Developing International Cooperation to Understand Arctic Change

Henry Burgess

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UKRI Natural Environment Research Council

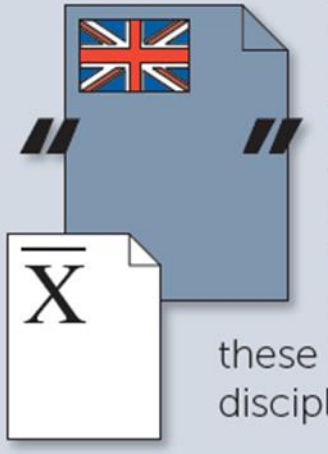
Arctic Office
NATURAL ENVIRONMENT RESEARCH COUNCIL

Is the United Kingdom better known for Antarctic science?

The United Kingdom has a strong record in Arctic research

Strong, High Impact and International Arctic Research

The UK is the 4th most productive country, measured by the number of papers in peer-reviewed journals (after the US, Russia and Canada).



Papers from UK-based researchers are cited 90% more than the global average for these individual disciplines.

Nearly two-thirds of the UK Arctic papers have international co-authors - higher than any of the other three nations with a larger output.

UK-based researchers are very regular co-authors

Source: *Arctic Research Publication Trends: A Pilot Study.* University of the Arctic *et al*, August 2016

To find out more about UK Arctic research excellence, infrastructure and international partnerships follow #UKinArctic and @Arctic_Office

Priorities, linkages, and gaps in the current work of the international Arctic research community

- Arctic research must be truly interdisciplinary, and indeed convergent, in order to meet both Arctic and global challenges.
- The Arctic research community must improve on its efforts to centre the priorities, voices, and contributions of Arctic residents and Indigenous Peoples.
- International and interdisciplinary cooperation are absolutely key to studying Arctic systems and should be encouraged and expanded
- Arctic data sharing, discoverability, access, and re-use continue to be difficult challenges, but work in these areas will be crucial for future success.
- Current levels of Arctic monitoring and research are insufficient to meet these challenges, despite the hard work and investments of both Arctic and non-Arctic countries.

Changing Arctic Ocean NERC

£20 million research

5-year programme

Dual national funding

SPONSORED BY THE

Federal Ministry of Education and Research

UKRI Natural Environment Research Council

32 research institutions

>200 investigators

AWI · Prifysgol Bangor University · British Antarctic Survey (Natural Environment Research Council) · University of Bristol · Cefas · Durham University · The University of Edinburgh · The Marine Biological Association · SAHFOS · UCL · University of Strathclyde · University of Glasgow · University of Leeds · University of Liverpool · Helmholtz-Zentrum Geesthacht (Zentrum für Material- und Küstenforschung) · Lancaster University · The University of Manchester · Universität Oldenburg · University of Huddersfield · University of East Anglia · University of Stirling · SAMS · Newcastle University · National Oceanography Centre · Northumbria University Newcastle · O.A.Sys (Ocean Atmosphere Systems) · GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel · Max Planck Gesellschaft · PML Plymouth Marine Laboratory · University of Oxford · University of Southampton · University of St Andrews

www.changing-arctic-ocean.ac.uk

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2 KEY RESEARCH CHALLENGES

1. A quantified understanding

To develop a quantified understanding of the structure and functioning of Arctic Ocean ecosystems

