

Polar Science for a Sustainable Planet

Science Strategy 2023-2033



**British
Antarctic Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

POLAR SCIENCE

FOR A SUSTAINABLE PLANET

**Earth's frozen regions
are changing in ways that
impact the entire planet.**

Robust scientific evidence is urgently required to underpin the necessary mitigation and adaptation policies.

British Antarctic Survey has the world-leading scientific expertise and capability to deliver this critical evidence.



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A view over Adelaide Island in the Antarctic Peninsula, with Rothera Research Station located on the small promontory in Marguerite Bay in the centre right of the image

Introduction

Our planet is changing at a rate and scale unlike anything seen in human history. This includes disruption to climate, a decline in biodiversity, and increasing dependence on technology both on the ground and in space.

The polar regions of our planet are particularly susceptible. As temperatures rise, ice melts, with consequences that impact livelihoods, societies, and ecosystems. Although Earth's polar regions may seem remote, changes there affect the entire world.

British Antarctic Survey (BAS) science spans the deep ocean to the inner edge of space, and encompasses both polar regions and Earth's snow-covered mountain ranges. We have world-class expertise in every polar science domain. Our science activities are underpinned by outstanding logistical and digital infrastructure. We will target our unique capabilities to address key

questions on the state of Earth's frozen regions: how are they changing, why are they changing, and how they might change in future.

Our ambition over this ten-year strategy is to deliver the scientific evidence needed by decision-makers in policy, industry, and society, for a sustainable planet.



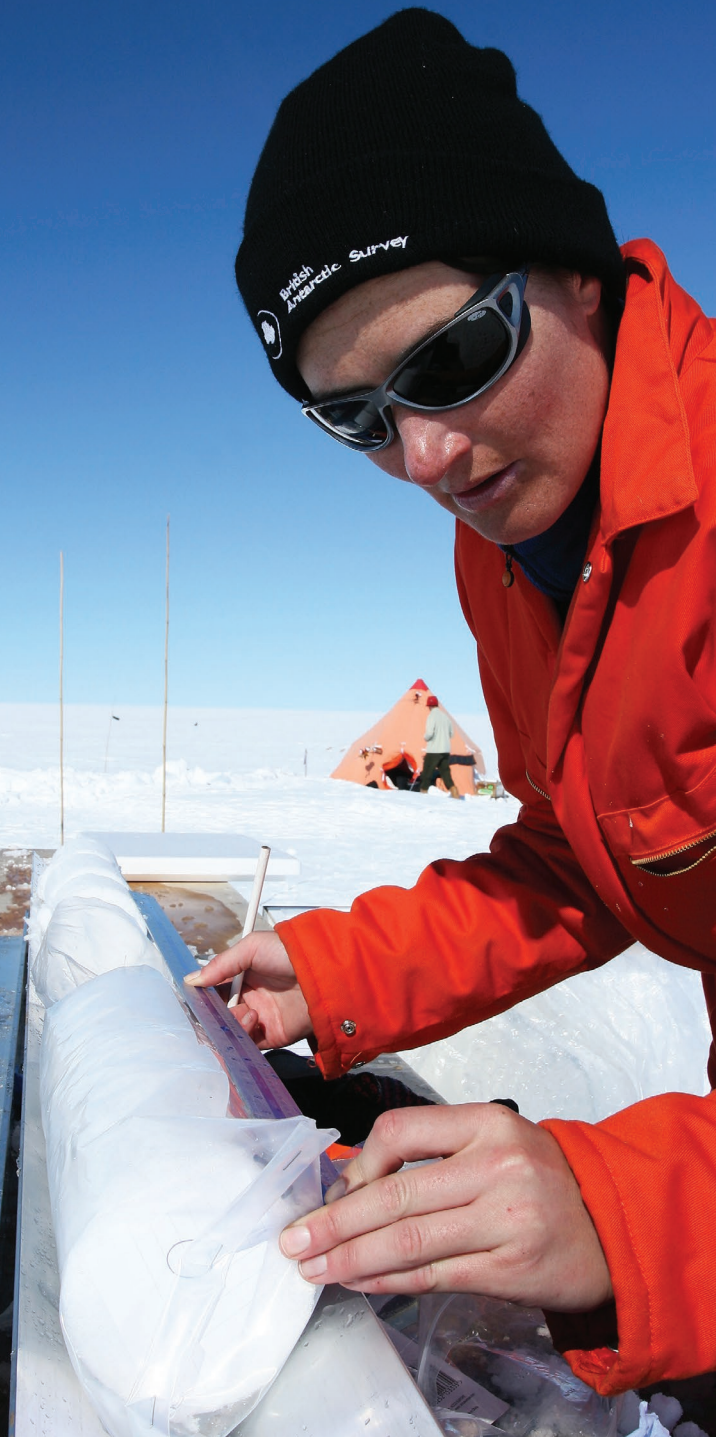
Dr Anna Jones
Director of Science
British Antarctic Survey





