

NET ZERO  
OCEANOGRAPHIC  
NZOC CAPABILITY

NEW TECHNOLOGY  
NEW TECHNIQUES

# Upscaling Autonomy Working Group

Webinar

Prof. Mark Inall, NOCA Chair



Natural  
Environment  
Research Council



National  
Oceanography  
Centre



# Background

- The drive to reduce global carbon emissions will transform how we conduct research expeditions and see changes to the UKRI/NERC ships and ship designs for the future.
- As detailed in the 2021 [NZOC: Net Zero Oceanographic Capability Summary Report](#), increasingly, we will depend upon the use of autonomous platforms and sensors to deliver world-class marine research.
- The Steering Board initiated a joint working group between the NOCA, Challenger Society, Marine Facilities Advisory Board and the Natural Environment Research Council called the **‘Upscaling of Autonomy Working Group’ (UAWG)**.

# Objective of the UAWG

To produce a report for the community, aimed at NERC, setting out what upscaling could look like, distributed across the UK with due regard to necessary sensor development beyond the current possible.

# Volunteer Opportunity

- The NOCA Board sought expressions of interest (EOI) for five volunteer members of the UAWG.
- The opportunity was open to anyone in UK with relevant experience.
- The Board was keen to hear from representatives from UK organisations with autonomous fleets (e.g. the British Antarctic Survey, the University of East Anglia, the Scottish Association for Marine Science, and the Plymouth Marine Laboratory).

# UAWG Membership

## **Chair**

Professor Mark Inall, Scottish Association for Marine Science

## **Ex-officio**

Professor Mike Meredith, President of the Challenger Society

Professor Carol Robinson, Chair of the Marine Facilities Advisory Board

## **Members**

Dr Rob Hall, University of East Anglia

Professor Kerry Howell, University of Plymouth

Alex Murphy, British Antarctic Survey

Dr Tim Smyth, Plymouth Marine Laboratory

## **Advisors**

Dr Maaten Furlong, Associate Director, National Marine Facilities, National Oceanography Centre

Dr Matthew Palmer, Digital Science Lead, Plymouth Marine Laboratory

Leigh Storey, Senior Responsible Owner NZOC, NERC

# UAWG Contacts

**Professor Mark Inall, UAWG Chair**

[mark.inall@sams.ac.uk](mailto:mark.inall@sams.ac.uk)

