectors that can be steered independently to compensate for ships roll, pitch and yaw to get a best fit of the ensonified line perpendicular to the ships track and thus a uniform coverage of the sea bed. The transducers are mounted in a gondola which is placed at the port site of the vessel at about one quarter to one third of the ships length from the bow. The motion of the vessel is registered by a Kongsberg MRU-5 motion reference unit. Ships position and heading is determined with two GPS antennas. The motion and position information is combined in a Seapath 200 ships attitude processing unit and send to the Transmit and Receiver Unit (TRU). The system is synchronized by means of a 1 pulse per second (1PPS) signal produced by the Seapath 200 which is send to the TRU. The data from the receiver transducer and the ships attitude are sent through an ethernet connection to the acquisition computer. Data acquisition is done using the Kongsberg SIS (Seafloor Information System) software. The sound velocity profile is calculated from salinity, pressure and temperature data recorded by a Seabird CTD system. During the cruise the Reson SVP 70 sound velocity probe that is normally mounted on the gondola containing the transducers and measures the sound velocity near the transducers was not available. The near-transducer sound velocity was taken from the calculated velocity profile. The processing PC is connected to a display on the bridge of the Pelagia through a KVM switch and an ethernet connection allowing operation of the system from the bridge if desired. Data can be processed on board using SISQA and Fledermaus (installed on the on board processing computer) or other user owned software.



Example of partly processed multibeam echo sounder data

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On board public relations activities

During the entire cruise artists/photographer Joeri Bosma took several thousands of photographs of the activities on board as well as the sea itself. These photographs will be used to create a piece art within the framework of the S.E.A. (Science Encounters Art) project on the “home island” of NIOZ, Texel. S.E.A. is an art project in which various artists originating on Texel are connected to a NIOZ scientist with the aim to create some piece of art that will be placed along an art route on the island during the summer of 2019. The aim of this project is to inform the general public on the beauty of the sea but also show the problems the sea is currently suffering (partly) because we humans are using the sea as a source of food, raw materials, transport route and place to dump our waste.
Tommy Wieringa is a Dutch novelist. During the cruise he used his experience on board to write a literary cruise report to be published in a Dutch newspaper or periodical.

Acknowledgement

The shipboard scientific party thanks the crew of the Pelagia and the NIOZ-NMF department for their support during the organisation of this cruise, technical assistance during the cruise and a pleasant atmosphere on board. Maria van Leeuwe, Geert-Jan Brummer and Corina Brussaard are thanked for introducing the students into the analyses required for the student program. Erik Zettler is thanked for supplying the Raman analyser and microscope and introduction to this equipment.

Appendix 1 - Cruise participants

Scientific crew

Anne Kruijt	Student	Utrecht University
Eirini Tsartsali	Student	Utrecht University
Wessel van der Sande	Student	University of Twente
Werna	Student	Utrecht University
Imke Smeets	Student	Utrecht University
Reinier Groeneveld	Student	Utrecht University
Jos Koning	Scientists	MARIN
Henk de Haas	Expedition leader	NIOZ

Non-scientific crew

Joeri Bosma	Artist/photographer
Tommy Wieringa	Novelist

Ships crew

Len Bliemer	First officer
Rik van Katwijk	Second officer
Jaap Seepma	Chief Engineer
Fred Hiemstra	Second Engineer
Robin Dijkhuizen	Able seaman
Cor Stevens	Bosun
Timothy Plug	Able seaman
Peter van Maurik	Able seaman
Jan Boskemper	Electronic engineer
Bert Puijman	Master
Vitalijs Maksimovs	Steward
Leon Moerland	Cook

Photograph of all cruise participants (image Joeri Bosma)

