



**Natural
Environment
Research Council**

(agenda item no.) **5**

NERC Cruise Programme Executive Board: October 2024

Author(s): [REDACTED]

2024/25 Marine Facilities Programme update

Purpose

1. To update the Board on delivery of the 2024/25 Marine Facilities Programme (MFP).

CPEB Terms of Reference

2. This paper relates to the following CPEB Terms of Reference:
 - Monitor the NERC-funded User costs associated with the Marine Facilities Programme and, when required, decide on the priority for programming events to best mitigate any science and financial risks

Recommendations

3. CPEB is invited to:
 - **NOTE** the updates and discuss any matters arising.

Timing

4. Delivery of the 2024/25 MFP (see Annex 1 and 2) is underway and approximately halfway completed, with all science activities broadly delivered as planned so far. A final update on 2024/25 will be provided to the Board in April 2025.

Broader considerations

Science activities – Discovery

5. Discovery started the year at refit in Rosyth, with the aid of additional project management support from the superintendents at NOC to keep to schedule, and a successful HVO trial enroute to Southampton. The BIOCARBON Spring cruise achieved all objectives; one of the accompanying ALRs was recovered due to a technical fault, meaning it would not complete its mission, and the crew acted swiftly to enable a helicopter medical evacuation to Iceland, with the individual making a full recovery.
6. Aberdeen was used as a port call [REDACTED], leading into the NC AtlantIS funded OSNAP and Darwin Mounds mooring cruise, with bolt on support for the RAPID evolution telemetry project. Good weather allowed contingency days to be used for additional science support.
7. NOC hosted 10 ambassadors and 25 senior diplomats in Reykjavik onboard Discovery for a tour and refreshments, which was well received. The following cruise was a barter for the

Netherlands (NIOZ-US OSNAP). [REDACTED]

[REDACTED]. All major objectives were met although the ship battled bad weather enroute to Halifax, Canada.

8. At the time of meeting, the Department of Fisheries and Oceans (DFO) and Natural Resources Canada (NRCAN) charter will be underway. Discovery will undertake a three-leg cruise spanning 77 days, encompassing the Eastern Canadian oceanographic, geologic and ecosystems autumn surveys. This is the fourth DFO charter and the second year of delivery between NOC and DFO/NRCAN under the five-year collaborative agreement.
9. A passage leg will relocate Discovery to Port Everglades, USA, for the RAPID west cruise in December 2024. Significant work has been undertaken to obtain permits, which are now granted for Bahamian waters; NOC and the Chief Scientist are still working with the US State department for clearances for US waters however, this is looking very positive.
10. Unfortunately, the Seafields charter, originally programmed for January 2025, has been removed from the programme. [REDACTED]
[REDACTED]
[REDACTED] NB this change will alter the User costs status for the programme, see section below. [REDACTED]
[REDACTED]
11. Consequently, Discovery will now passage across the Atlantic for 40 days alongside in Lisbon, Portugal; this was the optimum port for financial and carbon cost, as well as facilitating the ROV freight for the following cruise in Greece. NOC are unable to pursue any alternative science delivery opportunities during this alongside period, as the deadline for requesting diplomatic clearance has passed. Planning is underway for the following cruise, a Pushing the Frontiers funded activity using the ROV ISIS off the coast of Santorini, Greece, with no problems currently perceived.
12. ARGO Programme via UK Met Office are loading numerous floats (exact number TBC), to be deployed from RRS Discovery.

Science activities – James Cook

13. After successfully delivering SMARTEXII, asides from some challenges with AutoSub5, and with no issue from Greenpeace or delay from the Panama Canal, James Cook transited back to the UK arriving mid-April 2024 allowing timely delivery of the NMF GI Sismics suite trial. The primary objective of commissioning the new G2 series airguns was achieved, alongside proof of clustered airgun arrangements and dual gun series arrays. The trial also completed objectives to assist the planning and delivery of an EU funded grant, COSMOSS, scheduled in January 2025.
14. Two AtlantIS funded (NOC NC) activities were delivered – the annual PAP cruise with Whittard Canyon mooring servicing bolt-on. All objectives were met aside from recovery of the lost mooring rope and sensor frame; while disappointing, the science team recognised that every effort was made to retrieve it. Implementation of the long-awaited Global Oceanics pCO₂ system, new to the NMEP following MFAB support, was well received and was run alongside a user supplied pCO₂ system for data comparison.
15. The James Cook delivered a charter for the UK Met Office to service their meteorological buoy network in the Bay of Biscay and Celtic region. All buoy sites were successfully attended and

completed however, an equipment failure required the K1 buoy and mooring to be recovered shortly after deployment; NOC extended the charter by a day to accommodate this.

