

The logo for the National Oceanography Centre, featuring a square with a white top half and a blue bottom half, with the text "National Oceanography Centre" in black on the blue background.

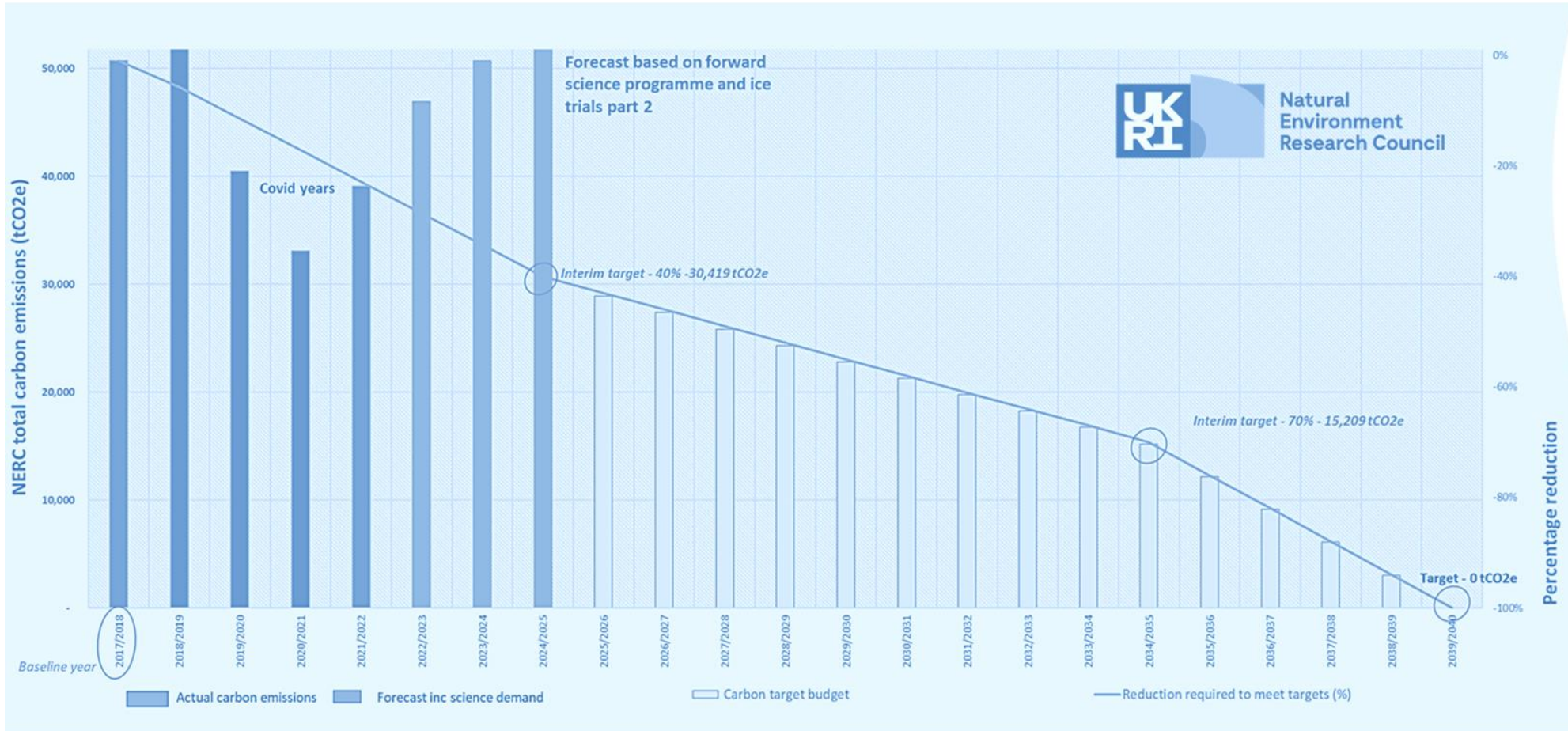
National
Oceanography
Centre

MANAGING AUTONOMY IN THE MFP