Appendix 2 - Station list

Station number	Date	Time	Latitude	Longitude	Device name	Action name
1	06/07/2018	11:31:24	49° 40.89912' N	3° 55.66578' W	CTD with samples	Begin
1	06/07/2018	11:42:58	49° 40.90356' N	3° 55.66266' W	CTD with samples	Bottom
1	06/07/2018	12:13:31	49° 40.9086' N	3° 55.65876' W	CTD with samples	End
2	06/07/2018	14:53:56	49° 29.65026' N	4° 28.60266' W	RPM SWEEP	Begin
2	06/07/2018	14:57:12	49° 29.67966' N	4° 28.71516' W	RPM SWEEP	RPM Change
2	06/07/2018	15:06:23	49° 29.9754' N	4° 29.54094' W	RPM SWEEP	RPM Change
2	06/07/2018	15:10:34	49° 30.17868' N	4° 30.09474' W	RPM SWEEP	RPM Change
2	06/07/2018	15:16:24	49° 30.53094' N	4° 31.05558' W	RPM SWEEP	RPM Change
2	06/07/2018	15:19:24	49° 30.729' N	4° 31.60998' W	RPM SWEEP	RPM Change
2	06/07/2018	15:22:31	49° 30.94458' N	4° 32.22306' W	RPM SWEEP	RPM Change
2	06/07/2018	15:24:34	49° 31.09368' N	4° 32.65368' W	RPM SWEEP	RPM Change
2	06/07/2018	15:27:55	49° 31.35096' N	4° 33.38886' W	RPM SWEEP	End
3	07/07/2018	12:50:03	48° 16.18566' N	9° 12.96858' W	RPM SWEEP	Begin
3	07/07/2018	12:51:49	48° 16.0554' N	9° 13.14702' W	RPM SWEEP	RPM Change
3	07/07/2018	12:53:45	48° 15.9063' N	9° 13.3578' W	RPM SWEEP	Speed Steady
3	07/07/2018	12:56:01	48° 15.72042' N	9° 13.6167' W	RPM SWEEP	RPM Change
3	07/07/2018	12:58:27	48° 15.51576' N	9° 13.90038' W	RPM SWEEP	Speed Steady
3	07/07/2018	13:00:30	48° 15.33444' N	9° 14.15046' W	RPM SWEEP	RPM Change
3	07/07/2018	13:02:13	48° 15.17628' N	9° 14.3694' W	RPM SWEEP	Speed Steady
3	07/07/2018	13:10:26	48° 14.20302' N	9° 14.9673' W	RPM SWEEP	RPM Change
3	07/07/2018	13:12:33	48° 13.9137' N	9° 15.03132' W	RPM SWEEP	Speed Steady
3	07/07/2018	13:14:39	48° 13.6245' N	9° 15.09162' W	RPM SWEEP	RPM Change
3	07/07/2018	13:16:22	48° 13.3755' N	9° 15.14538' W	RPM SWEEP	Speed Steady
3	07/07/2018	13:18:51	48° 13.01604' N	9° 15.22122' W	RPM SWEEP	RPM Change
3	07/07/2018	13:20:23	48° 12.78678' N	9° 15.27774' W	RPM SWEEP	Speed Steady
3	07/07/2018	13:23:06	48° 12.38724' N	9° 15.38124' W	RPM SWEEP	RPM Change
3	07/07/2018	13:24:27	48° 12.18396' N	9° 15.4374' W	RPM SWEEP	Speed Steady
3	07/07/2018	13:31:59	48° 11.24694' N	9° 16.33656' W	RPM SWEEP	End
4	07/07/2018	15:36:59	48° 7.76898' N	9° 43.00326' W	Multibeam	Begin
4	07/07/2018	20:27:22	48° 8.08188' N	9° 46.75278' W	Multibeam	Course Change
4	07/07/2018	20:53:55	48° 8.07276' N	9° 50.47356' W	Multibeam	Course Change
4	07/07/2018	23:09:36	47° 56.60424' N	9° 51.65406' W	Multibeam	Course Change
4	08/07/2018	01:57:32	48° 8.15202' N	9° 55.05108' W	Multibeam	Course Change
4	08/07/2018	04:45:53	47° 56.38248' N	9° 59.58354' W	Multibeam	End
5	08/07/2018	07:05:37	48° 3.00192' N	9° 47.00352' W	CTD with samples	Begin
5	08/07/2018	07:16:18	48° 2.9982' N	9° 46.9953' W	CTD with samples	Bottom
5	08/07/2018	07:40:01	48° 2.9904' N	9° 47.00364' W	CTD with samples	End
5	08/07/2018	10:08:30	48° 4.0527' N	9° 49.60668' W	URN Accelleration Run	Start Track 2
5	08/07/2018	10:13:02	48° 3.77286' N	9° 48.97308' W	URN Accelleration Run	End Track 2
5	08/07/2018	16:08:45	48° 2.18778' N	9° 49.11138' W	URN Accelleration Run	Start Track 1
5	08/07/2018	16:16:23	48° 2.84904' N	9° 48.24198' W	URN Accelleration Run	End Track 1
5	08/07/2018	08:35:18	48° 3.00144' N	9° 46.96278' W	URN Buoy	Deployment
5	08/07/2018	16:33:04	48° 2.0868' N	9° 49.16928' W	URN Buoy	Recovery
5	08/07/2018	10:21:17	48° 3.12474' N	9° 47.3031' W	URN ISO RUNS	COMEX
5	08/07/2018	10:21:58	48° 3.06744' N	9° 47.16672' W	URN ISO RUNS	CPA
5	08/07/2018	10:22:53	48° 3.0126' N	9° 46.96818' W	URN ISO RUNS	FINEX

