



New Report Highlights the Complexity of Climate Change Across the Antarctic

A new report by the Scientific Committee on Antarctic Research (SCAR) reveals that while large climatic changes are taking place in parts of the Antarctic, such as the Antarctic Peninsula and West Antarctica, much of the continent has experienced little change. Such a pattern is consistent with the impact of the ozone hole and influences from the tropical Pacific Ocean, such as El Niño.

Published in the last week in the journal *Polar Record*, the Antarctic Climate Change and the Environment (ACCE) report provides an update on the scientific advances made since the last report in 2009.

Important areas in which the science has rapidly advanced include the debate on whether the Antarctic ice sheet is growing or shrinking, and separating the signals of human-induced change from natural variations in the climate system.

Professor John Turner, editor of the ACCE update, said “the ACCE update allowed us to bring many of the rapidly advancing topics of Antarctic Science up-to-date and produce a handy summary for people who want to know the latest advances in the science.”

Key points are:

1. Recent research has improved the reconciliation of the various satellite-derived estimates of changes in the mass of the Antarctic ice sheet and also estimated the contribution to sea level rise. Overall this gives a contribution from the whole Antarctic ice sheet of $+0.20 \pm 0.15$ mm per year, which compares to $+0.39 \pm 0.14$ mm per year from the Greenland ice sheet.
2. Ice shelves along the Antarctic Peninsula have changed rapidly in recent decades, with episodes of retreat, breakup and collapse occurring on both sides. The overall reduction in total ice shelf area during the last five decades has recently been estimated to be over 28,000 km².
3. Since about 1980 the ozone hole has had a major impact on the climate of high southern latitudes, increasing the strength of the westerly winds over the Southern Ocean by 15-20%, slightly cooling much of the continent and decreasing the growth rate of plants.
4. Ozone-depleting substances in the stratosphere are now decreasing by about 1% per year. As a result the size and depth of the ozone hole have stabilised, but are not yet decreasing.

5. It has been forecast that stratospheric ozone loss rates will begin to decline noticeably between 2017 and 2021 and that by the middle of the 21st century springtime concentrations of stratospheric ozone are expected to have significantly recovered and will have almost fully recovered by the end of the 21st century.
6. The large winter season warming on the western side of the Antarctic Peninsula has been traced to a decrease of sea ice just to the west of the Peninsula over the Bellingshausen Sea. It is unclear at present whether this change is a result of anthropogenic activity.
7. Reconstructions of surface temperature for West Antarctica suggest that it has warmed markedly over the last 50 years with the Siple region identified as one of the most rapidly warming areas on Earth. These changes have been linked to sea surface temperature increases across the tropical Pacific Ocean.
8. Over the period 1979–2010 the sea ice over the Southern Ocean as a whole showed a positive trend in the annual mean of 1.3% per decade. The extent of Antarctic sea ice reached a new record maximum for the satellite era in 2012.
9. Ongoing responses of the marine ecosystem to climate change include: a shift in phyto- and bacterioplankton from larger to smaller species; a shrinking of Adélie and Gentoo penguin populations; shifts in the range of Southern elephant seal populations to the south, and decreases in the north of their range; low breeding success of Emperor penguins in East Antarctica due to changes in the food-chain and sea-ice extent.
10. Terrestrial and freshwater ecosystems have likewise shown a range of rapid and sensitive responses to different aspects of environmental change, including increases in populations, biomass and community complexity involving the native invertebrates and plants.

ENDS

Issued on behalf of SCAR and the editors by the Cambridge University Press (CUP):

Charlotte Porter, CUP, Tel: +44 (0)1223 347966; email: cporter@cambridge.org

Dr Eoghan Griffin, SCAR, Tel: +44 (0)1223 336550; email: eg393@cam.ac.uk

Linda Capper, BAS, Tel: +44 (0)1223 221448; mobile: 07714 233744 email: lmca@bas.ac.uk

Antarctic Climate Change and the Environment Editors' contact details:

Prof. John Turner, British Antarctic Survey. Tel: +44 (0)1223 221485; email jtu@bas.ac.uk

Notes for editors:

Antarctic Climate Change and the Environment

This review draws together important information from different scientific disciplines (such as meteorology, glaciology and biology) and therefore different aspects of the global climate system. The update to the report has been produced by 26 leading experts in Antarctic climate science representing 15 of the world's foremost Antarctic research institutions.

A short video interview introducing the report, by the editor Prof. John Turner, is available at the SCAR website, www.scar.org

Stunning broadcast-quality footage and stills of Antarctica, as well as location maps are available from the British Antarctic Survey Press Office.

The **Scientific Committee on Antarctic Research (SCAR)** is the main body dealing with the international co-ordination of scientific research in Antarctica and the Southern Ocean. Formed with 12 member countries in 1958 to continue activities begun during the International Geophysical Year of 1957 – 58, it is an interdisciplinary committee of the International Council for Science (ICSU) and now has 37 Member countries. SCAR played a leading role in the International Polar Year (2007 – 2008).