Centre for Environment Fisheries & Aquaculture Science

Cefas

RESEARCH VESSEL REPORT

RV CEFAS ENDEAVOUR
Survey: C END 07 - 2018

STAFF:

Name	Role	Cabin	Shift
Elisa Capuzzo	SIC	B1	Day
David Pearce	2IC / Mooring	C3	Day
Andrew Bodle	Multibeam	D2	Day
Eric Fitton	Mooring/Chem	C6	Day
Sophie Hare	Mooring	C5	Day
Stephen Woodward	Gliders	C8	Day
Tom Hull	Gliders	C1	Day
Fabio Campanella	Acoustic	B2	Day
Axayacatl Molina Ramirez	Mooring	C2	Day
Pip Simpson	Student	C7	Day
Martina Bristow	Student	D5	Day

DURATION: 7th May to 13th May 2018

MOBILISE: **LOWESTOFT**

DEMOBILISE: **LOWESTOFT**

OPERATION AREAS: North Sea

AIMS:

1. Service SmartBuoys at Dowsing, Warp and West Gabbard2 (SLA25G – 1.5 day);
2. Vattenfall Norfolk Vanguard: Waverider service, lander deployment, multibeam, grab and water sampling (C7311B – 0.5 day);
3. Vattenfall Norfolk Boreas: deployment of Waverider, lander, 2 guard buoys, multibeam, grab and water sampling (C7645B – 0.5 day);
4. AlterEco: deployment and recovery of gliders (Wave Glider, seagliders, Slocum Glider); zooplankton net hauls (C7114A – 3 days);
5. Service Waverider at Dowsing;
6. Service noise landers at Dowsing and Warp (SLA20A – 0.5 day);
7. Collection of zooplankton samples to test presence of microsporidia lineages in copepods;
8. Collection of zooplankton sample at West Gabbard for community composition analysis;
9. Integration of a Cefas water sampler with the Ferrybox system for the collection of nutrients and phytoplankton samples;

10. Collection of phytoplankton/chlorophyll samples to test for the presence of toxin producing phytoplankton.

SUMMARY:

The RV Cefas Endeavour sailed at about 02:00 (GMT) on Monday 7th May 2018 and steamed northward to Dowsing to service the SmartBuoy, Waverider and the 'noise lander'. After an operation's brief and toolbox talk with crew and scientists, sampling activities started with a CTD profile and water samples collection with the Rosette 'Sula'. The Dowsing SmartBuoy was recovered shortly afterwards (at 10:33), followed by recovery of the Waverider (at 11:30). A Master drill was carried out at 11:40.
The afternoon of the 7th was spent at the site, attempting to recover the 'noise' lander: the buffs and rope connected to the clamp (the preferable way of recovery) were no longer visible. Therefore, the acoustic release was triggered (which activates the release of buffs and rope from the lander to allow recovery), however, no signal was received from the acoustic release and the beacon on the lander. It was then agreed (after a further toolbox talk) to attempt recovery by grappling the cable which lays between the lander and the clump (see Figure 1), based on the known deployment positions. At the second attempt, the cable was grappled, followed by the recovery of the clamp (at 15:21), and the successful recovery of the 'noise' lander (at 15:34).
Instrumentation was then redeployed in the following order: 'noise' lander at 17:18, Waverider at 18:01, and SmartBuoy at 18:15; the new positions and deployment configuration are given in Figure 1.
A post-deployment CTD profile and sample collection with 'Sula' was carried out, followed by zooplankton sampling to test for presence of microsporidia in copepods. Weather conditions were excellent through operations, with light air and smooth sea. The Endeavour proceeded towards the area north of the Dogger Bank for the AlterEco work (objective 4), including deployment and recovery of gliders.
On Tuesday 8th May, a toolbox talk was carried out on deployment and recovery operations for Slocum Glider, seaglider and Wave Glider (Figure 2). The NOC Slocum Glider 345 ('Cabot') was then deployed successfully at 09:42. A CTD profile and water sample collection with 'Sula' where carried in proximity of the glider deployment for validation of the sensors on the glider. The NOC Slocum Glider 436 ('Stella') was recovered at 12:29, followed by the deployment of the UEA (University of East Anglia) seaglider 510 ('Orca') at 14:48, and deployment of the UEA seaglider 620 at 17:37. A post-deployment CTD profile with 'Sula' was carried out shortly afterwards with collection of water samples for salinity, nutrients, chlorophyll and suspended particulate materials concentration (at 17:55). All the CTD profiles carried out in the area north of the Dogger Bank showed vertical thermal stratification with a thermocline, and the presence of a deep chlorophyll maximum.
After a further toolbox talk, the Cefas Wave Glider 'Lyra' was deployed at 20:03 (on 8/5/2018).