Station list (continued)

Station number	Date	Time	Latitude			Longitude			Device name	Action name
5	08/07/2018	10:40:39	48°	1.98678'	N	9°	46.97946'	W	URN ISO RUNS	COMEX
5	08/07/2018	10:41:17	48°	1.96368'	N	9°	47.12436'	W	URN ISO RUNS	CPA
5	08/07/2018	10:42:01	48°	1.9566'	N	9°	47.277'	W	URN ISO RUNS	FINEX
5	08/07/2018	10:59:02	48°	8.24742'	N	9°	51.86892'	W	URN ISO RUNS	COMEX
5	08/07/2018	10:59:41	48°	8.7945'	N	9°	52.2189'	W	URN ISO RUNS	CPA
5	08/07/2018	11:00:31	48°	9.46866'	N	9°	52.72212'	W	URN ISO RUNS	FINEX
5	08/07/2018	11:17:06	48°	25.81086'	N	10°	22.59384'	W	URN ISO RUNS	COMEX
5	08/07/2018	11:17:46	48°	26.53146'	N	10°	24.67266'	W	URN ISO RUNS	CPA
5	08/07/2018	11:18:35	48°	27.42114'	N	10°	27.3093'	W	URN ISO RUNS	FINEX
5	08/07/2018	12:46:23	48°	2.9607'	N	9°	48.0741'	W	URN ISO RUNS	COMEX
5	08/07/2018	12:47:01	48°	2.9106'	N	9°	47.95446'	W	URN ISO RUNS	CPA
5	08/07/2018	12:47:53	48°	2.8866'	N	9°	47.7729'	W	URN ISO RUNS	FINEX
5	08/07/2018	13:03:32	48°	2.83842'	N	9°	47.8632'	W	URN ISO RUNS	COMEX
5	08/07/2018	13:04:08	48°	2.88318'	N	9°	47.98236'	W	URN ISO RUNS	CPA
5	08/07/2018	13:05:06	48°	2.95848'	N	9°	48.1785'	W	URN ISO RUNS	FINEX
5	08/07/2018	13:18:27	48°	2.92854'	N	9°	48.21516'	W	URN ISO RUNS	COMEX
5	08/07/2018	13:19:05	48°	2.88318'	N	9°	48.08916'	W	URN ISO RUNS	CPA
5	08/07/2018	13:20:00	48°	2.82024'	N	9°	47.90532'	W	URN ISO RUNS	FINEX
5	08/07/2018	13:32:40	48°	2.79102'	N	9°	47.96706'	W	URN ISO RUNS	COMEX
5	08/07/2018	13:33:20	48°	2.84202'	N	9°	48.10302'	W	URN ISO RUNS	CPA
5	08/07/2018	13:34:13	48°	2.91066'	N	9°	48.2829'	W	URN ISO RUNS	FINEX
5	08/07/2018	13:45:33	48°	2.87754'	N	9°	48.30786'	W	URN ISO RUNS	COMEX
