OCEANIDS

Next Generation Marine Autonomous Systems in Support of Marine Observations

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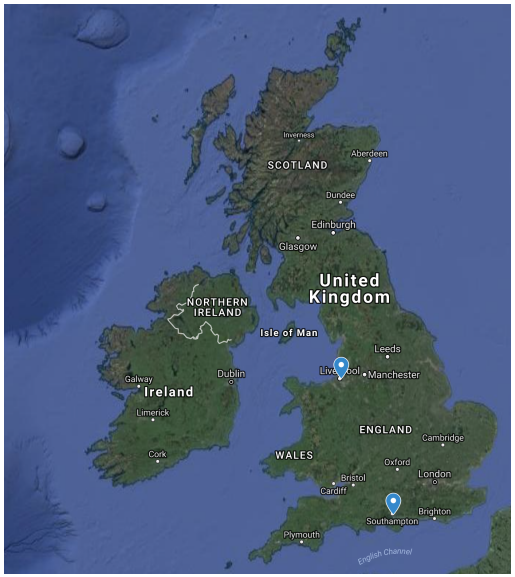


- **the science**
  NOC tackles the big environmental issues facing the world. Research priorities include the oceans' role in climate, sea level change, and the future of the Arctic Ocean.

- **the engineering in support of science**
  NOC manages facilities and capabilities for the benefit of the whole marine science community.
  - provide the very best data we can to science community
  - develop tools to further improve this data delivery
  - working with partners (Marine Robotics Innovation Centre)

The MARS Fleet

- Teledyne Webb Slocum (1000m) x 12
- Teledyne Webb Slocum (200m) x 10
- Kongsberg Seagliders x 9
- Autosub6000
- Autosub Long Range x 3
- **Autosub6000 mk2**
- **ALR1500 x 3**
- Isis ROV
- HyBIS ROV
- TOBI

- 35 staff personnell
- about 15 M GBP 2016-2020

the OCEANIDS programme

Oceanids is a up-to £15M, 4 years programme funded by NERC to develop Maritime Autonomous Systems:

- 3 Autosub Long Range 1500
- 1 Autosub6000 MK2 vehicle
- a unified command control and data infrastructure for operation of the NERC long range fleeet (C2)
- new Onboard Control System (OCS) for the robotic platforms

why NERC invested in MAS: doing more for less

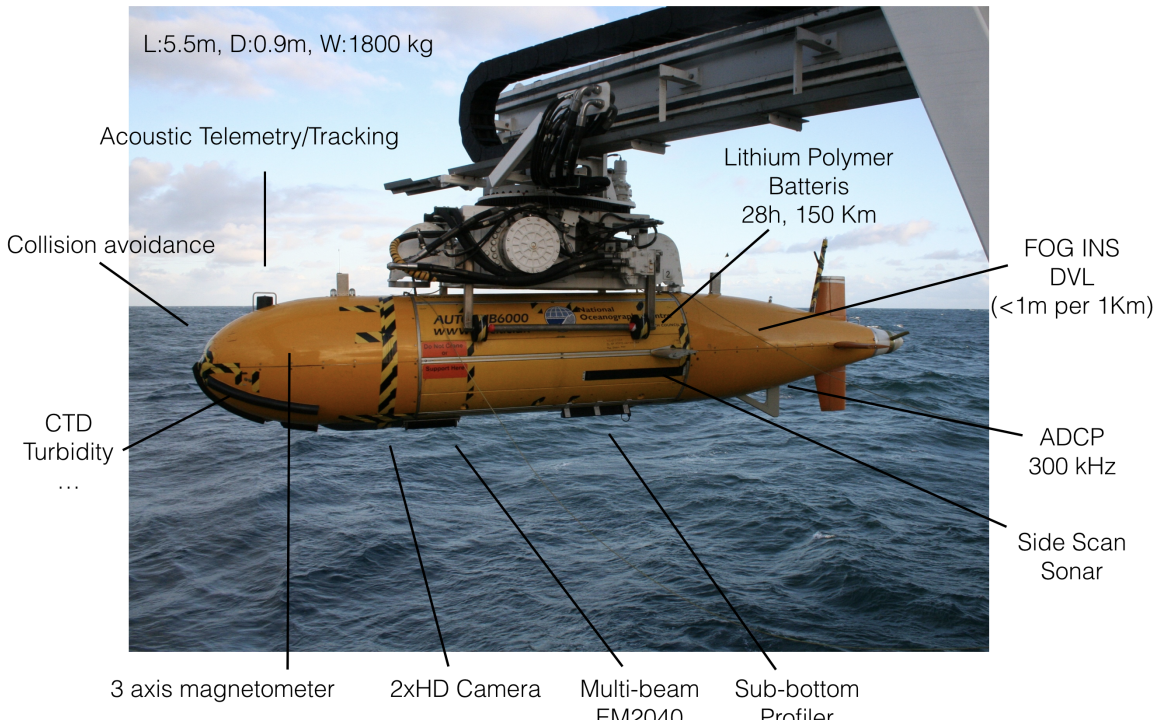
- Ships are very expensive to run
- MAS have the potential to increase the quantity and quality of data