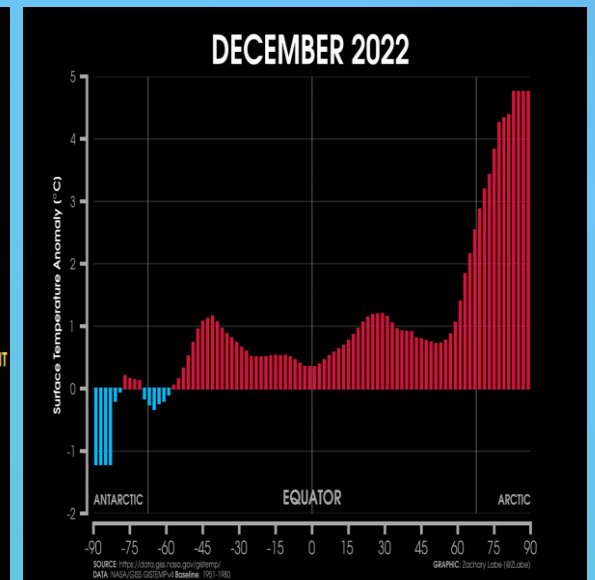
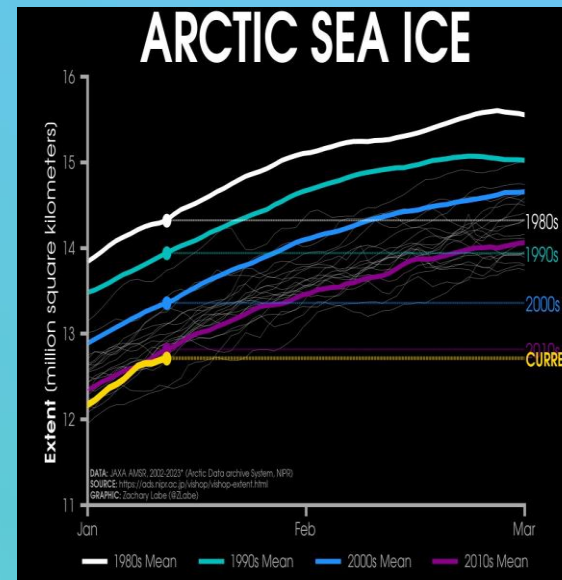
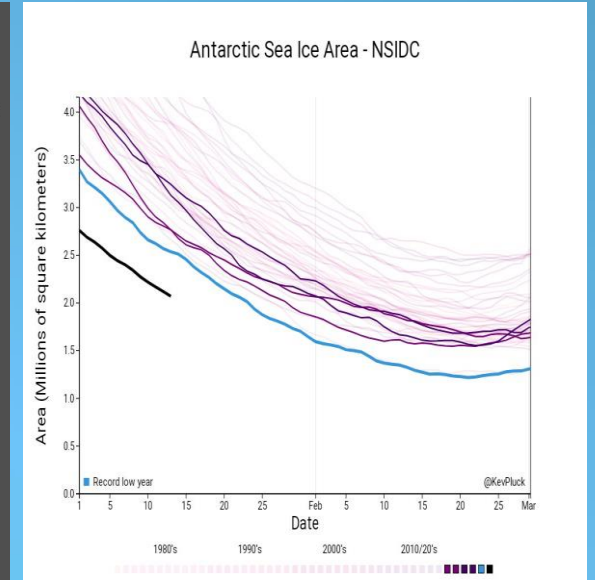
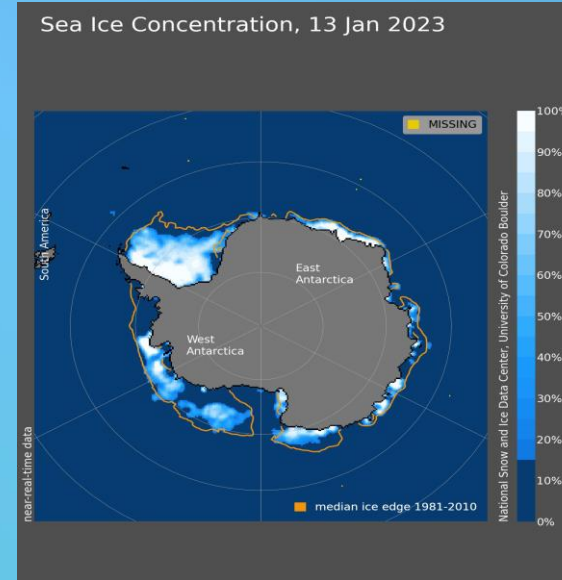
**Jackie Pearson UAWG Secretary**

[jfpea@noc.ac.uk](mailto:jfpea@noc.ac.uk)

**Dr Kristian Thaller Programme Director (NZOC)**

[kthall@noc.ac.uk](mailto:kthall@noc.ac.uk)

NZOC is founded upon two key precepts: there is an imperative to measure the ocean in ever greater detail if we are to understand, predict and mitigate the catastrophic changes we are precipitating; and there is a requirement to be part of the solution whilst we do it.

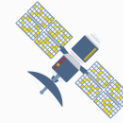
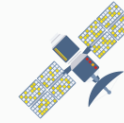
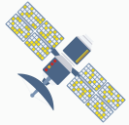