5	08/07/2018	13:46:17	48°	2.82972'	N	9°	48.18234'	W	URN ISO RUNS	CPA
5	08/07/2018	13:47:18	48°	2.76192'	N	9°	48.00366'	W	URN ISO RUNS	FINEX
5	08/07/2018	13:59:32	48°	2.7273'	N	9°	48.078'	W	URN ISO RUNS	COMEX
5	08/07/2018	14:00:11	48°	2.77182'	N	9°	48.19572'	W	URN ISO RUNS	CPA
5	08/07/2018	14:01:11	48°	2.84292'	N	9°	48.3837'	W	URN ISO RUNS	FINEX
5	08/07/2018	14:12:08	48°	2.78118'	N	9°	48.43476'	W	URN ISO RUNS	COMEX
5	08/07/2018	14:12:58	48°	2.72832'	N	9°	48.29424'	W	URN ISO RUNS	CPA
5	08/07/2018	14:13:59	48°	2.6595'	N	9°	48.12282'	W	URN ISO RUNS	FINEX
5	08/07/2018	14:24:50	48°	2.61024'	N	9°	48.20412'	W	URN ISO RUNS	COMEX
5	08/07/2018	14:25:33	48°	2.65698'	N	9°	48.33432'	W	URN ISO RUNS	CPA
5	08/07/2018	14:26:32	48°	2.72076'	N	9°	48.5118'	W	URN ISO RUNS	FINEX
5	08/07/2018	14:37:49	48°	2.67048'	N	9°	48.5499'	W	URN ISO RUNS	COMEX
5	08/07/2018	14:38:48	48°	2.61918'	N	9°	48.41976'	W	URN ISO RUNS	CPA
5	08/07/2018	14:39:49	48°	2.56584'	N	9°	48.28206'	W	URN ISO RUNS	FINEX
5	08/07/2018	14:50:35	48°	2.4858'	N	9°	48.33516'	W	URN ISO RUNS	COMEX
5	08/07/2018	14:51:33	48°	2.53458'	N	9°	48.47412'	W	URN ISO RUNS	CPA
5	08/07/2018	14:52:52	48°	2.60118'	N	9°	48.66222'	W	URN ISO RUNS	FINEX
5	08/07/2018	15:03:30	48°	2.54208'	N	9°	48.7302'	W	URN ISO RUNS	COMEX
5	08/07/2018	15:04:32	48°	2.49048'	N	9°	48.5964'	W	URN ISO RUNS	CPA
5	08/07/2018	15:06:00	48°	2.41746'	N	9°	48.40134'	W	URN ISO RUNS	FINEX
5	08/07/2018	15:16:08	48°	2.35968'	N	9°	48.5052'	W	URN ISO RUNS	COMEX
5	08/07/2018	15:17:07	48°	2.41368'	N	9°	48.64182'	W	URN ISO RUNS	CPA
5	08/07/2018	15:18:26	48°	2.48862'	N	9°	48.8244'	W	URN ISO RUNS	FINEX
5	08/07/2018	15:36:57	48°	2.40156'	N	9°	48.95382'	W	URN ZIGZAG	Start Track

Station list (continued)