two main objectives:

- increase the impact of research cruises: autosub 6000 MK2
- move some measurements to long range MAS: AUVs, gliders, USVs

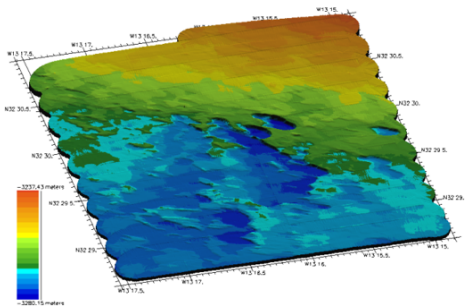
Autosub 6000 MK2

...develop a next generation: ship launched, high power, deep diving AUV platform which will be made available to the Science Community via the National Marine Equipment Pool MARS Fleet.

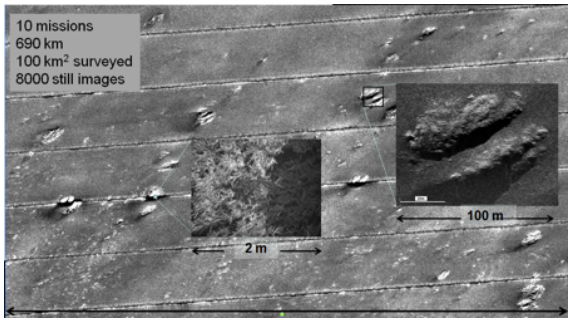


Autosub 6000 MK2

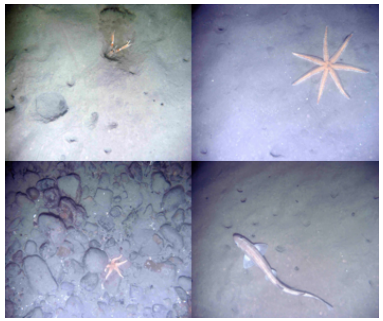
- new vehicle control system (electronics and software)
- enhance the situational awareness and autonomy
- integrate advanced payloads, e.g. 3D camera systems, synthetic aperture sonar
- explore new and novel battery technologies, such as Lithium Sulphur, to enhance the range and endurance of the platform