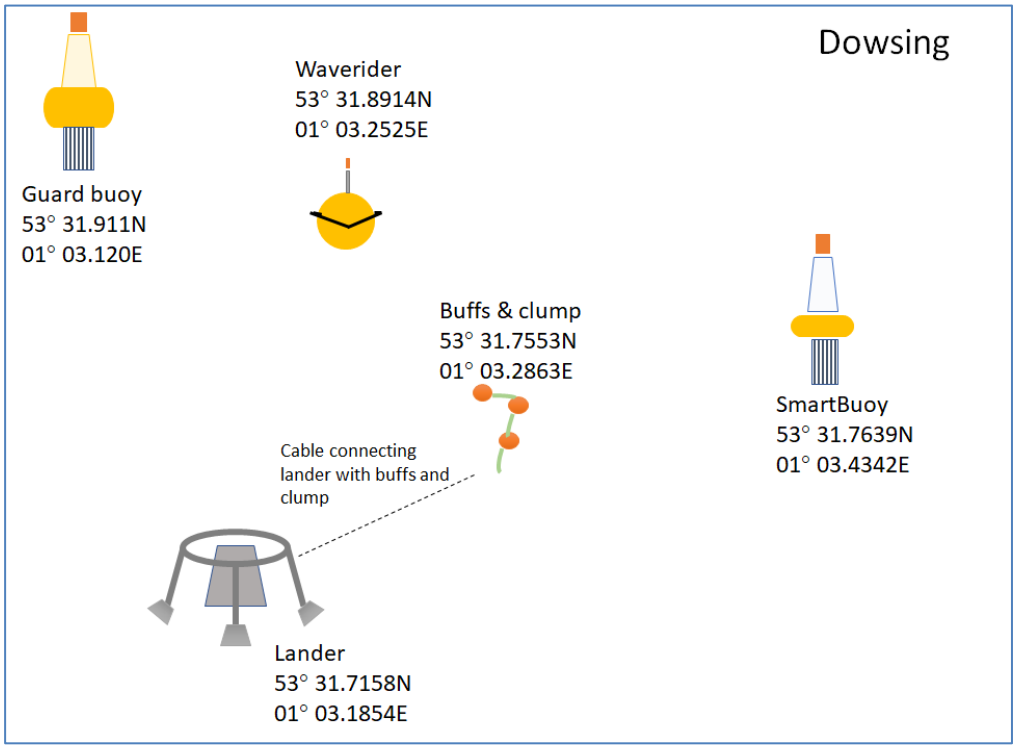

Figure 1. Schematic and coordinates of the deployments at Dowsing.