Station number	Date	Time	Latitude			Longitude			Device name	Action name
5	08/07/2018	15:37:02	48°	2.3955'	N	9°	48.93618'	W	URN ZIGZAG	Course Change
5	08/07/2018	15:37:14	48°	2.38428'	N	9°	48.89322'	W	URN ZIGZAG	Course Change
5	08/07/2018	15:37:50	48°	2.36724'	N	9°	48.76242'	W	URN ZIGZAG	Course Change
5	08/07/2018	15:38:27	48°	2.31906'	N	9°	48.65028'	W	URN ZIGZAG	Course Change
5	08/07/2018	15:38:32	48°	2.31564'	N	9°	48.63708'	W	URN ZIGZAG	End Track
5	08/07/2018	15:52:03	48°	2.23842'	N	9°	48.74262'	W	URN ZIGZAG	Start Track
5	08/07/2018	15:52:10	48°	2.24838'	N	9°	48.7668'	W	URN ZIGZAG	Course Change
5	08/07/2018	15:52:26	48°	2.27424'	N	9°	48.8157'	W	URN ZIGZAG	Course Change
5	08/07/2018	15:53:03	48°	2.34264'	N	9°	48.91242'	W	URN ZIGZAG	Course Change
5	08/07/2018	15:53:30	48°	2.358'	N	9°	49.00578'	W	URN ZIGZAG	End Track
no number	08/07/2018	17:10:11	48°	0.4611'	N	9°	52.39926'	W	URN Accelleration Run	End Track 2
6	09/07/2018	13:14:16	46°	10.62828'	N	13°	44.47482'	W	RPM SWEEP	Begin
6	09/07/2018	13:18:31	46°	10.23828'	N	13°	45.28992'	W	RPM SWEEP	RPM Change
6	09/07/2018	13:22:03	46°	9.98784'	N	13°	45.81612'	W	RPM SWEEP	Speed Steady
6	09/07/2018	13:25:28			N			W	RPM SWEEP	RPM Change
6	09/07/2018	13:27:39			N			W	RPM SWEEP	Speed Steady
6	09/07/2018	13:32:32			N			W	RPM SWEEP	RPM Change
6	09/07/2018	13:34:02			N			W	RPM SWEEP	Speed Steady
6	09/07/2018	13:42:21			N			W	RPM SWEEP	RPM Change
6	09/07/2018	13:43:52			N			W	RPM SWEEP	Speed Steady
6	09/07/2018	13:47:02			N			W	RPM SWEEP	RPM Change
6	09/07/2018	13:48:26			N			W	RPM SWEEP	Speed Steady
6	09/07/2018	13:51:21			N			W	RPM SWEEP	End
6	09/07/2018	14:09:45			N			W	RPM SWEEP	Begin
6	09/07/2018	14:13:33			N			W	RPM SWEEP	RPM Change
6	09/07/2018	14:15:34			N			W	RPM SWEEP	Speed Steady
6	09/07/2018	14:19:36			N			W	RPM SWEEP	RPM Change
6	09/07/2018	14:21:37			N			W	RPM SWEEP	Speed Steady
6	09/07/2018	14:25:32			N			W	RPM SWEEP	RPM Change
6	09/07/2018	14:27:23			N			W	RPM SWEEP	Speed Steady
6	09/07/2018	14:30:25			N			W	RPM SWEEP	RPM Change
6	09/07/2018	14:34:04			N			W	RPM SWEEP	Speed Steady
6	09/07/2018	14:37:13			N			W	RPM SWEEP	RPM Change
6	09/07/2018	14:39:09	46°	9.8055'	N	13°	46.21122'	W	RPM SWEEP	Speed Steady
6	09/07/2018	14:43:22	46°	3.35394'	N	13°	47.03094'	W	RPM SWEEP	End
6	09/07/2018	14:48:57	46°	3.21006'	N	13°	46.50774'	W	RPM SWEEP	Begin
6	09/07/2018	14:53:52	46°	3.31794'	N	13°	46.15998'	W	RPM SWEEP	RPM Change
6	09/07/2018	14:56:04	46°	3.37842'	N	13°	45.98388'	W	RPM SWEEP	Speed Steady
6	09/07/2018	14:58:04	46°	3.44604'	N	13°	45.78312'	W	RPM SWEEP	RPM Change
6	09/07/2018	15:01:54	46°	3.57432'	N	13°	45.40014'	W	RPM SWEEP	Speed Steady
6	09/07/2018	15:06:11	46°	3.7464'	N	13°	44.91942'	W	RPM SWEEP	RPM Change
6	09/07/2018	15:08:23	46°	3.83976'	N	13°	44.66328'	W	RPM SWEEP	Speed Steady
6	09/07/2018	15:15:34	46°	4.18524'	N	13°	43.73958'	W	RPM SWEEP	RPM Change
6	09/07/2018	15:18:06	46°	4.31148'	N	13°	43.40316'	W	RPM SWEEP	Speed Steady
6	09/07/2018	15:22:06	46°	4.5156'	N	13°	42.8556'	W	RPM SWEEP	RPM Change
6	09/07/2018	15:24:38	46°	4.67058'	N	13°	42.45186'	W	RPM SWEEP	Speed Steady

