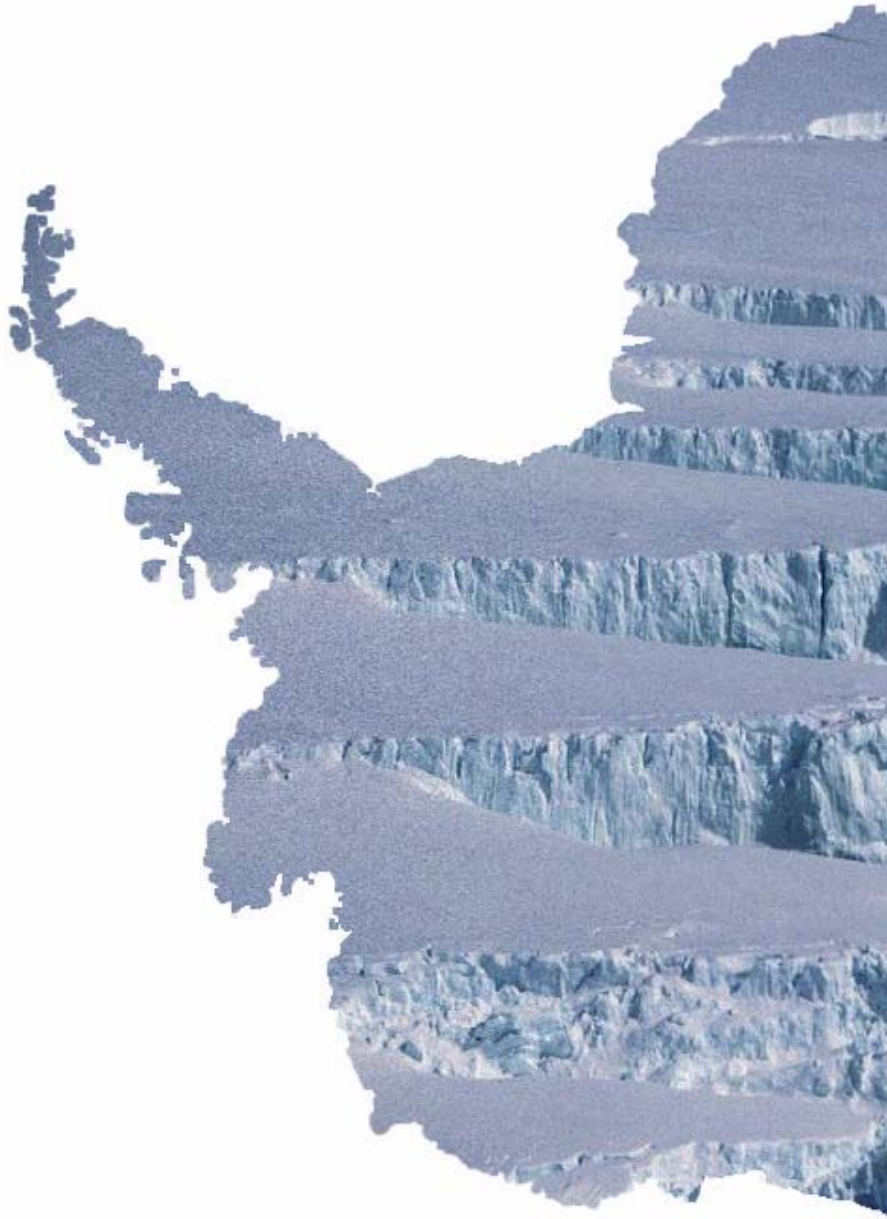
GSAC LTMS:

a progress report

August 2006



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Long-Term Monitoring and Survey: our ninth GSAC programme

- A key part of the national capability provided by Research Council Institutes (Quinquennial Review of the Research Councils – November 2001)
- “to enable long-term survey, monitoring and data management activities underpinned by research”
- Importance of LTMS emphasised in the NERC submission to the House of Commons Science and Technology Committee enquiry into Research Council Institutes (June 2006)

The structure of LTMS within BAS

- Four main activities: Topographic Survey (MAGIC), Geosciences Survey, Biological Survey & Biological Monitoring, Atmospheric & Oceanographic Monitoring
- LTMS Steering Group
- Annual review by the IPRC

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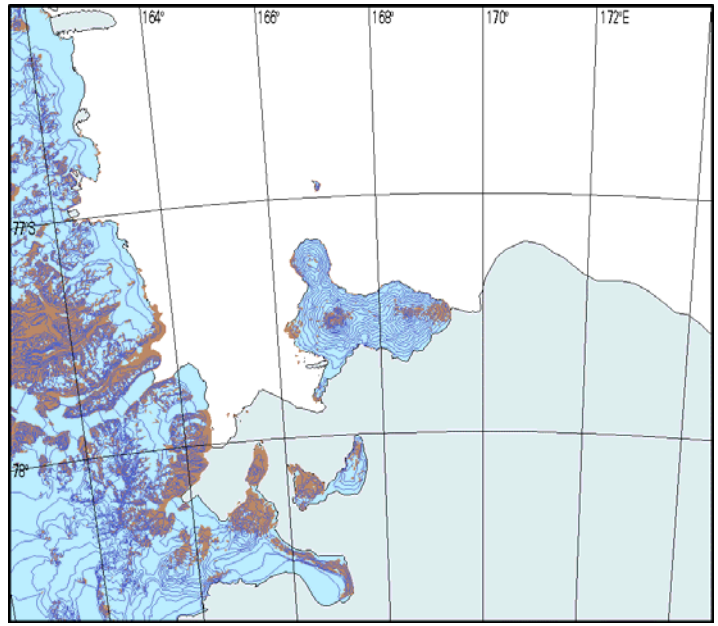
MAGIC - LTMS