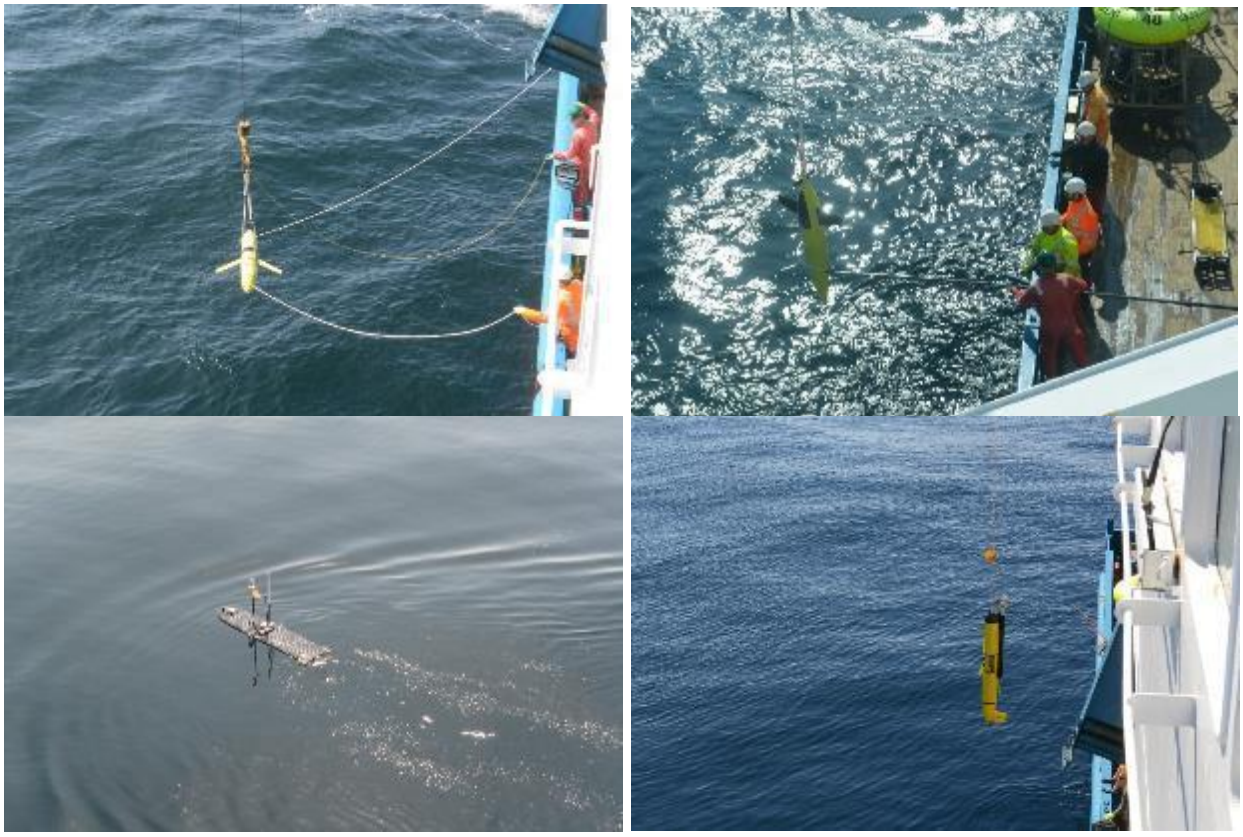

Figure 2. Clockwise from top left corner: deployment of NOC Slocum Glider, recovery of UEA seaglider, recovery of NOC Slocum Glider and deployment of Cefas Wave Glider Lyra.

For the remaining part of the evening and night (from 21:00 on 8/5 to 06:00 on 9/5), sampling for zooplankton was carried out along 'Lyra's route every hour, while CTD profiles and water sampling were carried out every 3 hours. The good weather and sea conditions (light airs and smooth swell) continued throughout the activities.

On the morning of the 9th May, from 07:00 (GMT) to 09:00 (GMT), the survey was suspended as the deck crew, together with the 2IC and the First Officer, were employed in an inventory check of the gear list for the operations at the Vattenfall sites. This resulted in a 2-hour delay on the planned work for the day under the AlterEco project. Operations were resumed with the recovery of the Cefas Wave Glider 'Lyra' (at 09:52), to carry out checks on the acoustic system with which 'Lyra' is fitted. Check completed, the Wave Glider was then redeployed at 10:27.

The NOC Slocum 352 (OMG1) was successfully recovered at 12:56, followed by the deployment of the UEA seaglider 579 ('Humpback') at 13:42, and a post-deployment CTD profile with the Rosette 'Sula', and water samples collection. After a short steam, the Endeavour returned following the course of 'Lyra', with hourly zooplankton sampling resumed between 17:30 to 21:30. CTD profiles and water sampling were carried out at 17:00 and 20:00.

Hourly zooplankton sampling along Lyra's route (as well as 2 further CTD profiles and water sampling) continued the following morning (10th May) from 05:30 to 11:00, until the RV started the steam southwards to the Vattenfall sites. A total of 40 zooplankton samples (20 with the 80 µm and 20 with the 270 µm mesh size net) were collected along Lyra's route, in addition to 8 CTD profiles, and water samples for analysis of salinity, chlorophyll, dissolved inorganic nutrient concentration and suspended particulate materials. A toolbox talk was carried out at 18:00, including all scientists and crew involved in operations at the Vattenfall sites, in preparation for the activities planned for the following day.

The Endeavour arrived at the site of Vattenfall Norfolk Boreas in the early hours of Friday 11th May (around 01:30). Multibeam transects were carried out in the area for assessing the sea floor in preparation for the lander deployment and were completed by 08:00. Gear was then deployed in the following order at the site: guard buoy GB1 (NBOWF GB1) at 08:05, Waverider (NBOWF DWR H) at 08:32, guard buoy GB2 (NBOWF GB2) at 08:59 and the lander (NBOWF AWAC) at 09:22. Activities at the site were completed with a CTD/Rosette profile (with collection of water samples for salinity and suspended solids), and 3 day-grabs.

After a 20-mile steam, the Endeavour moved to the Vattenfall Norfolk Vanguard site, where the Waverider (NVOWF DWR G) was recovered at 13:21. Multibeam transects were then carried out, between 14:37 and 16:29, to investigate the structure of the sea floor, where the lander (NVOWF AWAC) was later deployed at 16:51. The serviced Waverider (NVOWF DWR G) was then deployed at 17:39. As at the previous sites, a CTD/Rosette profile with water sampling and 3 day-grabs were carried out in the proximity of the lander. With operations completed around 18:30, the RV progressed towards the Warp SmartBuoy site.