ELLA DARLINGTON

ELEDAR@NOC.AC.UK

BUILDING A NET ZERO OCEANOGRAPHIC CAPABILITY



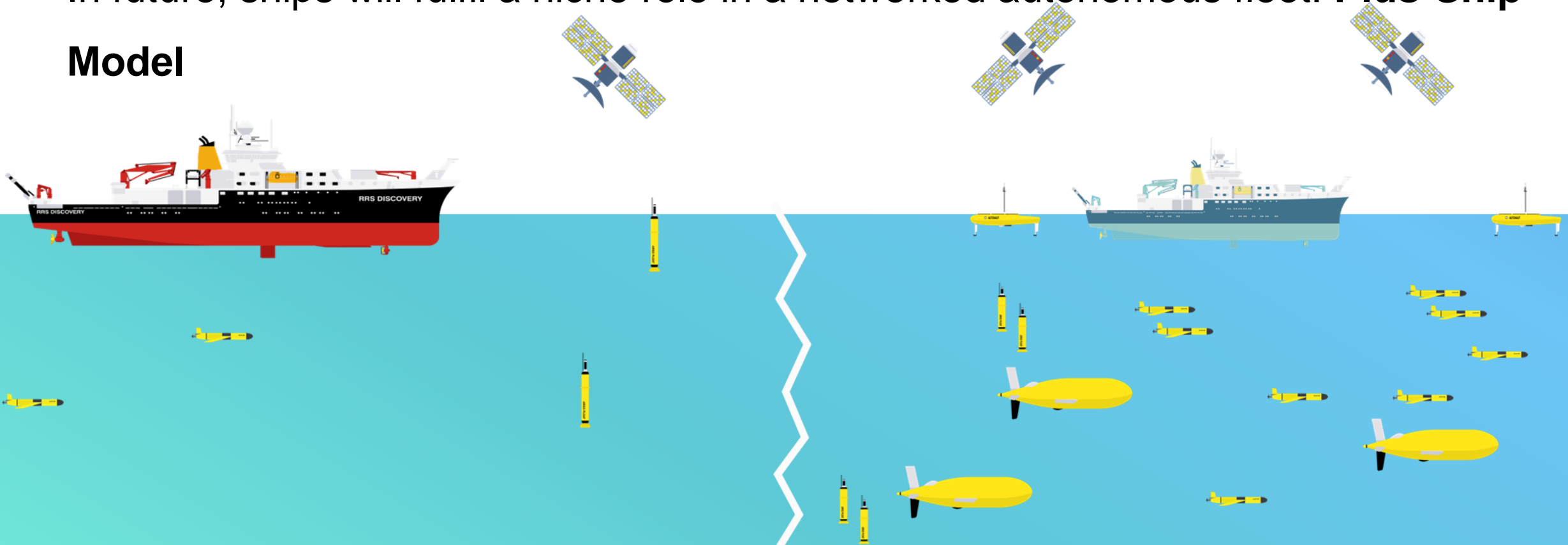
NEW TECHNOLOGY NEW TECHNIQUES

THE FMRI PROGRAMME WILL DELIVER
NEW TECHNOLOGIES TO CREATE A
SUSTAINABLE AND INCLUSIVE RESEARCH
ENVIRONMENT THAT ENABLES NEW AND
DIFFERENT SCIENCE.