Maintain and develop the SCAR Antarctic Digital Database (ADD)

The ADD provides seamless cover from the best international mapping. It is the accepted geographical framework for Antarctica and an important resource for IPY. BAS has managed and developed the ADD since 1993.

- Version 5 by end of 2006
- Web-map and web-feature servers
- Improved data included
- Extended to include sub-Antarctic Islands



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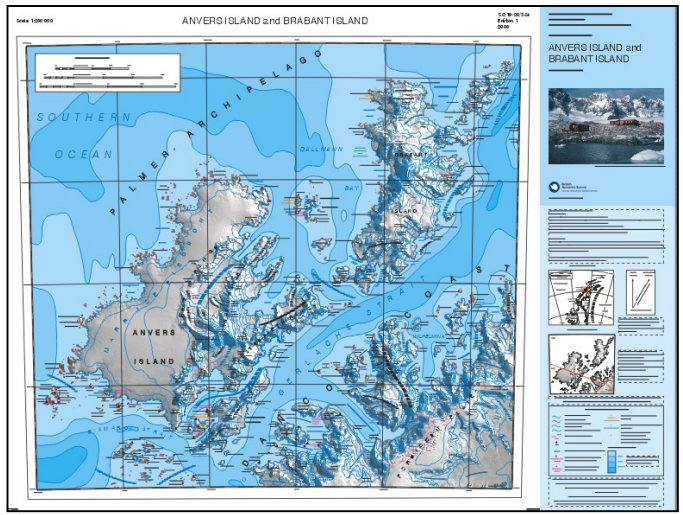
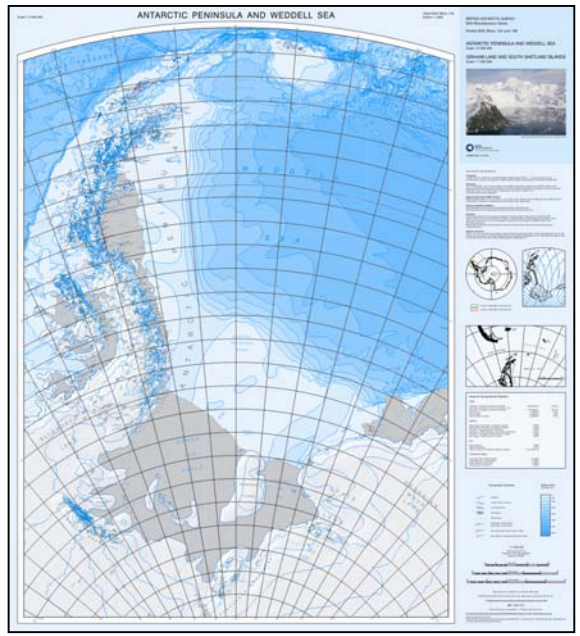
MAGIC - LTMS

Publish regional scale topographic maps

To sustain for the UK an active and influential regional presence (BAS mission)

- Antarctic Peninsula and Grahamland, 2005
- Anvers and Brabant islands, 2005
- Scotia Sea in preparation, 2006





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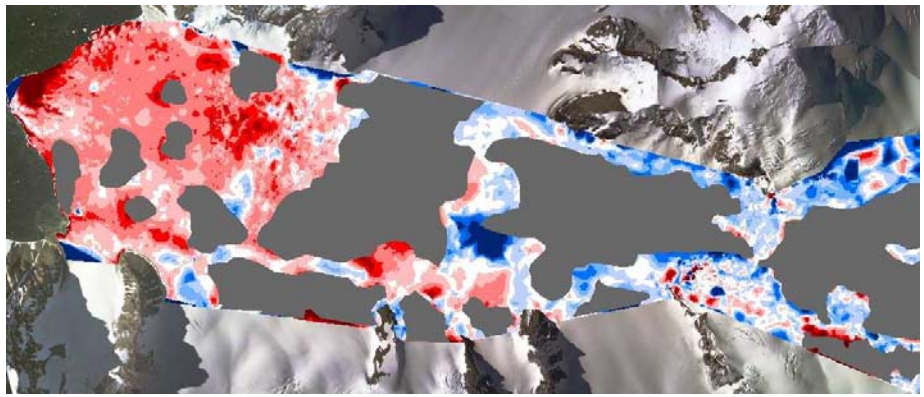
MAGIC - LTMS

Develop a method for long-term monitoring of glacier change

- Builds on work on glacier fronts (Cook et al, Science 2005)
- Volume change (sea-level change) from 50+ years of aerial photography
- Linking historic photographs to new GPS-supported photography – no ground survey



