

SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH (SCAR) – NATIONAL REPORT 2011-2012
MEMBER COUNTRY: UNITED KINGDOM

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A BRIEF SUMMARY OF SCIENTIFIC HIGHLIGHTS

Seabirds Affected by Food Availability

The most comprehensive study ever taken has been carried out to determine the amount of food required by seabirds. This international group, co-led by Dr. Ian Boyd of the Scottish Ocean Institute, University of St Andrews, has shown that many seabirds begin to suffer when the food available for them in the ocean declines below a critical level, of approximately one-third of the maximum measured amount of food available. They have found that this critical level is about the same for seabird species around the world, including birds from the Arctic to the Antarctic and from the Pacific to the Atlantic. This study is important so that we can develop better methods of setting the limits of exploitation of important marine species. This means being able to establish general guidelines that, if exceeded, will cause changes to other important components in the ecosystems. Seabirds are some of the best and most easily measured indicators we have of the health of these ecosystems and it seems sensible to use them in this context.

Monitoring Penguins From Space

Working as part of an international programme, BAS scientists have improved the resolution of the satellite imagery in order to estimate the number of penguins at each colony around the coastline of Antarctica. The science teams were able to differentiate between birds, ice, shadow and penguin poo (guano). They then used ground counts and aerial photography to calibrate the analysis. Results show that there are almost double the numbers of emperor penguins than previously thought (~595,000 birds). This study represents the first comprehensive census of a species taken from space. The results provide an important benchmark for monitoring the impact of environmental change on the population of this bird.

Origin of the Gamburtsev Subglacial Mountains

Scientists from the Antarctica's Gamburtsev Province (AGAP) project have now been able to provide insight into the formation of the Gamburtsev Subglacial Mountains, which has puzzled scientists since their first discovery in 1958. Plate collision caused the mountains to form and created a crustal root that extended deep beneath the mountain range. Over time these mountains were eroded but the cold dense root was left behind. Around 250–100 million years ago rifting caused this old crustal root to warm. This rejuvenated crustal root, together with the East Antarctic Rift forced the land upwards again reforming the mountains. Rivers and glaciers carved deep valleys and this helped uplift the peaks to create the spectacular landscape of the Gamburtsevs, which resemble the European Alps. The East Antarctic Ice Sheet, which formed 34 million years ago, has since protected the mountains from erosion.

Carbon Storage in Southern Ocean

A new study has revealed how carbon is drawn down from the surface of the Southern Ocean to the deep waters beneath. The Southern Ocean is an important carbon sink in the world, with around 40% of the annual global CO₂ emissions absorbed by the world's oceans enter through this region. Scientists from British Antarctic Survey (BAS) and Australia's national research agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), reveal that rather than carbon being absorbed uniformly into the deep ocean in vast areas, it is drawn down and locked away from the atmosphere by plunging currents a thousand kilometres wide. A combination of winds, currents and eddies create these carbon-capturing pathways drawing waters down into the deep ocean from the ocean surface.

Space Weather

Space weather is of intense interest to the UK Government as millions are lost as a result of large magnetic storms in space causing satellite damage. As a result, a new European Union system to forecast space weather was launched in March 2012. The SPACECAST project will provide frequent and reliable web-based forecasts so that satellite operators can take action to protect their satellites from space radiation damage.

Subglacial Lake Ellsworth

Work continues at Subglacial Lake Ellsworth in preparation for drilling into the lake in the 2012-13 field season. At the start of 2012 BAS engineers returned to the UK having put in place equipment and supplies for the ambitious project later in 2012. A powerful 'tractor-train' towed nearly 70 tonnes of equipment travelled more than 250 km through the Ellsworth Mountain range, over deep-snow terrain and crevasses to the Lake Ellsworth drilling site. Lake Ellsworth will be the first Antarctic subglacial lake to be measured and sampled directly through the design and manufacture of space-industry standard 'clean technology'. This December a science and engineering team will make the 16,000 km journey from the UK to collect water and sediments from the buried lake.

Frozen Planet

The BBC documentary Frozen Planet made a big impact on the Television in 2011. One episode – On Thin Ice – featured BAS scientists working at Pine Island Glacier (PIG) in West Antarctica. Dr. Andy Smith was interviewed, showing how the thinning of Pine Island Glacier (at a rate of > 1m/yr) has been of great interest to scientists worldwide. The flow rate of PIG has accelerated over the past 15 years and current research is looking at the glacier's potential contribution to sea level rise, which could be significant.