Ship+ → +Ship

- Today, autonomy augments conventional, ship-based deployments: **Ship-Plus Model**
- In future, ships will fulfil a niche role in a networked autonomous fleet: **Plus-Ship Model**



AUTOSUB LONG RANGE (ALR)

Long Range MAS platforms can be in the water for weeks, months or even a year providing temporal coverage not typically available with a conventional research ship

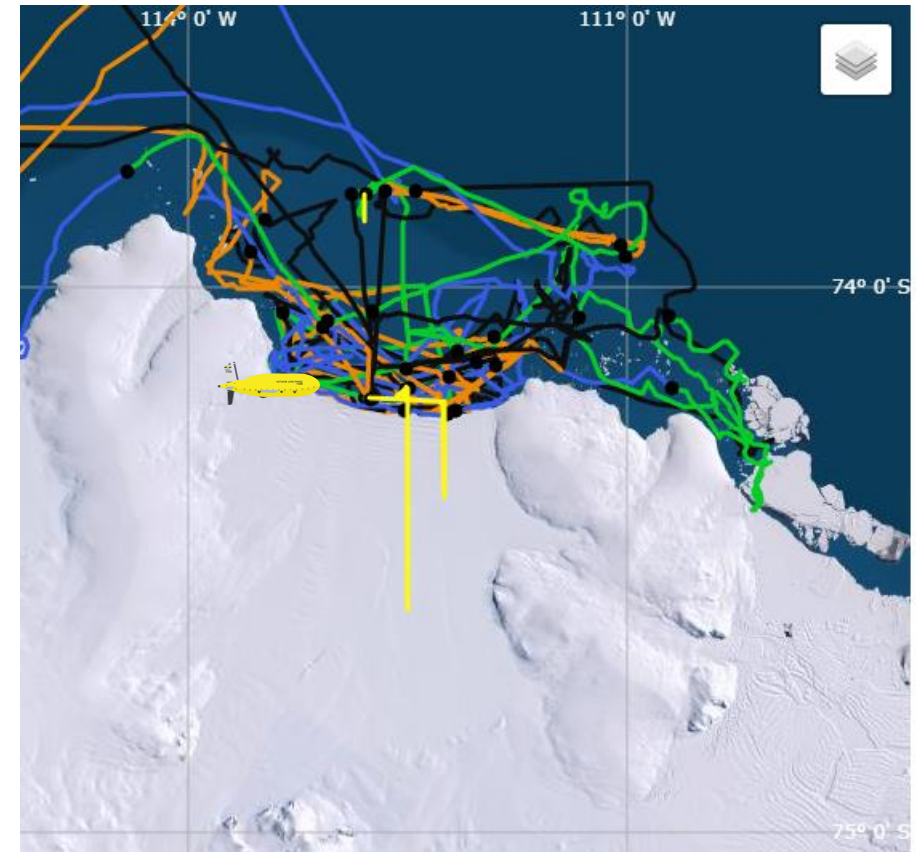
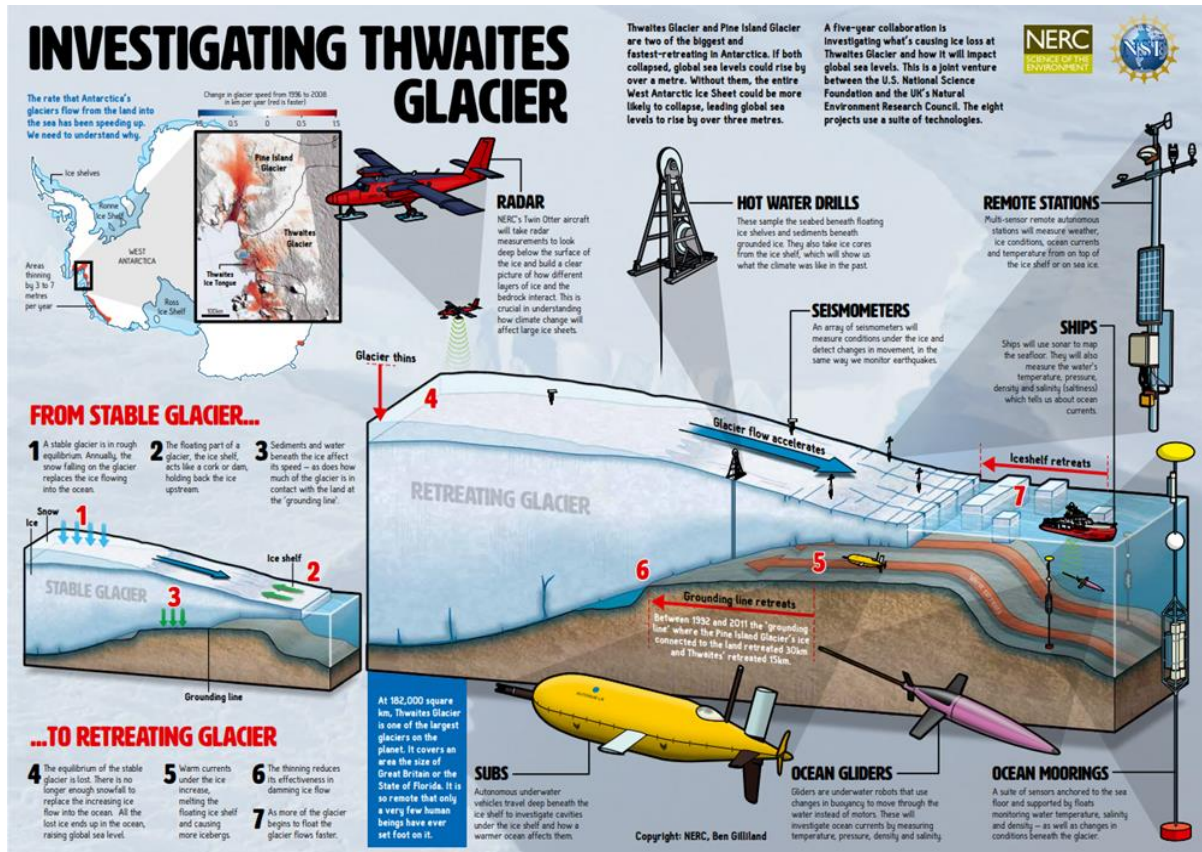
- Long range platforms as part of a NZOC / FMRI Capability
- Developed and built in-house at NOC
- Shore launch / ship launch / vessel of opportunity
- Fleet of six ALRs (funding granted for another 4 to be built)
 - 3 x 1500 m (ALR1500), 3 x 6000 m rated (ALR6000)
- Deployments so far from 2022
 - [TARSAN: Under the Dotson Ice Shelf](#)
 - [Oceanids Sensors: DY149 Southwest Approaches](#)
 - [Long Distance Proving Trial: 2000 km from Plymouth to the Shelf break and back again –capacity for 4000 km](#)
 - [DY152: Benthic Imaging in the Greater Haig Fras and South West Deeps \(East\) MPA](#)