16. [REDACTED] led to the decision to refit the James Cook alongside NOC in Southampton, to mitigate science delivery risk. Thanks should be paid to all those who were instrumental to ensuring all key objectives of the refit were met, despite the increased workload, including the Captain and crew, NOC superintendents, estates and logistics teams, and the local contractors.
17. Post refit trials were undertaken from Southampton to Nuuk, Greenland, where on arrival NOC had organised a series of engagement events, in collaboration with the British Embassy in the Kingdom of Denmark. The ship hosted round table discussions with Greenlandic science community and the Government of Greenland, and 160 members of the Greenlandic public for a tour. A UK-Greenland science exchange symposium took place in the local research institute. James Cook also participated in a day of emergency exercise and damage control training with the Danish Naval vessel TRITON, with tours of each ship exchanged by the crew.
18. Leaving Nuuk, the ReBELS-1 cruise (Pushing the Frontiers funded, rescheduled from 2023/24 following science party equipment delays) was successfully delivered, ending in Reykjavik, Iceland with a final Arctic engagement event. 35 Icelandic marine biology students and their teachers had a tour of the James Cook organised with the British Embassy in Iceland.
19. At the time of the CPEB meeting, the BIOCARBON autumn cruise will be drawing to a close; planning for the activity went well and there are no expected challenges for delivery. The cruise will finish in Cardiff where the ship, crew and BIOCARBON team will support NERC's 'Explore our Planet' showcase, in collaboration with NOC and Techniquet. This showcase was originally planned for 2020 but understandably delayed due to the pandemic.
20. Following the showcase, NOC have secured a charter in Cardiff Bay with Bad Wolf Productions using the James Cook as a set for a new BBC environmental drama. The crew will remain onboard for filming from Cardiff to Southampton. Once in Southampton, the James Cook will take advantage of a 30 day alongside period to fit a new ballast water treatment plant (unable to be fitted in the refit period), deliver numerous outreach and engagement events, and mobilise for the following two cruises.
21. The PML NC funded AMT cruise will be delivered as an 'underway' (i.e. no stopping, using underway data only) activity whilst relocating the James Cook from Southampton to Buenos Aires, Argentina. The ship will then deliver a Future Leaders Fellowship cruise, COSSMoSS, using the newly commissioned NMEP seismic equipment and an ALR to study physical oceanography on the Argentinian shelf. Non-NERC UKRI funded cruises such as this currently require NOC to contract with the awarded institution (Exeter in this case), which presents significant additional workload and other challenges – this will be discussed further at CPEB in a dedicated agenda item. NMF have already undertaken a port appraisal and embassy visit in Buenos Aires to mitigate risks of diplomatic clearance being granted and are in discussion with the embassy regarding engagement activities, particularly as the visit coincides with the 200th anniversary of the UK & Argentina Declaration of Friendship Treaty.
22. The James Cook's final cruise will deliver for a Pushing the Frontiers funded project, CarTRidge, sailing from Rio de Janeiro, Brazil to Walvis Bay, Namibia, and studying carbon export driven by internal tides over the mid-Atlantic ridge. Two Slocum gliders will be deployed and recovered within the cruise to augment the ship-based measurements.
23. In the latter half of the programme, the James Cook will deploy 30 floats for the ARGO Programme via UK Met Office, for the UK, USA and Germany.

Science activities – Sir David Attenborough

24. Since the last CPEB meeting, the SDA completed last call at the island stations and Polar Code training for the crew at Rothera, departing the Falkland Islands in mid-May and arriving back at Harwich in mid-June 2024. Whilst in Harwich BAS facilitated a family day and offload period before moving the vessel to Rosyth for refit and mobilisation for the following science cruise.
25. During the 2023/24 Antarctic season, SDA deployed six floats for the Argo programme and Met Office, and supported a number of CASS (Collaborative Antarctic Science Scheme) requests around the larger marine science activities.
26. Running July-August 2024, Kang-Glac (a Highlight Topic funded grant) was SDA's first science cruise in Arctic waters, having waited several years for delivery. Kang-Glac is a geology-heavy multidisciplinary project assessing marine-terminating glacier change in Greenland and its impact on marine productivity. The Erebus workboat was used to swath fjords and deploy the SAMS operated AUV Gavia; the latter completed 13 successful missions, totalling over 28 hours of on-mission time, 120 km of distance covered, and the deepest ever dive (for this AUV) to 435 m. Helicopters from Air Greenland were run from the helideck to take field parties on to shore. This was a highly complex cruise with coring overnight and helicopter, workboat and on-ship work during the day, with the ship carrying a full complement of marine and field scientists.
27. Following a second refit period in Rosyth, at the time of the meeting SDA will be at Harwich for loading prior to transiting south for the Antarctic season. The first marine science activity, for the Strategic Research funded Clouds programme, will take place during the island first call activity in Nov-Dec 2024, efficiently aligning logistics calls with science delivery.
28. In January 2025, the Erebus workboat will deliver the Pushing the Frontiers funded SICLING project whilst SDA is alongside in Rothera, relieving some science pressure from the ship itself. Shortly afterwards, SDA will deliver a combined marine science cruise for the BAS NC BIOPOLE and Western Corebox projects, before demobbing in the Falklands ahead of island last calls.