Moider Glacier, PQP Island 1957-2005

Up to 20 m ice loss in lower part, some ice gain in upper part

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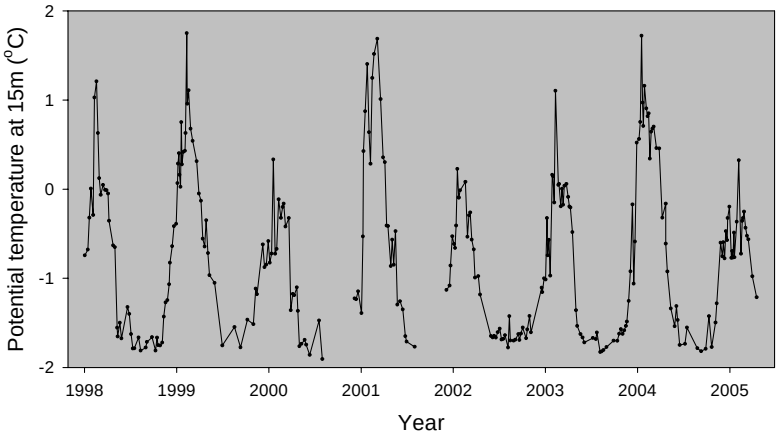
MAGIC - LTMS

Opportunities for the future

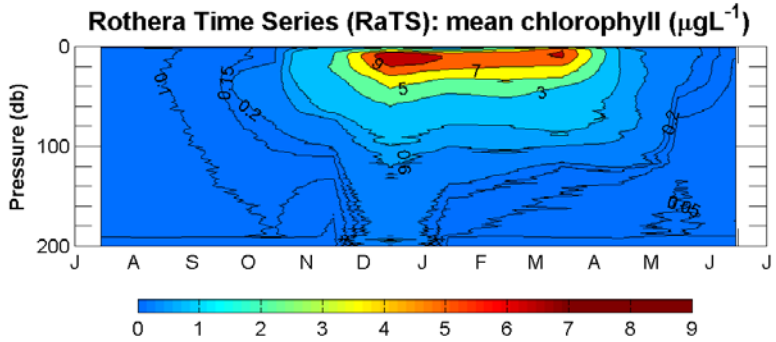
- Adoption of ADD and Landsat mosaic as Google Earth for Antarctica
- Promote ADD as framework for other datasets; BEDMAP, ADMAP, geosciences GIS
- AFI 8 proposal for glacier volume and sea level change using new methods

Biological Sciences

Rothera Oceanographic and Biological Time-Series (RaTS)



Ecologically significant interannual variability in temperature at 15m depth



Long-term mean (1997-2005) seasonal picture of chlorophyll (note contours showing flux at height of bloom)

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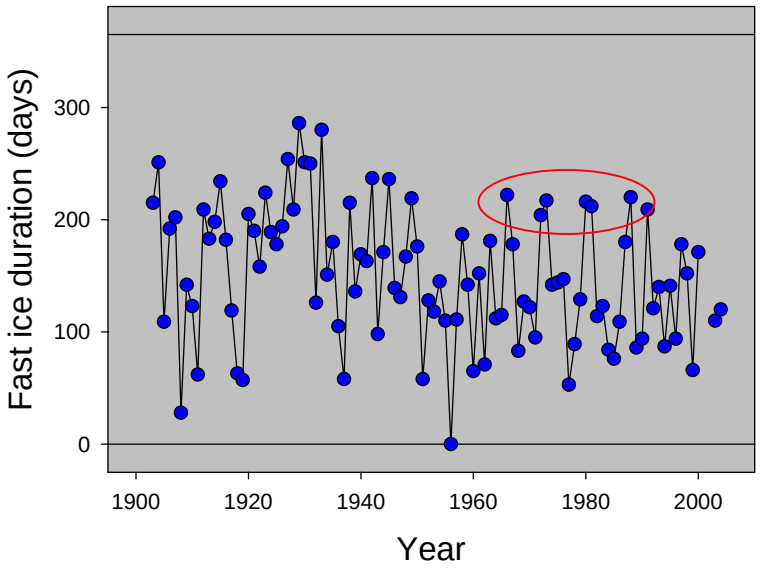
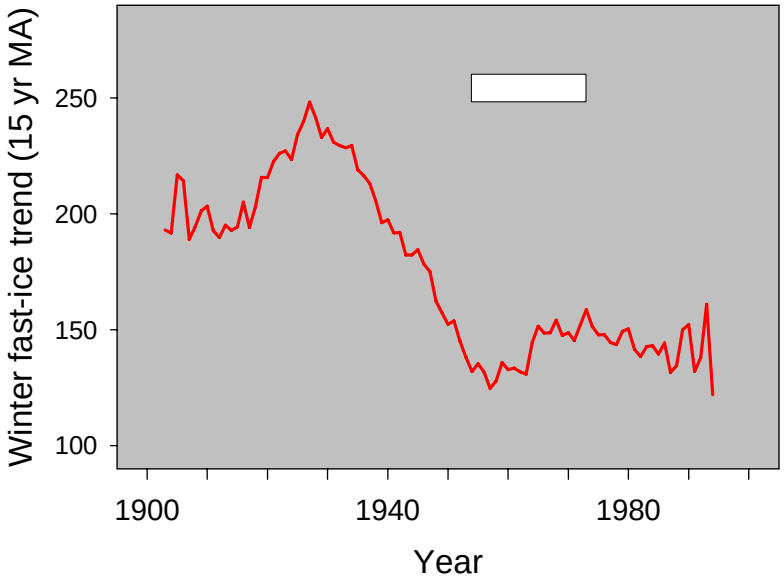
Biological Sciences