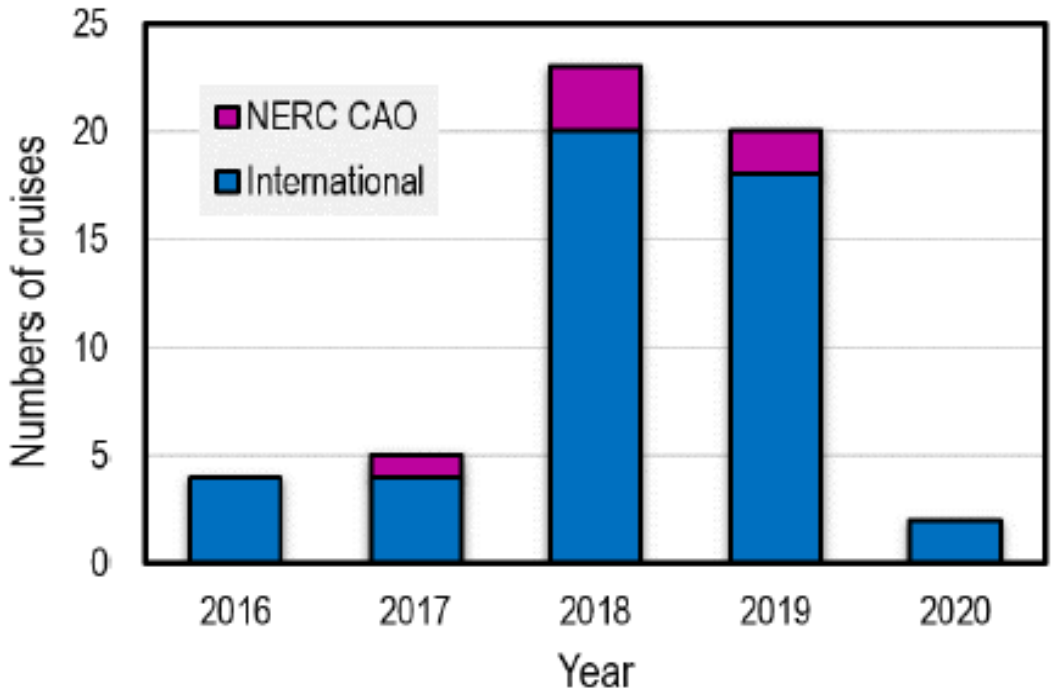
2. Sensitivity to change and future projections

To understand the sensitivity to multiple stressors;
To develop projections of change

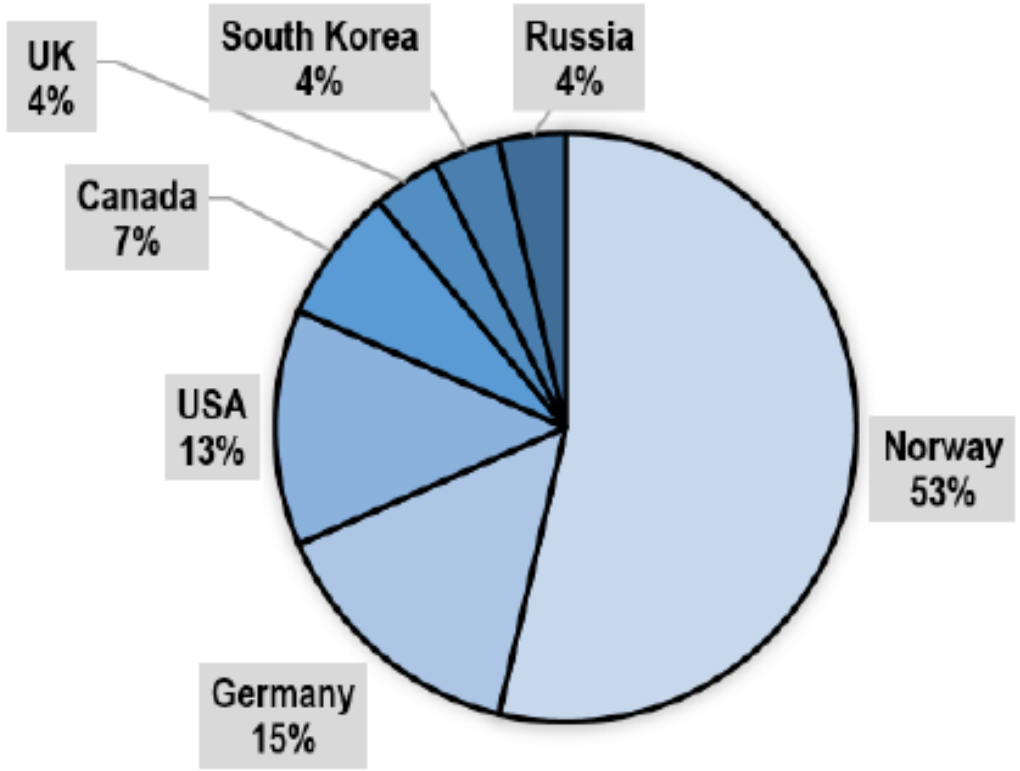
Photo by Callum Whyte

INTERNATIONAL COLLABORATION

Participation on Arctic cruises



International cruise funding source



Prioritising participation in the biggest science questions

MOSAiC
International Arctic Drift Expedition

The MOSAiC expedition is taking the closest look ever at the Arctic as the epicentre of global warming in order to gain fundamental insights to better understand global climate change. Hundreds of researchers from 20 countries are taking part in this exceptional endeavour.