# Transitional phases to +ship, zero carbon model

2020 SHIP+ MODEL

2040 +SHIP MODEL



Phase 1 -  
autonomous  
platforms

Phase 2 -  
sensor dev &  
integration

Phase 3 -  
scaling up of  
autonomy

Phase 4 -  
'green' ship  
fuels





# Endurance & Capability

ALR4 was deployed South of Plymouth Breakwater 11

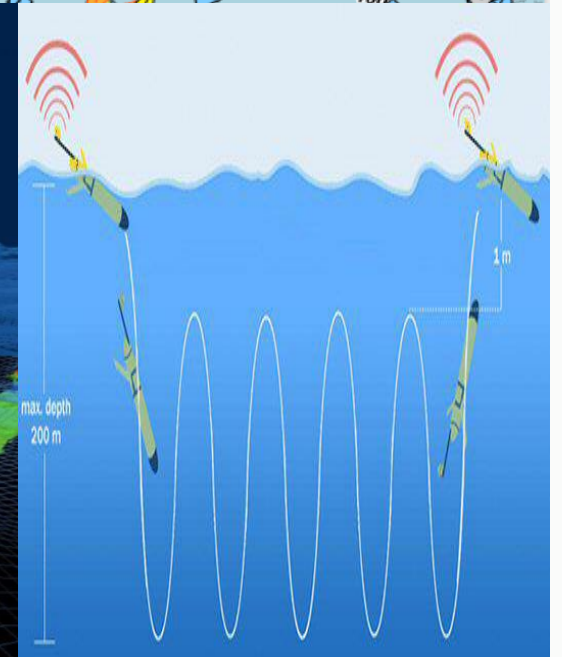
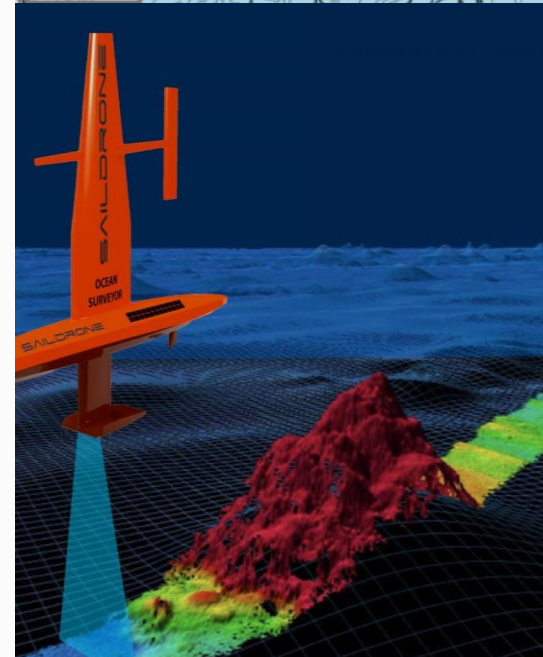
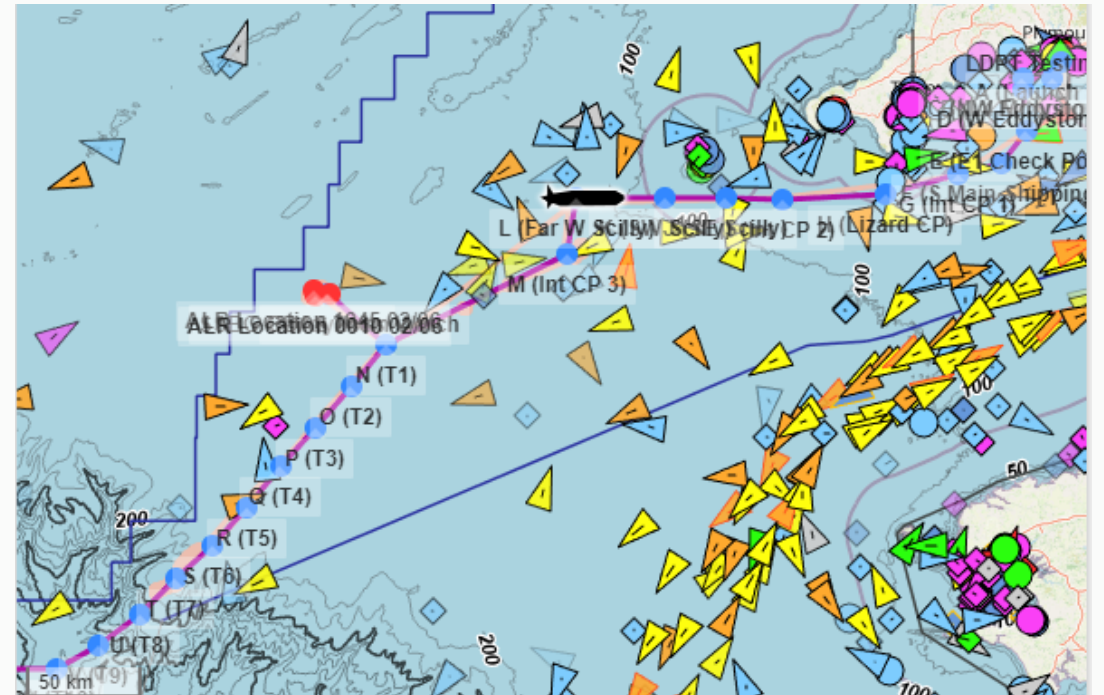
May and recovered 13 Jun