Signy sea-ice camera

Winter ice duration in South Orkney Islands



Raw data. Note 4 complete ACW cycles (red oval)



Trend (15-year running mean to remove effect of ACW). Note long-term decline in pre-satellite era

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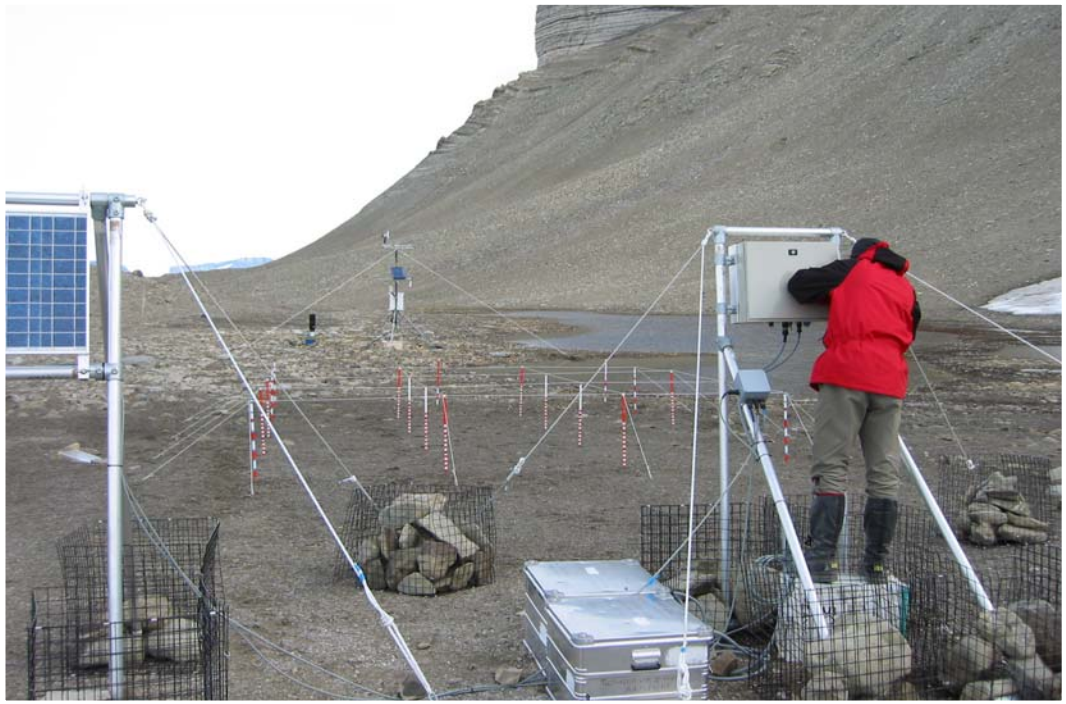
Biological Sciences

Biological Survey

•Task 5 (microclimate of terrestrial ecosystems): automatic weather stations installed at Mars Oasis and Coal Nunatak

•Task 6 (macrobe survey): samples collected from Alexander Island for analyses of plant and invertebrate community structure.



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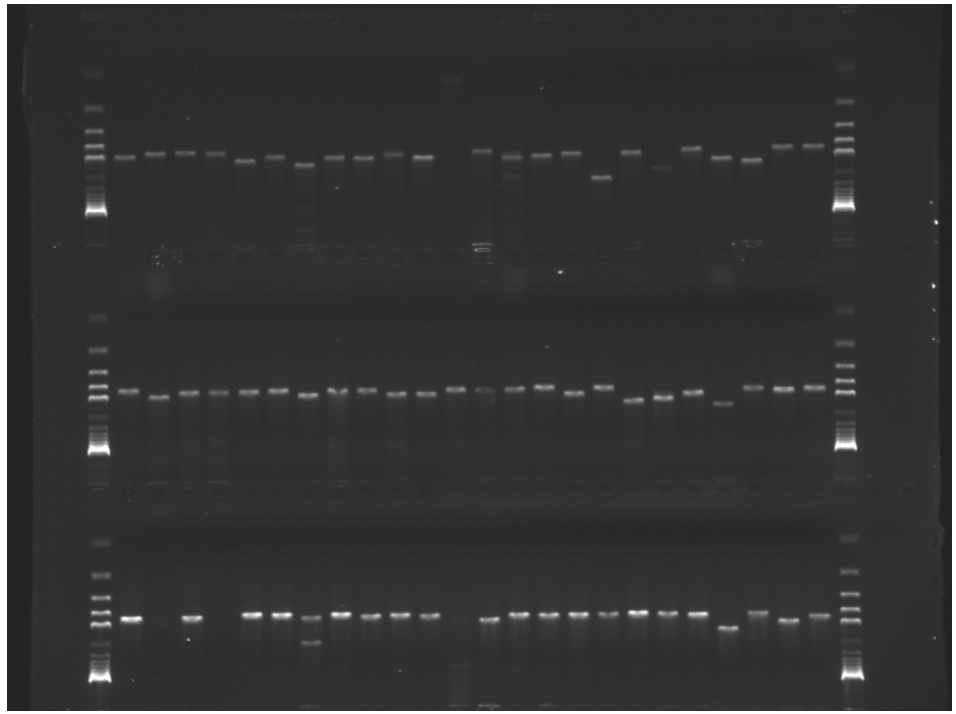
Biological Survey