ALR UNDER ICE – DOTSON GLACIER 21/22

Multi-day deployment of ALR1 from the Nathaniel B Palmer under Dotson Glacier as part of TARSAN International Thwaites Glacier Collaboration

Longest track was 40 km in under the ice flying at circa 100 m altitude



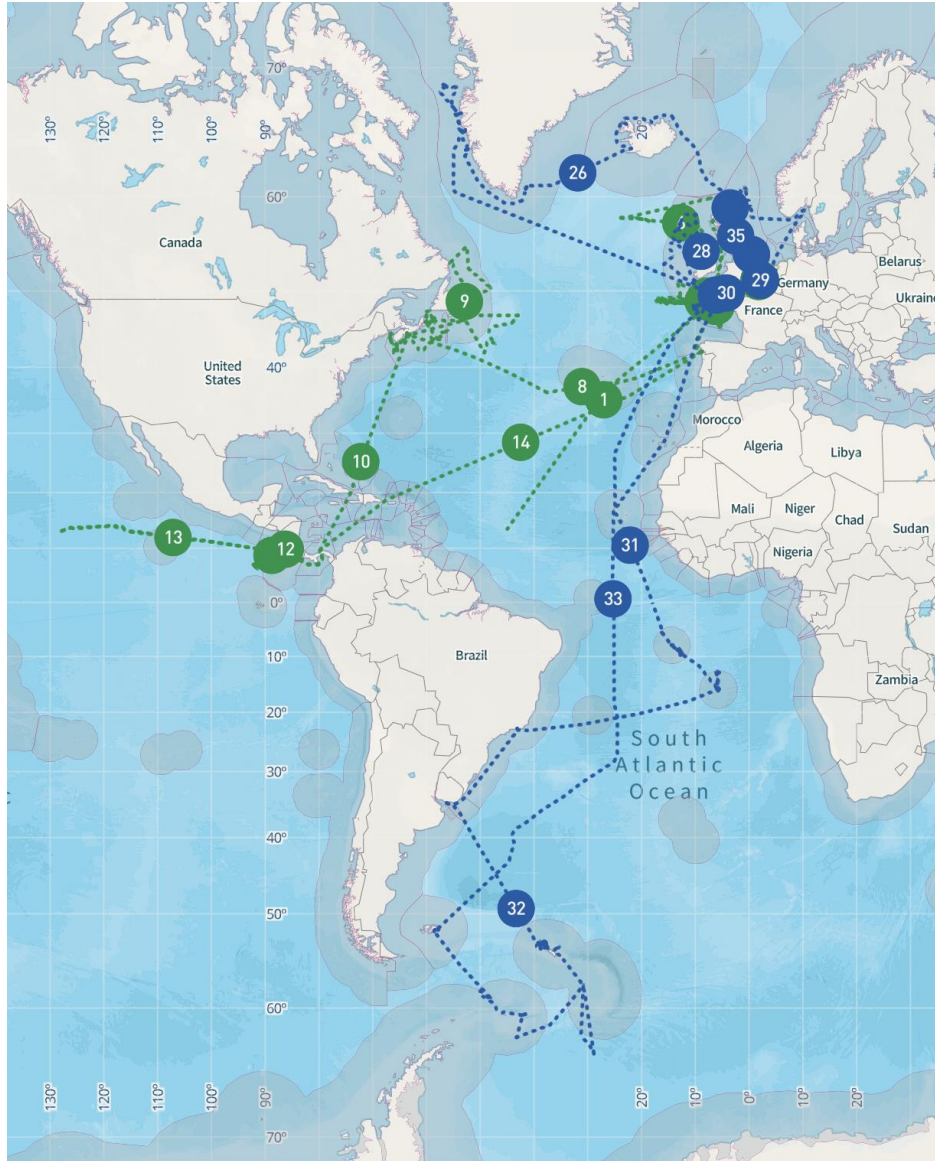
CURRENT DEPLOYMENTS

- Currently have 35 gliders, 4 ALRs and the National Marine Equipment Pool
 - Autonomous platforms are at full capacity until end of **2025**
 - Autonomy changes the dynamics of scheduling...
- Deployed Ship 1, recovered ship 1
 - Deployed Ship 1, recovered ship 2/3
 - Deployed from shore, recovered from ship
 - Deployed from ship, recovered from shore