Our science

We present an ambitious programme of integrated scientific activities focused on urgent issues of regional and global importance.



Science themes

Climate change science for developing resilience

The Polar Regions play a vital role in controlling global climate – the vast Southern Ocean absorbs excess heat and carbon dioxide from the atmosphere, and sea ice and snow-cover act as a mirror reflecting solar radiation back to space. We will determine how changes in the Polar Regions impact global climate and provide the evidence to underpin policies for a sustainable Earth.

Protecting coastal and technical infrastructure

Changes in Earth's climate are felt both at ground level and in space. The accelerating erosion of vast ice masses affects global sea level, threatening coastal communities and infrastructure, including many of the world's largest cities. Changes in the upper atmosphere increase the lifetime of space debris which, together with extremes of space weather, threaten satellites and technology on which societies rely. We will deliver polar research that enables evidence-based decisions to mitigate or adapt to these threats to coastal societies and critical infrastructure.





Science themes *continued*

Conserving polar biodiversity

The Polar Regions contain a rich variety of species adapted to their unique environments. Rapid changes to these environments make polar species some of the most threatened on Earth. Many of these species play vital roles in driving global cycles of carbon and nutrients on which we depend. BAS will deliver at the forefront of polar ecosystem research to ensure that scientific consensus drives polar biodiversity conservation policy.

Sustaining livelihoods and societies

The Arctic, the Antarctic, and snow-covered mountain ranges sustain human societies and their ways of life. Arctic sea ice and mountain glaciers have provided food and water resources over generations. The Polar Regions hold opportunities for the future, such as useful molecules for industrial processes and medicine. Our challenge is to provide the robust evidence required both by decision-makers and societies facing changes in their frozen environments, to mitigate associated socio-economic risks, and to optimise potential benefits.

Safeguarding our future

Our planet is changing at a rate and scale not experienced in human history. An urgent challenge is to predict high-impact environmental events and ‘tipping points’ and to assess and mitigate their impacts. We will develop new methods, including leveraging data from the past, to constrain projections of the future, and understand how the frozen regions of our planet may respond to climate mitigation measures.

Science into policy

The British Antarctic Survey works closely with other research groups, governments, international development organisations, universities and businesses all over the world to collect and interpret crucial scientific data that shapes policy, protects the environment and ultimately improves people's lives.

We play active roles in delivering key scientific reports, including for the IPCC (Intergovernmental Panel on Climate Change), and IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services).

We are in regular dialogue with policy-makers from across UK Government departments. We also provide expert advice to key Government officials, host briefing visits to BAS Cambridge by parliamentarians and Ministers of State, and provide written and oral science briefings.



Our unique capability

The British Antarctic Survey is at the forefront of polar science. We bring together world-leading scientific experts, artificial intelligence, and sophisticated numerical models to understand environmental data collected in harsh remote environments by state-of-the-art polar infrastructure.

This infrastructure includes modernised research stations, the cutting-edge capabilities of the UK's polar research vessel RRS *Sir David Attenborough*, survey aircraft, satellite remote sensing, autonomous observing platforms, and fleets of automated underwater vehicles and airborne drones. Our programme is set up to deliver science within the net zero carbon commitments of BAS, UKRI-NERC, and the UK.

Over our 10-year strategy, BAS will play a leading and collaborative role with our national and international partners, including in industry, to develop digital twins of the Polar Regions. This approach will enable, for the first time, the full integration and sharing of data across our entire polar infrastructure, tools and equipment, from vehicles and sensors to AI algorithms and models. Key outcomes will include improved decision-making and a boost to scientific discovery.