Agadir Canyon Scours
Cruise JC027 (2008)
Altitude 50 – 100m



Darwin Mounds (Rockall)
Cruise JC060 (2011)
Altitude 15-50m

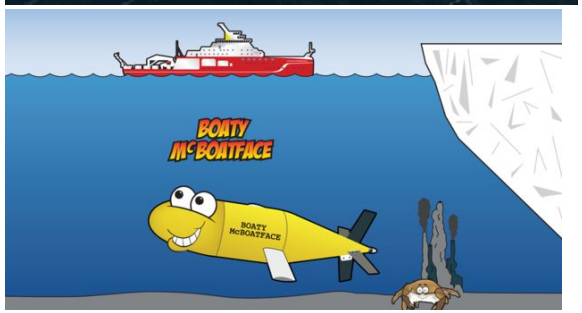


Celtic Sea
Cruise DY008 (2014)
Altitude 2.2m

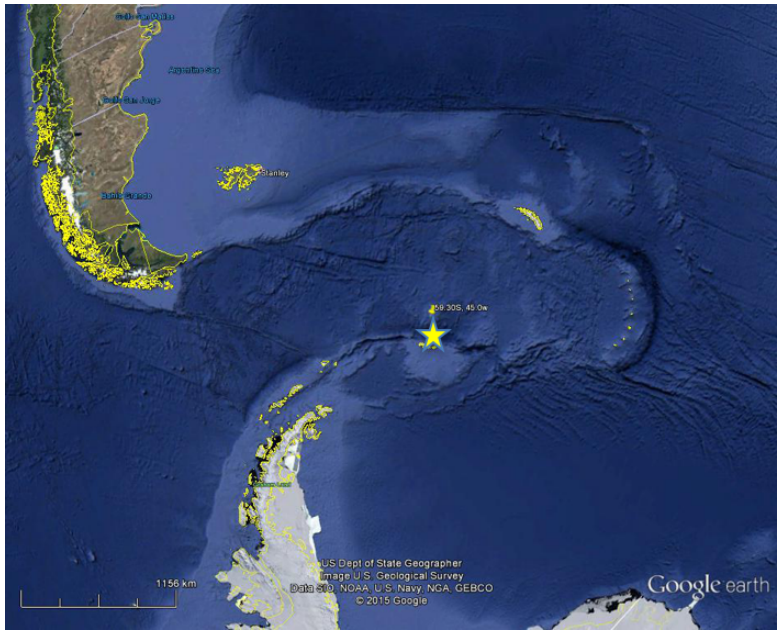
Autosub Long Range

- max depth: 6000m
- max range: 6000 km, 6 months
- speed: 0.35 - 0.8 m/s
- ship or shore launched.

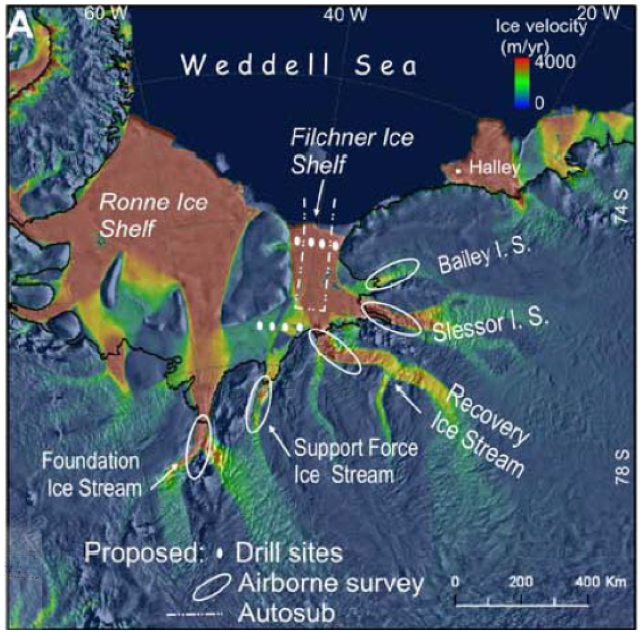
- hotel power: 1W
- flying modes: depth, altitude, profiling
- communications: iridium, wi-fi
- payload: CTD, ADCP
- optionals: turbulence probe, magnetometer, flourometer...