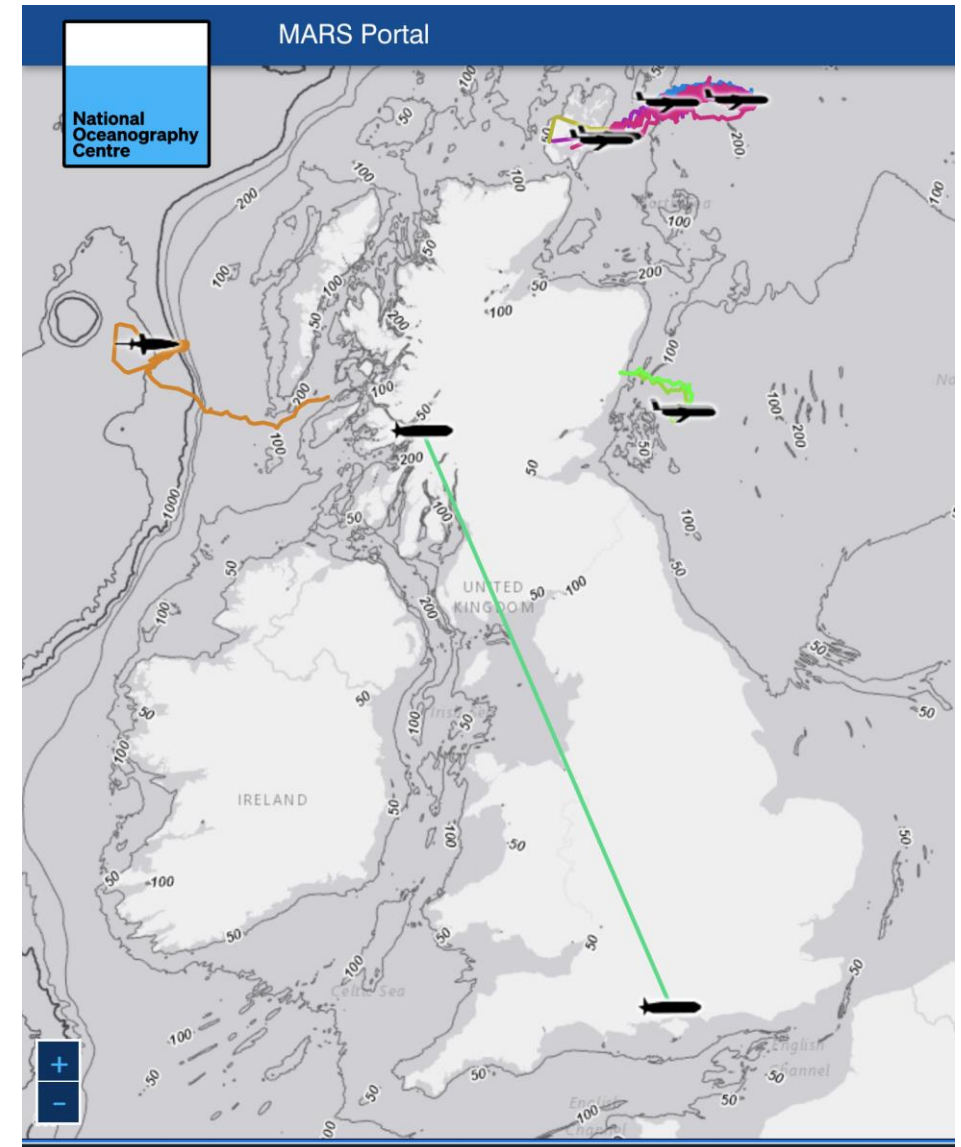


It gets
COMPLICATED!!!

INTEGRATING WITH THE MFP

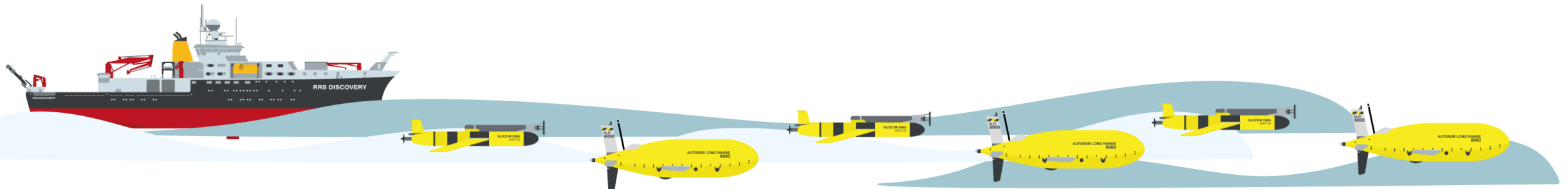


- Ship track (James Cook and Discovery) 22/23 & 23/24
- Current autonomous deployments
- Assets managed in the MFP
- ‘programmed in the MFP’
- Required more links!