•Task 7 (metagenomics):
DNA extracted from soil samples collected at Mars Oasis and seawater samples collected in the Scotia Sea



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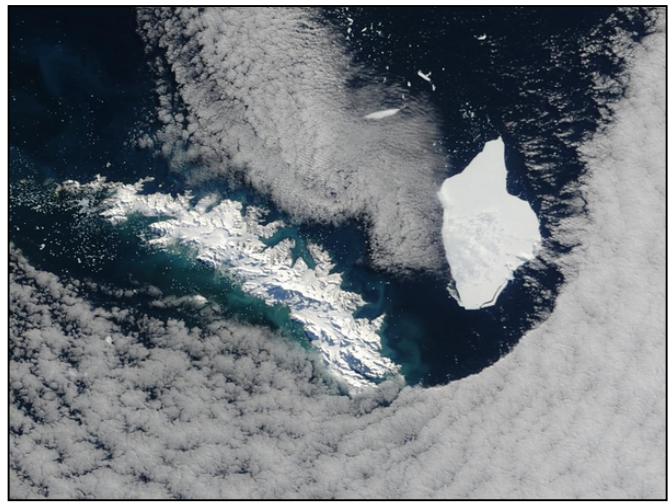
Biological Sciences

CCAMLR



- Development of a database to hold higher predator (seals, albatross and penguin) diet & demography data 1986-2006, and beyond
- Easier access to LTMS data for BAS research and improved provision of data to CCAMLR

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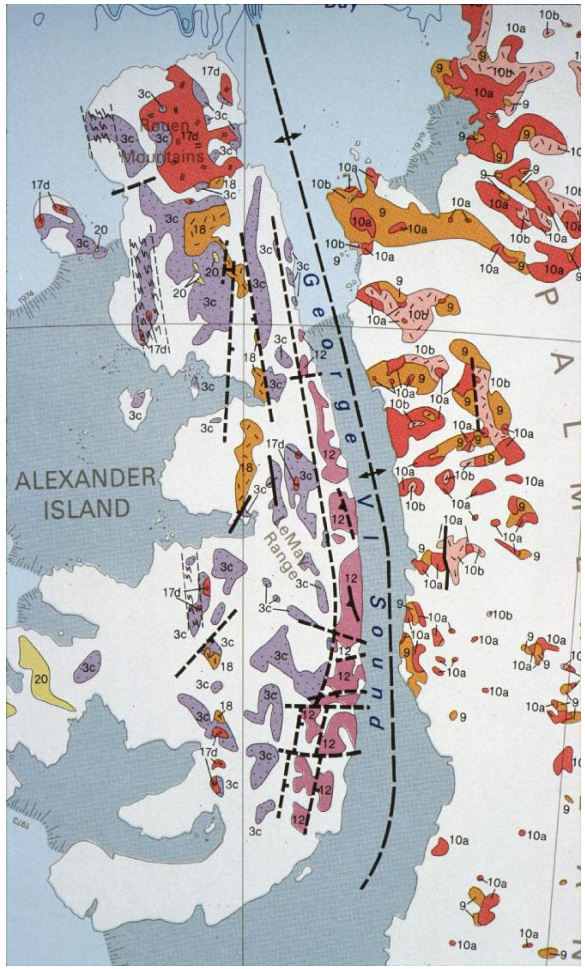
Geological Sciences