Station list (continued)

Station number	Date	Time	Latitude			Longitude			Device name	Action name
6	09/07/2018	15:28:28	46°	4.91154'	N	13°	41.8263'	W	RPM SWEEP	End
7	10/07/2018	07:13:25	44°	48.66'	N	16°	35.76'	W	CTD with samples	Begin
7	10/07/2018	08:34:38	44°	48.72'	N	16°	35.76'	W	CTD with samples	Bottom
7	10/07/2018	10:45:39	44°	48.66'	N	16°	35.76'	W	CTD with samples	End
8	10/07/2018	13:10:09	44°	41.21454'	N	16°	55.42464'	W	Speed Through Water Run	Start Track
8	10/07/2018	13:30:45	44°	39.46632'	N	16°	59.47218'	W	Speed Through Water Run	End Track
8	10/07/2018	13:35:23	44°	39.3666'	N	17°	0.45138'	W	Speed Through Water Run	Start Track
8	10/07/2018	13:49:28	44°	39.28026'	N	17°	3.50622'	W	Speed Through Water Run	End Track
8	10/07/2018	13:53:40	44°	38.8305'	N	17°	4.15038'	W	Speed Through Water Run	Start Track
8	10/07/2018	14:06:02	44°	37.07448'	N	17°	5.57328'	W	Speed Through Water Run	End Track
8	10/07/2018	14:10:49	44°	36.30774'	N	17°	5.74464'	W	Speed Through Water Run	Start Track
9	11/07/2018	07:08:31	43°	18.7002'	N	20°	15.7998'	W	CTD with samples	Begin
9	11/07/2018	07:44:26	43°	18.7002'	N	20°	15.7998'	W	CTD with samples	Bottom
9	11/07/2018	08:48:27	43°	18.7002'	N	20°	15.7998'	W	CTD with samples	End
no number	11/07/2018	19:36:06	43°	8.32098'	N	20°	22.01118'	W	Speed Through Water Run	End Track
10	11/07/2018	19:42:31	43°	8.17914'	N	20°	21.29154'	W	Multibeam	Begin
10	11/07/2018	21:25:19	42°	57.95022'	N	20°	21.35292'	W	Multibeam	Course Change
10	11/07/2018	21:50:01	42°	57.75414'	N	20°	17.54694'	W	Multibeam	Course Change
10	11/07/2018	23:39:06	43°	8.16792'	N	20°	17.35482'	W	Multibeam	Course Change
10	12/07/2018	02:03:39	42°	57.42654'	N	20°	13.61364'	W	Multibeam	Course Change
10	12/07/2018	10:01:26	42°	56.70186'	N	20°	23.77518'	W	Multibeam	Course Change
10	12/07/2018	10:22:37	42°	54.22698'	N	20°	23.84748'	W	Multibeam	Course Change
10	12/07/2018	13:03:36	42°	54.29502'	N	20°	4.09296'	W	Multibeam	End
11	12/07/2018	13:17:42	42°	54.468'	N	20°	3.9321'	W	CTD with samples	Begin
11	12/07/2018	13:54:00	42°	54.46476'	N	20°	3.91404'	W	CTD with samples	Bottom
11	12/07/2018	14:53:09	42°	54.46224'	N	20°	3.93738'	W	CTD with samples	End
12	13/07/2018	11:26:51	41°	40.01844'	N	23°	1.76826'	W	Background sound	Bottom
12	13/07/2018	14:45:13	41°	35.62932'	N	23°	6.57426'	W	Bow thruster	Bottom
12	13/07/2018	08:06:22	41°	36.8415'	N	23°	5.58252'	W	CTD with samples	Begin
12	13/07/2018	08:43:51	41°	36.72018'	N	23°	5.64924'	W	CTD with samples	Bottom
12	13/07/2018	09:38:51	41°	36.48924'	N	23°	5.78868'	W	CTD with samples	End
12	13/07/2018	10:10:36	41°	36.37386'	N	23°	5.86914'	W	URN Buoy	Deployment
12	13/07/2018	15:07:59	41°	35.55624'	N	23°	6.5037'	W	URN Buoy	Recovery
12	13/07/2018	10:47:28	41°	36.14658'	N	23°	6.10182'	W	URN ISO RUNS	COMEX
12	13/07/2018	10:48:15	41°	36.23274'	N	23°	6.00582'	W	URN ISO RUNS	CPA
12	13/07/2018	10:49:04	41°	36.3276'	N	23°	5.90304'	W	URN ISO RUNS	FINEX
12	13/07/2018	13:13:23	41°	35.9433'	N	23°	6.249'	W	URN ISO RUNS	COMEX
12	13/07/2018	13:14:08	41°	35.85912'	N	23°	6.34806'	W	URN ISO RUNS	CPA
12	13/07/2018	13:14:55	41°	35.7693'	N	23°	6.45504'	W	URN ISO RUNS	FINEX
12	13/07/2018	13:26:22	41°	35.74878'	N	23°	6.5139'	W	URN ISO RUNS	COMEX
12	13/07/2018	13:27:08	41°	35.83302'	N	23°	6.41448'	W	URN ISO RUNS	CPA
12	13/07/2018	13:28:05	41°	35.93904'	N	23°	6.2895'	W	URN ISO RUNS	FINEX
12	13/07/2018	13:39:59	41°	35.90154'	N	23°	6.35454'	W	URN ISO RUNS	COMEX
12	13/07/2018	13:40:39	41°	35.82036'	N	23°	6.44316'	W	URN ISO RUNS	CPA
12	13/07/2018	13:41:28	41°	35.7204'	N	23°	6.55206'	W	URN ISO RUNS	FINEX
12	13/07/2018	13:54:51	41°	35.646'	N	23°	6.52044'	W	URN ISO RUNS	COMEX