Total Distance Travelled circa 2000km

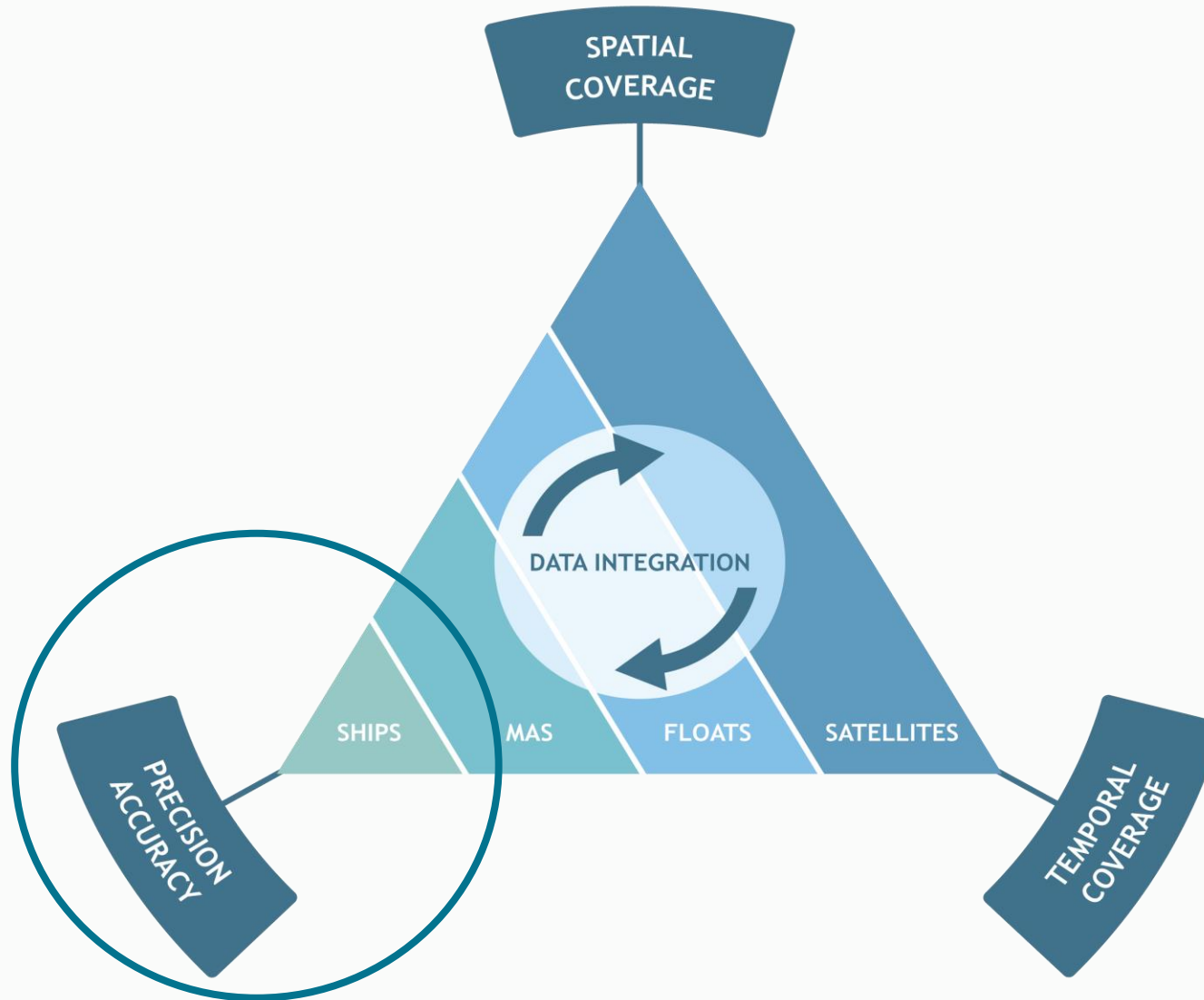
Total Energy Used 40kWh (Out of 74kWh installed)