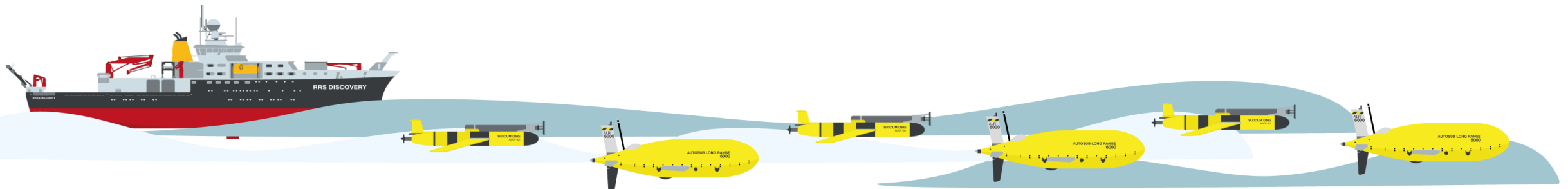
MANAGING COMPLEX ECOSYSTEMS

- In a world where we have...
 - XX ships
 - 400 gliders
 - 50 ALR's
- Autonomy requires separate workflow (ADF)
 - Many similarities to SME e.g. MSR / dip-clear
 - Differences
- LOGISTICS is vital
 - Integrating part of the IMS system into Project Management
 - Export licenses!
- SME and ADFs need ability to be linked
 - Manage deployment / recovery mechanisms
- Personnel Management
 - Maintenance, deployment, ship time, piloting...



MANAGING COMPLEX ECOSYSTEMS

- In a world where we have...
 - XX ships
 - 400 gliders
 - 50 ALR's
- Manage multiple users using the same asset
 - Use AI to best determine which asset, sensor fit, and when sensors need to be active
 - Which vessel is best placed to deploy / recover
 - Are there vessels nearby with capability for emergency recovery
- Highlight where capacity is available
 - Specific asset availability
 - OR – capacity to turn sensors on, for existing deployments
- Automated data ingestion into the data centre's
 - Improve access – *Findability, Accessibility, Interoperability, and Reusability (FAIR)*

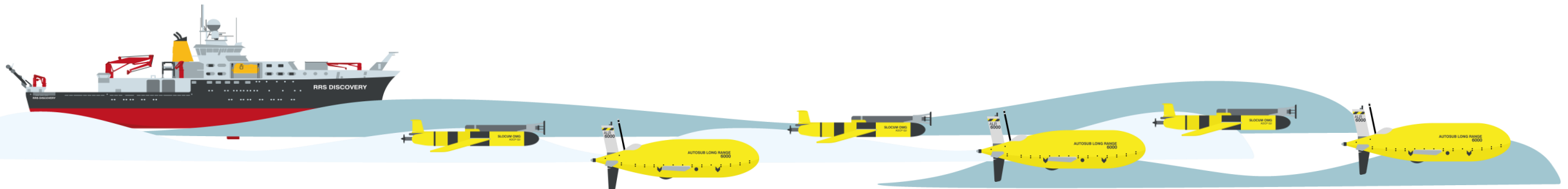


COMMUNITY COLLABORATION



TO GET THE MOST OUT OF AUTONOMY...

1. Few large scale expeditions, to numerous smaller deployments
2. Coordination and effective project management
3. Logistics plays a key role
4. Best placed as part of an integrated programme with vessels
5. Economies of scale
6. Effective use of wider marine assets from the international research community
7. Transparency – increased access and opportunity
8. Integrate data management from the planning stage



The logo consists of a white square with a black border. The text "National Oceanography Centre" is centered within the square in a bold, black, sans-serif font. The background of the entire image is a blue wavy pattern representing water.