Station list (continued)

Station number	Date	Time	Latitude			Longitude			Device name	Action name
12	13/07/2018	13:56:00	41°	35.73234'	N	23°	6.42066'	W	URN ISO RUNS	CPA
12	13/07/2018	13:57:23	41°	35.84034'	N	23°	6.3021'	W	URN ISO RUNS	FINEX
12	13/07/2018	14:05:05	41°	35.83338'	N	23°	6.3252'	W	URN ISO RUNS	COMEX
12	13/07/2018	14:06:21	41°	35.73456'	N	23°	6.44964'	W	URN ISO RUNS	CPA
12	13/07/2018	14:07:29	41°	35.64318'	N	23°	6.5649'	W	URN ISO RUNS	FINEX
12	13/07/2018	14:17:44	41°	35.58114'	N	23°	6.59268'	W	URN ISO RUNS	COMEX
12	13/07/2018	14:18:58	41°	35.67606'	N	23°	6.48792'	W	URN ISO RUNS	CPA
12	13/07/2018	14:20:17	41°	35.78436'	N	23°	6.36948'	W	URN ISO RUNS	FINEX
12	13/07/2018	14:29:35	41°	35.7756'	N	23°	6.42168'	W	URN ISO RUNS	COMEX
12	13/07/2018	14:30:35	41°	35.68602'	N	23°	6.52242'	W	URN ISO RUNS	CPA
12	13/07/2018	14:31:45	41°	35.58054'	N	23°	6.64212'	W	URN ISO RUNS	FINEX
13	14/07/2018	08:09:22	40°	30.6678'	N	25°	24.12798'	W	CTD with samples	Begin
13	14/07/2018	08:45:07	40°	30.6837'	N	25°	24.11364'	W	CTD with samples	Bottom
13	14/07/2018	09:32:31	40°	30.68724'	N	25°	24.11358'	W	CTD with samples	End