Science activities – third party ships

29. A Pushing the Frontiers project, IMPULSE, was successfully bartered onto a US vessel in August 2024. Securing a time slot for the cruise that was available on a US vessel (favoured for the seismic capability available), that enabled use of ocean bottom seismometers from NERC's Geophysical Equipment Facility, and importantly that met the science team's requirements (including to avoid poor weather) proved difficult and took several years of effort between the UK and US teams. Despite some poor weather, delivery went to plan with the majority of instruments returning usable data and the data quality being described as good / excellent.
30. Efforts to charter the RV Legend in Taiwan for a Standard Grant funded project in the Gaoping Canyon unfortunately fell through. Geopolitics (Chinese war ships positioning over the sampling sites post Taiwan's election) impacted in-country relationships, the cost of the activity and the ability to sample as required, thus leading to the decision to stop and consider a plan B. Working with the relevant NERC funding teams, the project has been rescoped with delivery in a new location, Mississippi Canyon, USA, being planned for 2025/26.

Science activities – autonomy

31. Glider deployments are busy in 2024/25. For example, and aside from those deployed as part of science cruises, as part of the NOC NC funded Atlantis project, SAMS deployed NMEP gliders on NMF's behalf for the Ellet array. The second year of glider deployments for the NERC funded Pelagio are also underway in the North Sea. Gliders deployed for the BIOCARBON project from the Discovery in June will be recovered by the James Cook in September. Three gliders for the ReBELS project will be shore deployed at the end of the programme year, in March 2025, from Greenland and recovered on the ReBELS-2 cruise in August 2025.
32. ALRs were deployed from the Canary Islands in spring 2024 as part of an EU sensor integration project; the platforms crossed eddies (diameter between 100-300 km), flew to the upwelling in the African coast and returned into Gran Canaria.
33. Much of the autonomy in 24/25 has also been associated with vessel activity. In addition, for the BIOCARBON project and enabled by additional funding from the FMRI programme to demonstrate shore-based deployment and ALR capability, two ALRs were deployed from Iceland to Scotland. ALR4 made the transit successfully, while ALR6 required recovery from RRS Discovery when in the area. This marks the first deployment of its type for a long range scientific AUV with ALR4 being at sea for over two months covering 2500 km, providing evidence of the potential to reduce ship reliance. Thanks are sent to the Embassy in Iceland and the Icelandic Coastguard, as well as Sound of Harris Shellfish for hosting the ALR recovery team on the Isle of Harris, for their support with these deployments from their shores.

Areas to note

34. The User costs for the 2024/25 MFP on the NOC operated vessels are projected to be affordable, previously assuming use of £706k of the MGO contingency budget (£1195k total). However, the loss of the Seafields charter will add an alongside period for the vessel with some fuel use, [REDACTED]. Final figures are being calculated for this change but the programme is still considered affordable within the boundaries of the MGO contingency.
35. The average price of fuel across the NOC ship programme is currently £695/tonne, which is relatively low compared to the previous 2-3 years. All User costs are monitored every 6 weeks by the Ship Model User costs Group (SMUG), with forecasted expenditure allocated to relevant NERC budgets (e.g. Discovery Science, Strategic Research) and included in finance forecasts. SMUG will continue to monitor affordability of the Programme and update CPEB at the Spring 2025 meeting (or before if affordability changes).
36. NMF's [REDACTED] from November 2024. Following a successful recruitment process, [REDACTED] will backfill the role, bringing much experience and knowledge.
37. Following successful trialling of low carbon hydrotreated vegetable oil (HVO) on all three vessels, teams have been seeking opportunities for funding to allow HVO use in 2024/25. In August, £1.1m of dedicated decarbonisation funding became available ([REDACTED] from MRC) and has been awarded to NOC and BAS to fund the differential cost of HVO from MGO where available in 2024/25.

Next steps

38. NERC Marine Planning, NMF and BAS ship operations will continue to work together, as per normal process, to monitor any delivery risks to the remainder of the 2024/25 Programme. A final update for the year will be provided to CPEB at the April 2025 meeting, with any unexpected challenges/risks to delivery raised with NERC Directors at the earliest convenience.

Annex 1. The 2024/25 Marine Facilities Programme on the RRS Discovery, RRS James Cook, third party ships and autonomous deployments
NB this screenshot is from the MFP website