Geological mapping



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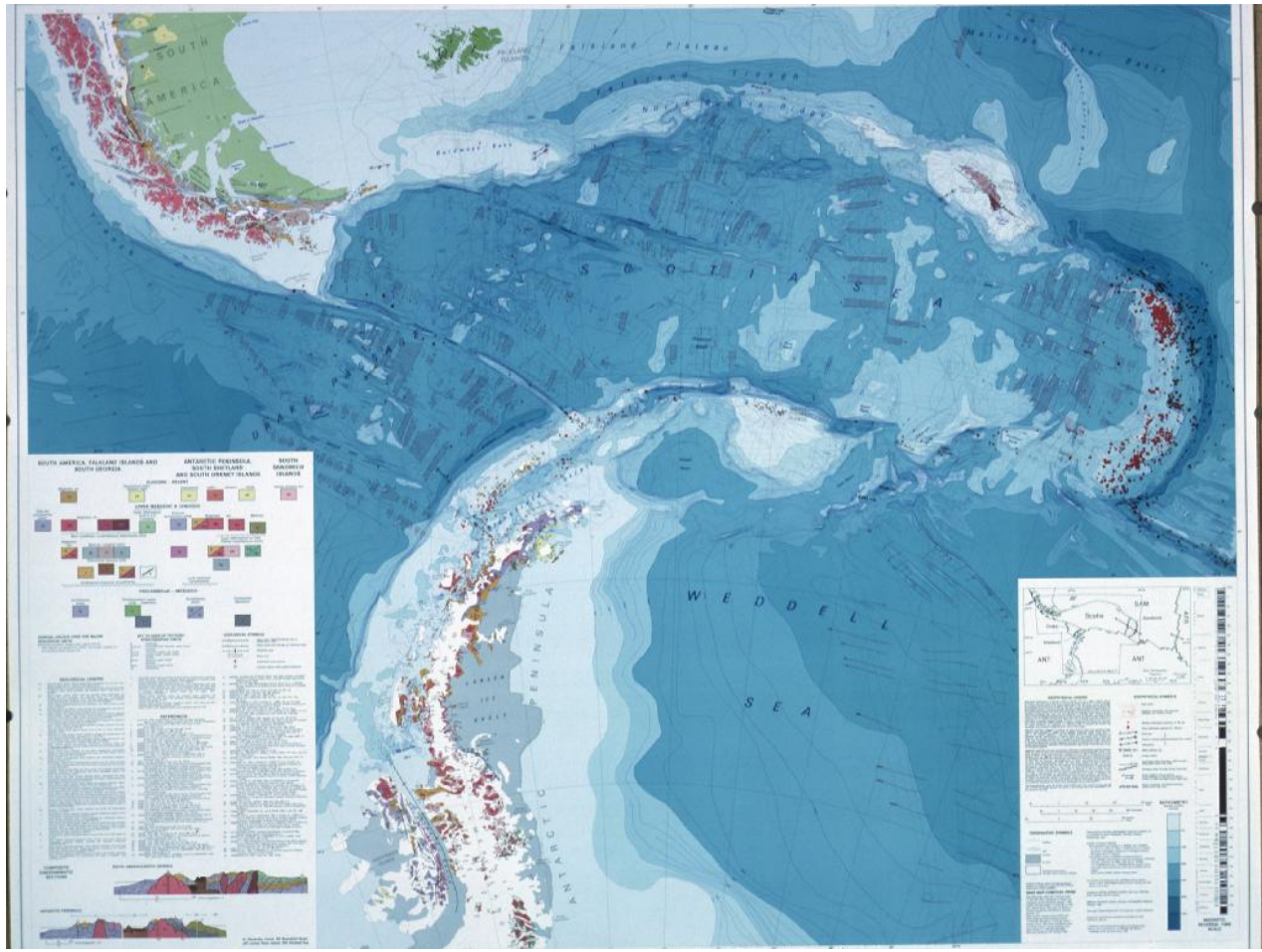
Geological Sciences

Tectonic Map of the Scotia Arc

Major collaborative project – GSD, MAGIC, U. Texas Inst. Geophysics; 2007-09



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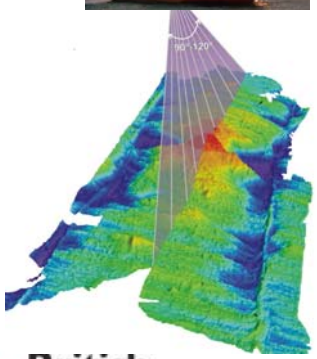
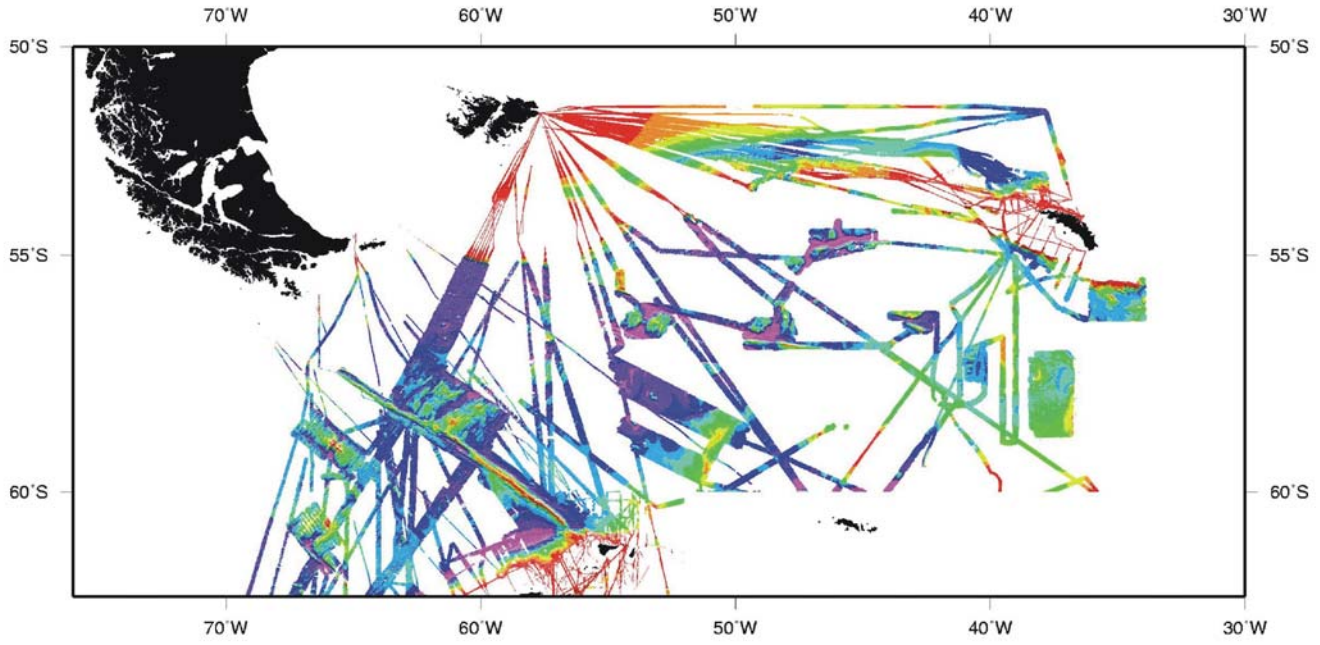
Geological Sciences