Sensor Fit:

- An upwards and downwards Nortek 500kHz ADCP, A Seabird 52MP CTD with Seabird 43F DO, NOC pH LOC, Seabird SeapHOx, Wetlabs CDOM Fluorometer (ECO-FLCDRTD), 4000m range echosounder



# Mission Planning & Data Integration



# LRI, delivery of capability & its use

## LRI

- What is Large Research Infrastructure? - easy if a ship cos its 'large' and easily identified
- What is in the National Marine Equipment Pool? - does the introduction and scaling up of MAS change this?
- How might industry affect how we think about LRI?

## Delivery of Capability

- Maintenance
- Operation
- Technical advice
- Development
- Innovation
- Shore infrastructure
- Regulation/Compliance
- National collaboration
- International collaboration

## Use of NZOC

- How to fund?
- Rules on access and prioritisation
- Visibility and availability
- Data management
- Data processing
- Review & VFM (CPRG)
- Community input (MFAB)
- Virtual science parties & data access

# MFP & planning

The screenshot displays the MFP Portal interface. The top navigation bar includes 'Programme', 'My Schedule', 'Training & Certificates', and 'My Profile'. The main content area is divided into two sections. The upper section shows a map of the North Atlantic Ocean with various deployment sites marked. The lower section provides a detailed view of the 'Ellett Array 9 - SEC - Ellett Array 9 (SEC)' project, including a timeline for 2022, a list of personnel, and project details.

| Category               | Item  | Start Date | End Date |
|------------------------|-------|------------|----------|
| Discovery              | DY159 | Oct 41     | Oct 44   |
|                        | DY158 | Oct 45     | Oct 48   |
|                        | DY157 | Oct 49     | Oct 51   |
|                        | DY164 | Nov 1      | Nov 3    |
|                        | DY165 | Nov 4      | Nov 6    |
|                        | DY166 | Nov 7      | Nov 9    |
|                        | DY167 | Nov 10     | Nov 12   |
| James Cook             | JC243 | Nov 13     | Nov 15   |
|                        | JC238 | Nov 16     | Nov 18   |
|                        | JC228 | Nov 19     | Nov 21   |
|                        | JC241 | Nov 22     | Nov 24   |
|                        | JC246 | Nov 25     | Nov 27   |
| Autonomous Deployments | JC247 | Nov 28     | Nov 30   |
|                        | JC249 | Dec 1      | Dec 3    |
|                        | JC251 | Dec 4      | Dec 6    |

**Ellett Array 9 - SEC - Ellett Array 9 (SEC)**  
 134 Days 20/1309  
 Location: Oban  
 Planned Deployment: 01/01/2023  
 Planned Recovery: 14/05/2023  
 Mobilisation: SAMS  
 Demobilisation: SAMS  
 Vehicle Recovery Strategy: Small boat or RIB  
 Vehicle Launch Strategy: Small boat or RIB  
 Personnel: PI Estelle Dumont, Chief Scientist Penny Holliday, Project Manager Jon Short

- MFP website captures scientific requirements and PI interactions with the planning functions, e.g. workflows, paperwork and notifications
- MFP website captures asset lifecycle (purchase, interoperability, maintenance, calibration, planning, logistics, disposal)
- MFP website captures personnel qualifications and support to the projects
- Key point - benefits multiplied as users share information:
  - I can see ship programmes for UK, Germany, Norway, Spain, Belgium, Finland + US and Australia/NZ
  - Aim to share information across other national partners

NET ZERO  
OCEANOGRAPHIC  
NZOC CAPABILITY



Natural  
Environment  
Research Council



National  
Oceanography  
Centre



Thank You

# Upscaling Autonomy Community Consultation