RRS Sir David Attenborough is one of the most advanced polar research vessels in the world

Our community

Polar research transcends boundaries – no one country has the expertise or logistical capability to independently conduct the research needed to answer the big questions. Our work relies on co-operation, partnerships, and sharing best practice.

BAS works inclusively and positively with colleagues in the UK and internationally, and develops the next generation of polar researchers who will carry forward this vital work in the future. Importantly, we work closely with stakeholders and decision-makers, in policy, industry, and society, to inform ongoing activities and to provide the key information they need to deliver robust policies and actions for a sustainable planet.

 For more information, please visit: bas.ac.uk



British Antarctic Survey has world-leading specialists in science, engineering and polar logistics who help develop the next generation of polar researchers

Further information

More information about the BAS Science Strategy 2023-2033 is available on our website:



bas.ac.uk/our-strategy

Contact BAS

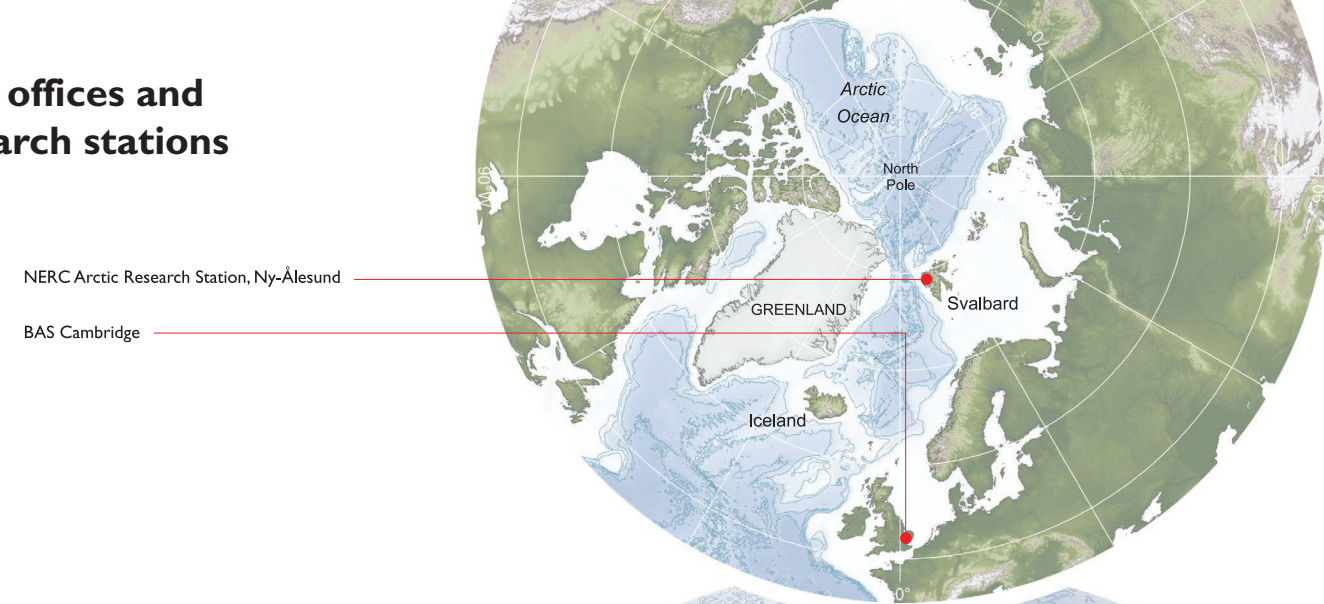


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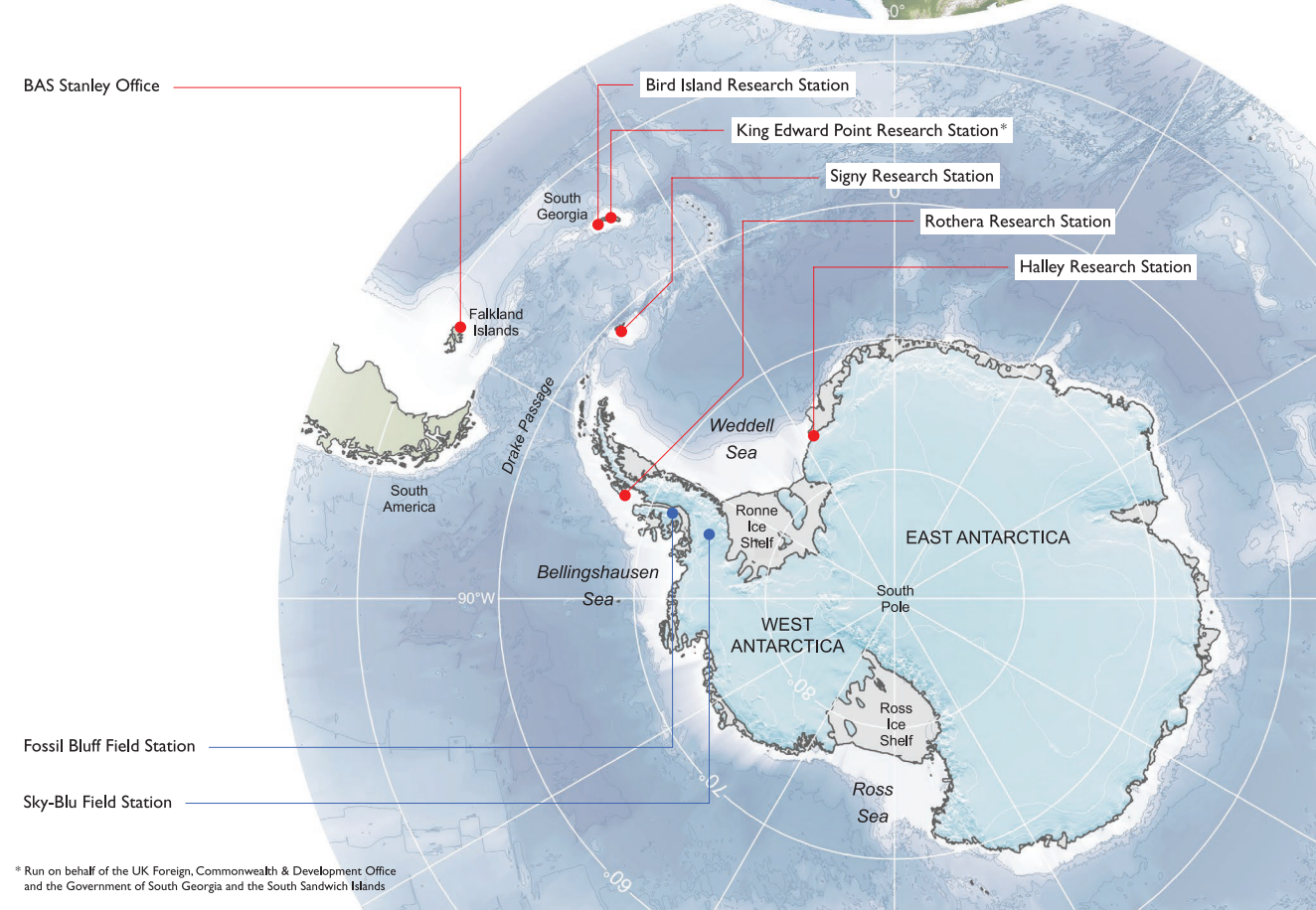
 For more information, please visit: bas.ac.uk

BAS offices and research stations



NERC Arctic Research Station, Ny-Ålesund

BAS Cambridge



BAS Stanley Office

Bird Island Research Station

King Edward Point Research Station*

Signy Research Station

Rothera Research Station

Halley Research Station

Fossil Bluff Field Station

Sky-Blu Field Station

* Run on behalf of the UK Foreign, Commonwealth & Development Office and the Government of South Georgia and the South Sandwich Islands



The British Antarctic Survey strives to uncover the secrets of the Polar Regions and the frozen regions of the Earth. Our expertise spans the depths of the oceans to the inner edge of space.

Our research highlights the fragility of the Earth's frozen environments, and what that means for our planet. We have been living and working in the extremes of Antarctica and the Arctic for over 60 years. Our scientists discovered the hole in the ozone layer and identified key evidence for climate change in ancient ice – our science continues to inform decision-makers.

We provide the UK's national polar capability by operating research stations, aircraft and Royal Research Ship *Sir David Attenborough*, supporting science at the poles and securing the UK's presence in Antarctic affairs.

The British Antarctic Survey is part of the Natural Environment Research Council (NERC). NERC is part of UK Research and Innovation.

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