Swath bathymetry

- One of the World's best systems
- Provides road map for marine science





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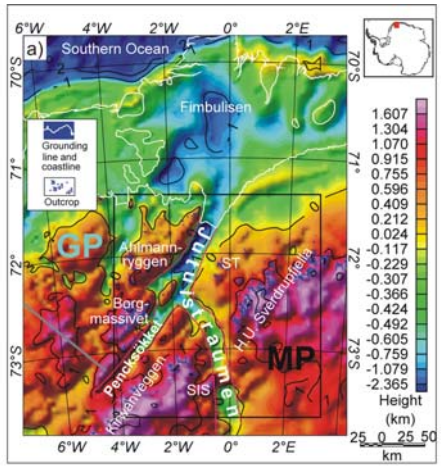
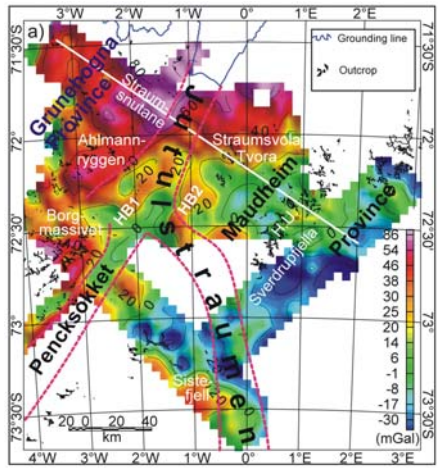
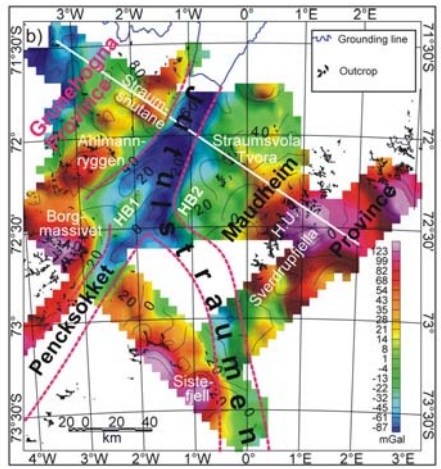
Geological Sciences

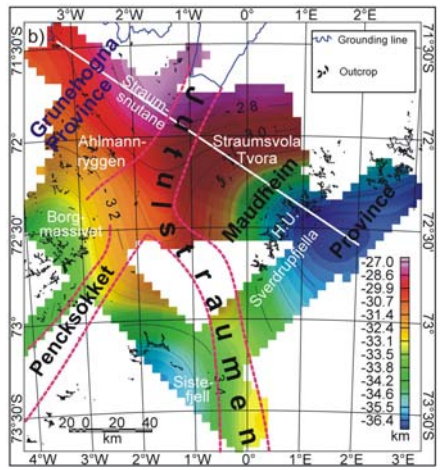
Aerosurvey

- Magnetics
- Gravity
- Radio-echo sounding
- 5-year plan:
  - Integration of data in GIS
  - Surveys: Antarctic Peninsula, Glaciological









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Physical Sciences

Isostatic rebound monitoring – GPS station

- To be deployed 06/07 on Dyer Plateau
- Links US WAIS GPS network to N. Peninsula networks & GRACE.
- New power platform (“LPM on steroids”) – 7.5 W in winter, 45W in summer. Rapid deploy.