The expedition brings a modern research icebreaker close to the north pole for a full year including for the first time in polar winter.

New research opportunities – RRS *Sir David Attenborough*

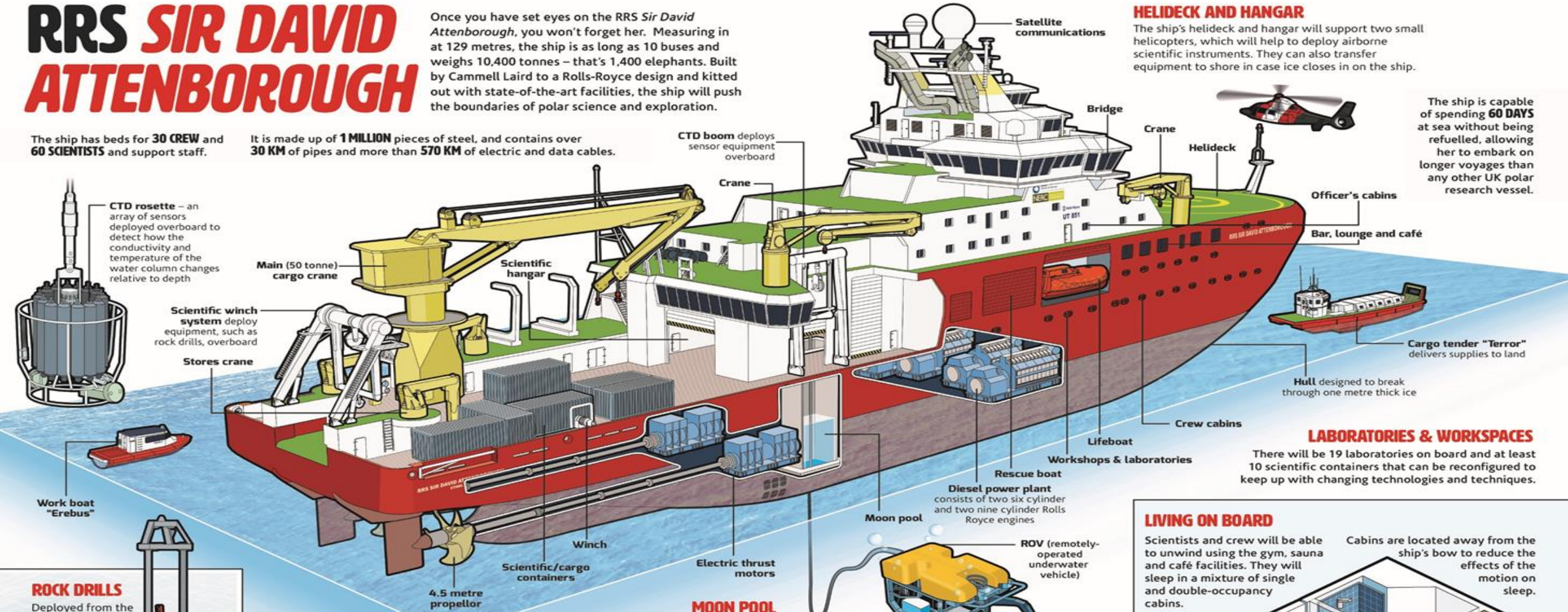
RRS *Sir David Attenborough* spec: PC5: Year-round operation in medium first-year ice 128m long 24m wide. 13 knot cruise speed. Hybrid Battery system. 2150 m3 / 1000t Cargo Hold. 28 crew, 60 scientist berths. 40 single cabins 25 double cabins. 60 day endurance, 19,000 nautical miles. Minus 35 C design temperature. Polar Code compliant. Sea bed mapping sonars. Low underwater noise.

RRS *SIR DAVID ATTENBOROUGH*

Once you have set eyes on the RRS *Sir David Attenborough*, you won't forget her. Measuring in at 129 metres, the ship is as long as 10 buses and weighs 10,400 tonnes – that's 1,400 elephants. Built by Cammell Laird to a Rolls-Royce design and kitted out with state-of-the-art facilities, the ship will push the boundaries of polar science and exploration.

The ship has beds for **30 CREW** and **60 SCIENTISTS** and support staff.

It is made up of **1 MILLION** pieces of steel, and contains over **30 KM** of pipes and more than **570 KM** of electric and data cables.