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Oceanography
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EMPTY CABINS



- Find A Science Berth (FASB)
 - Looked at ways we could advertise available berths
 - No participant funding allocated, but helps with widening opportunity
 - Not yet live, caught up in assessment process of eligibility

MFP | Portal Eleanor Darlington

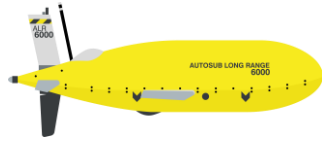
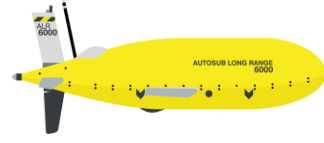
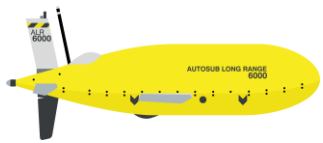
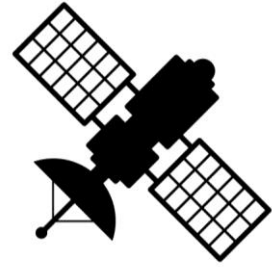
Programme My Schedule Training & Certificates My Profile

HYBRID TIMELINE **TABLE** MAP SHIP SCHEDULE Ships Today Period: 01/01/2023 - 01/01/2024 12 Months

Code	Application Name	Scientist	Date ↓	Ship ↑	Departure Port	Arrival Port	Location	Available Berths		
Ship: Discovery										
DY157	AMT - The Atlantic Meridional ...	Andy Rees	21 Feb - 30 Mar 2023	Discovery	Port Stanley	Southampton	atlantic ocean		synopsis	Apply
DY147	Passage ESSCT > GBSOU	Eleanor Darlington	8 - 14 Jun 2023	Discovery	To be confirmed	To be confirmed			synopsis	Apply
DY158	POETS WCB 22/23 + SCOOBIE...	Ryan Saunders	22 Dec - 29 Jan 2023	Discovery	Montevideo	Port Stanley	Scotia Sea, South Atlantic		synopsis	Apply
	SOG SEDIMENT TRAP MOORI...	Penny Holliday	21 Feb - 30 Mar 2023	Discovery	Port Stanley	Southampton	Atlantic-southern oligotrophic gyre		synopsis	Apply
Ship: James Cook										
JC228A	MoHole Part 2- ASUB6000 and...	Ingo Grevemeyer	13 - 22 Jan 2023	James Cook	Puerto Caldera	Puerto Caldera	Eastern Pacific offshore central America	32	synopsis	Apply
JC228	MoHole to Bending Faults	Ingo Grevemeyer	6 Dec - 9 Jan 2023	James Cook	Puerto Caldera	Puerto Caldera	Eastern Pacific offshore central America	32	synopsis	Apply
JC241	NERC Highlight Topic Deep-Se...	Daniel Jones	5 Feb - 26 Mar 2023	James Cook	Puerto Caldera	Puerto Caldera	Clarion-Clipperton Zone, Pacific	32	synopsis	Apply
Ship: Third Party Ship										
RAPID West ...	RAPID West (Oct 2022)	Ben Moat	21 Jan - 12 Feb 2023	Third Party Ship	Port Everglades	Port Everglades	Subtropical Atlantic		synopsis	Apply

Added in Programme Construction

REMOTE EXPEDITIONS - FUTURE



- Increasing satellite bandwidth will increase opportunity to engage with expeditions remotely
- Requires ship side infrastructure
 - Conferencing facilities
 - VR headsets (?)
 - Organised scheduled with those working remotely
- Requires shoreside infrastructure
 - Conferencing facilities
 - 24/7 work schedules
 - Piloting
- Progress to Net Zero
 - Less people onboard = less flights
 - Cabin space may be at a premium in the future

FOOD FOR THOUGHT

- How to manage...
 - Bad weather
 - Change in ship usage
 - Broken down equipment
 - Time pressures onshore e.g. caring responsibilities, routine work, shift pattern of the vessel
 - Connectivity issues onshore
 - Connectivity issues offshore
 - Exciting data leading to changing plans
 - Etc, etc



The revolutionary visionOS features a brand new three-dimensional interface that users can magically control with their eyes, hands and voice.

Cruise of the future?

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