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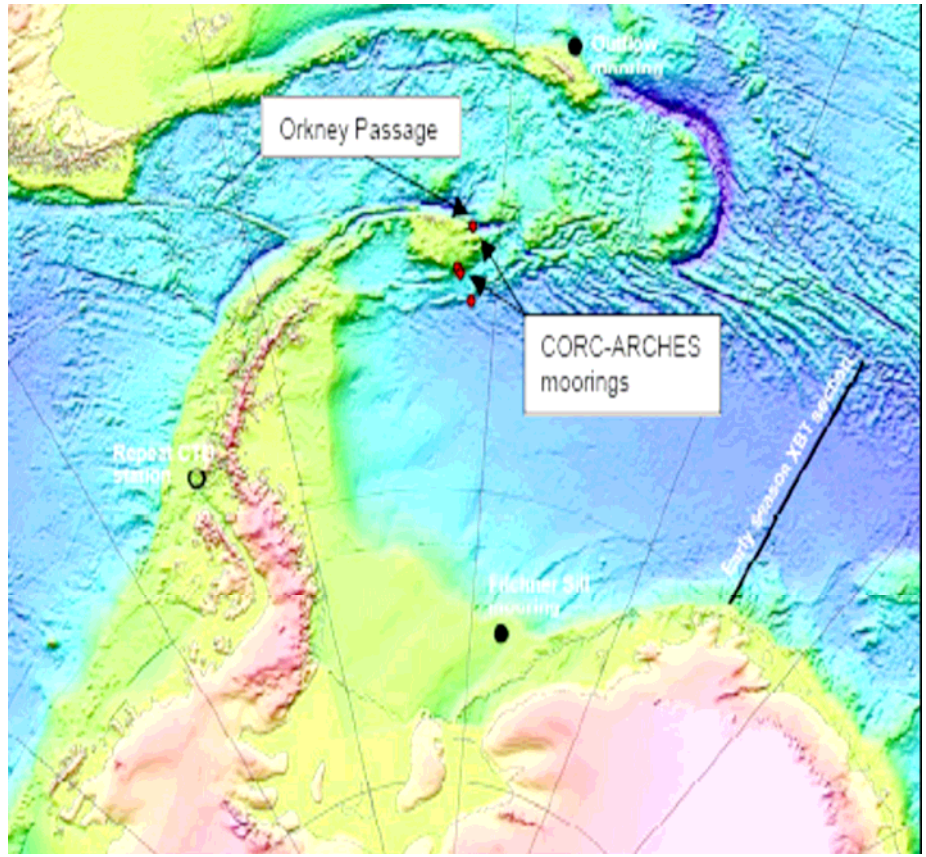
Physical Sciences

Oceanography – CTD moorings

- Deploy last season of Orkney Passage mooring – AABW outflow from Weddell
- Links (MoU) with Lamont Doherty mooring network in same region.
- Initial Marguerite Trough survey completed



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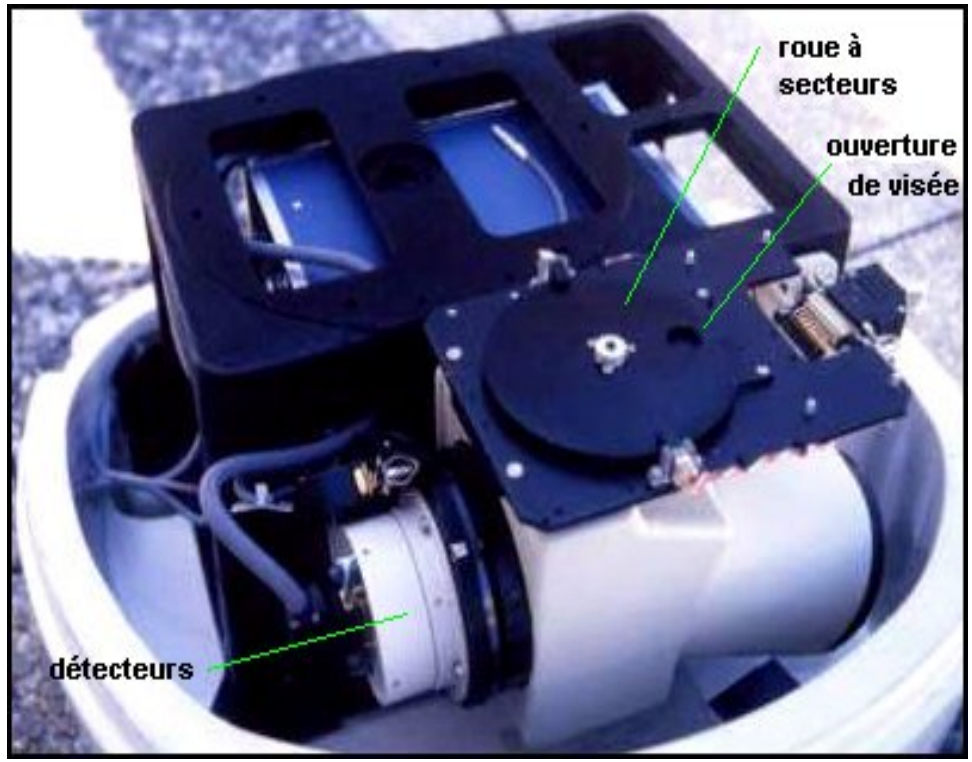
Physical Sciences

Ozone @ R – instrument replacement

- Replacement SAOZ instrument to be deployed at Rothera 06/07: ozone + NO_2 measurements.
- Fully automatic instrument
- Critical ozone hole edge region



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Physical Sciences

Atmospheric & Oceanographic Monitoring:Highlights

- Turner et al paper on tropospheric warming.
  - Classic use of LTMS; reward for painstaking work in creating validated database (READER)
- Meredith et al paper on fresh water content of Ryder Bay (RaTS).
  - Finding that dominant freshwater source is not sea ice melt but meteoric water (glacial ice melt).
- Espy et al on (Swedish) mesosphere temperature monitoring.
  - 10 year data set required to quantify effect of solar proton events on atmosphere.

Some issues for the future

- Is the sum greater than the parts?; interdisciplinary LTMS
- Stakeholder consultation
- NERC FAB: Capability v Programme

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