Operations at the Warp site started on Saturday 12th May with collection of a zooplankton sample, followed by a pre-recovery CTD/Rosette and water sampling. High values of fluorescence (both from the Ferrybox fluorometer and the CTD/Rosette) and difficulties in filtering water samples signalled the presence of a phytoplankton bloom at the site. The bloom

appeared to not be limited to the area off the Thames but to extend also off the East Anglia coast as shown in a satellite image from NASA (Figure 3).

Figure 3. Satellite image of the Southern North Sea 09 May from NASA. Cod end of zooplankton 200 µm ring net at West Gabbard2 and CTD/Rosette profiles at Warp, during the phytoplankton bloom.

The Warp SmartBuoy was recovered at 05:38 and the new SmartBuoy was deployed shortly afterwards at 06:02, followed by the deployment of the 'noise' Microlander at 06:35 (Figure 4). Operations at the site were completed with a post deployment CTD/Rosette profile and water samples collection (07:42), before proceeding towards the West Gabbard2 SmartBuoy.

Samples for chlorophyll analysis and for testing for the presence of toxin-producing phytoplankton were collected from the Ferrybox flow through during the steam from Warp to West Gabbard2. The phytoplankton bloom extended also in this area as demonstrated by

the elevated fluorescence detected by instrumentation and difficulties in carrying out water filtrations. A CTD/Rosette pre-recovery was carried out at arrival at West Gabbard2 (13:07), followed by recovery of the SmartBuoy (13:46) and deployment of the new buoy (14:22). As in the previous days, operations commenced only after a toolbox talk between crew and scientists, on deck, and officers on the bridge.

After the post-deployment CTD/Rosette profile, samples for zooplankton analysis were collected with the 200 µm mesh size net, for analysis of zooplankton community and for investigating presence of microsporidia in copepods. At the end of each cast, the mesh was clogged with phytoplankton (likely *Phaeocystis*; Figure 3). Sampling activities continued in the evening with hourly sampling between 19:30 and 22:30 with the CTD/Rosette, in proximity of the West Gabbard2 SmartBuoy.

During the survey, a Cefas water sampler (integrated with the Ferrybox system) was tested for the collection of nutrients and phytoplankton samples, while the NOC sampler analyser was running measuring continuously nitrogen and phosphate concentrations from the Ferrybox flow through.

Weather conditions were excellent throughout the survey with sea height of 0.5 m and slight swell. The Endeavour returned to port in Lowestoft on the morning of the 13th May 2018 (07:30 pilot on board).

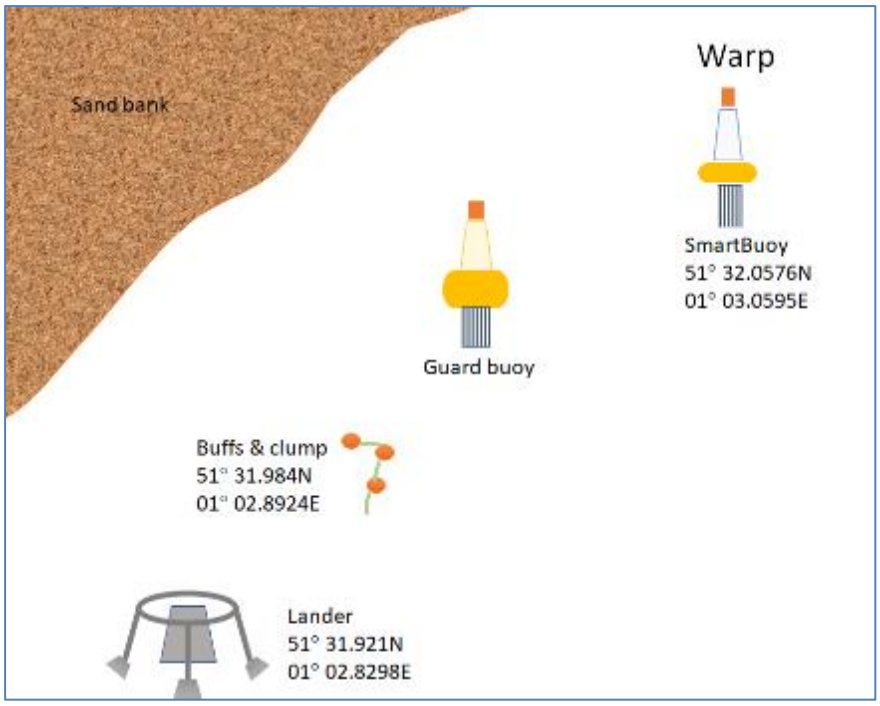

Figure 4. Schematic and coordinates of the deployments at Warp.

Elisa Capuzzo
Scientist in Charge
13/05/2018