Autosub Long Range: cruises



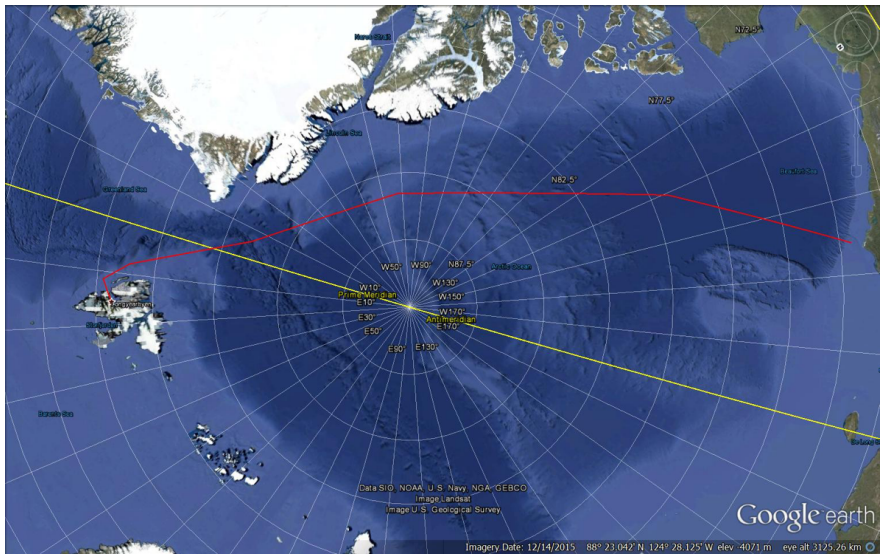
Dynamics of the Orkney Passage Outflow



Filchner Ice Shelf System Project

Autosub Long Range: where we are heading

- future missions: long endurance, e.g. artic crossing
- strong scentific push, e.g. NERC artic programme
- technical challenges: navigation, fault tolerance, endurance...



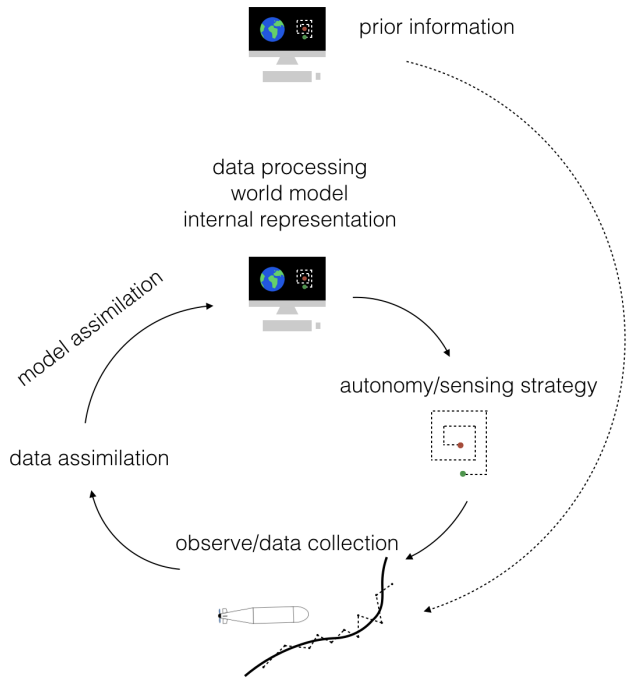
Longyearbyen, Svalbard to Barrow, Alaska: 3600 km, 2 months, 90% ice covered
must be run at 10m to 1000m depth

Command and control

...enhance both the command and control of the long range fleet as well as automating the archiving and processing of the near real time data collated by the vehicles.

objectives:

- straight forward access to real time collected science data and associated metadata
- allow for some piloting automation to:
  - maximise the quality of data,
  - enhance platform safety
  - increase number of assets in the water at the same time.
- provide a national infrastructure available for scientistist and to facilitate public



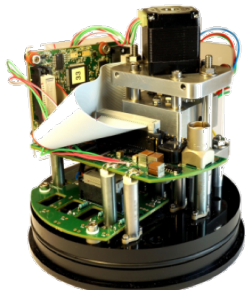
Cooperative UAV/USV Survey System

sub-surface long range accurate navigation and vehicle monitoring is difficult and requires regular vehicle surfacing to transmit vehicle positioning (decreasing the endurance).

- collaboration to acoustically couple a USV to act as a communication gateway and a navigational aid
- demonstration Missions: 2017
- ready for Full Scale Missions: 2018
- funded through Innovate UK

BRIDGES

BRINGING TOGETHER RESEARCH AND INDUSTRY FOR THE DEVELOPMENT OF GLIDER ENVIRONMENTAL SERVICES



- two versions: 2500m (Deep) and 6000m (Ultra Deep)
- large wet payload space.
- large battery pack (4500W 48V)
- pressure hull design
- propulsion to increase flexibility
- Lab-on-chip sensors
  - nitrate, phosphate
  - silicate, ammonia
- mission-driven payload: marine science, water column habitat, sub-sea mining...

thank you

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