CTD rosette – an array of sensors deployed overboard to detect how the conductivity and temperature of the water column changes relative to depth

The ship is capable of spending **60 DAYS** at sea without being refuelled, allowing her to embark on longer voyages than any other UK polar research vessel.

HELIDECK AND HANGAR

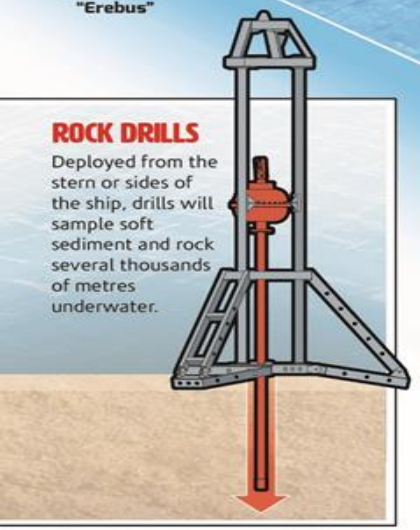
The ship's helideck and hangar will support two small helicopters, which will help to deploy airborne scientific instruments. They can also transfer equipment to shore in case ice closes in on the ship.

LABORATORIES & WORKSPACES

There will be 19 laboratories on board and at least 10 scientific containers that can be reconfigured to keep up with changing technologies and techniques.

ROCK DRILLS

Deployed from the stern or sides of the ship, drills will sample soft sediment and rock several thousands of metres underwater.

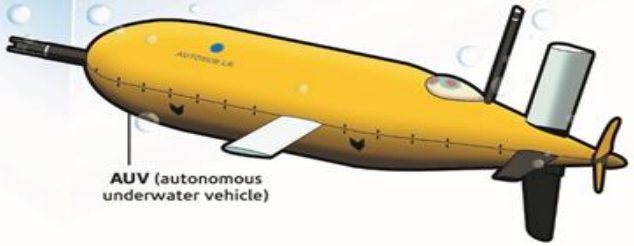


ENGINES

The engines will run as silently as possible to avoid interference with the 'ears of the ship', acoustic instruments, which use echo sounders to measure life in the water and map the sea floor.

MOON POOL

Scientists can lower and raise equipment (such as ROVs) through the moon pool, a vertical hole running through the hull of the vessel. This makes it easier and safer to deploy scientific equipment in the rough polar oceans and ice-covered waters.



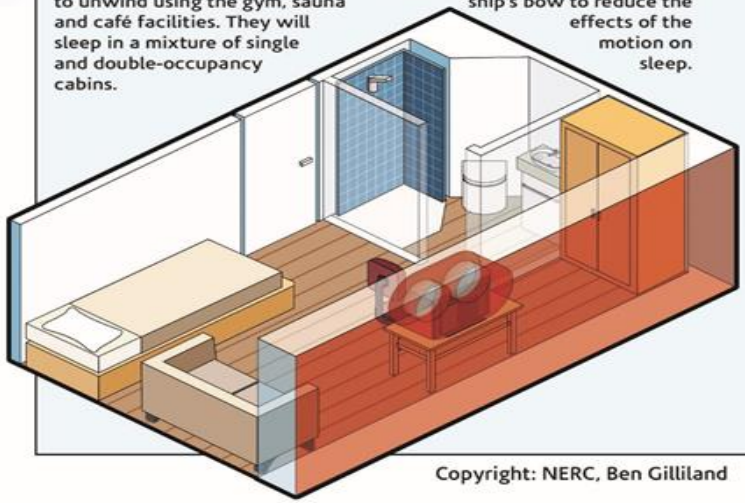
MARINE ROBOTICS

The ship will act as a central platform for deploying state-of-the-art autonomous and remotely-operated vehicles. These will explore untouched parts of the ocean and atmosphere. Remotely controlled vehicles will be connected to the ship and powered via a cable – just like an umbilical cord. Autonomous underwater vehicles, like the 'Boaty' Autosub Long Range, will have no link to the ship and will travel deep beneath ice shelves and at the edge of active glaciers.

LIVING ON BOARD

Scientists and crew will be able to unwind using the gym, sauna and café facilities. They will sleep in a mixture of single and double-occupancy cabins.

Cabins are located away from the ship's bow to reduce the effects of the motion on sleep.



henry.burgess@bas.ac.uk
+44 (0)1223 221426
+44 (0)7590 461620

www.arctic.ac.uk
arctic@bas.ac.uk
@Arctic_Office
#UKinArctic