SSG – Geosciences Report

EXCOM Meeting – 22 July 2013
Outline

• New officers
• Progress & successes
• New involvements
• Issues and requests
New SSG-GS Officers Elected in Portland – 2012

- Berry Lyons (USA) – Chief Officer
- Jesús Galindo-Zaldivar (Spain) – Deputy
- Naresh Pant (India) – Secretary
Bedmap2: improved ice bed, surface and thickness datasets for Antarctica – Fretwell et al., 2013, The Cryosphere, 7:375-393

– Contributions from 13 different countries
Bedmap2: improved ice bed, surface and thickness datasets for Antarctica


1British Antarctic Survey, Cambridge, UK
2School of Geographical Sciences, University of Bristol, UK
3Lamont-Doherty Earth Observatory of Columbia University, Palisades, USA
4Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy
5School of Geosciences, University of Aberdeen, UK
6Institute for Geophysics, University of Texas at Austin, USA
7Centro de Estudios Científicos, Santiago, Chile
8Laboratoire de Glaciologie, Université Libre de Bruxelles, Brussels, Belgium
9Earth and Space Sciences, University of Washington, Seattle, USA
10Department of Geography, Swansea University, Swansea, UK
11Federal Institute for Geosciences and Natural Resources, Hannover, Germany
12National Space Institute, Technical University of Denmark, Denmark
13National Institute of Polar Research, Tokyo, Japan
14Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA
15Electrical Engineering & Computer Science, University of Kansas, Lawrence, USA
16Stockholm University, Stockholm, Sweden
17St. Olaf College, Northfield, MN 55057, USA
18Alfred Wegener Institute, Bremerhaven, Germany
19Norwegian Polar Institute, Fram Centre, Tromso, Norway
20NASA Wallops Flight Facility, Virginia, USA
21College of Science, University of Canterbury, Christchurch, New Zealand
22Department of Geosciences, University of Oslo, Norway
23Institute for Geology and Mineral Resources of the World Ocean, St.-Petersburg, Russia
24Earth Research Institute, University of California in Santa Barbara, USA
25Norwegian Polar Institute, Tromso, Norway
26Department of Earth System Science, University of California, Irvine, USA
27National Institute of Polar Research, Tokyo, Japan
28Polar Marine Geosurvey Expedition, St.-Petersburg, Russia
29School of Physical Sciences, University of California, Irvine, USA
30Environment Department, University of York, Heslington, York, YO10 5DD, UK
31Department of Sustainability, Environment, Water, Population and Communities, Australian Antarctic Division, Hobart, Tasmania, Australia
32School of Geography, Politics and Sociology, Newcastle University, Newcastle upon Tyne, NE1 7RU, UK
Coverage of datasets used to construct ice thickness

Fretwell et al., 2013
Ice thickness

Fretwell et al., 2013
Progress & Successes 2

Antarctic Digital Magnetic Anomaly Project (ADMAP) – e.g. M. Ghidella (Argentina)

– Meeting in Korea next week to:
  • Establish ADMAP-2
  • Compile data collected over the last decade

http://www.dna.gov.ar/mararg/admap/
Antarctic Permafrost, Soils and Periglacial Environments (ANTPAS) – e.g. M. Guglielmin (Italy) & G. Vieira (Portugal)

– A series of important publications demonstrating warming in both the Peninsula region and NVL
Climate warming and permafrost dynamics in the Antarctic Peninsula region

J. Bockheim a,*, G. Vieira b, M. Ramos c, J. López-Martínez d, E. Serrano e, M. Guglielmin f, K. Wilhelm a, A. Nieuwendam b

a Department of Soil Science, University of Wisconsin, Madison, WI 53706-1298, USA
b Center of Geographic Studies, IGOT, University of Lisbon, Lisbon, Portugal
c Department of Physics, University of Alcalá, Madrid, Spain
d Departamento Geología y Geociencias, Facultad de Ciencias, Universidad Autónoma de Madrid, 28049 Madrid, Spain
e Departamento Geográﬁca, Universidad de Valladolid, 47011 Valladolid, Spain
f Department of Theoretical & Applied Science, Imola University, Varese, Italy

ABSTRACT

Dramatic warming of the climate over the last several decades has influenced the properties and distribution of permafrost in the Antarctic Peninsula region. Five approaches were used to estimate the distribution of permafrost in the region: (1) correlation of permafrost distribution with mean annual air temperature isotherms, (2) mapping the distribution of periglacial features indicative of permafrost, (3) summarizing data from shallow excavations and boreholes, (4) detection of permafrost from geophysical techniques, and (5) application of models to predict the occurrence of permafrost. Whereas permafrost is continuous in the South Orkney Islands (60°-61°S) and along the eastern Antarctic Peninsula (63°-64°S), it is discontinuous in the South Shetland Islands (62°-63°S), and occurs only sporadically in the Palmer Archipelago and Biscoe Islands along the western Antarctic Peninsula (64°-66°S). Permafrost then becomes continuous on Alexander Island (71°-74°S) along the western Antarctic Peninsula as the maritime climate shifts to a more continental climate. Reports prior to 1980 mention the presence of permafrost at depths of 25 to 35 cm in ice-free areas near Palmer Station (64°46′S, 64°04′W), where the mean annual air temperature from extrapolation of data from the nearby Vernadsky Station has increased 3.4 °C and the mean winter temperature has increased 6 °C since 1950. Recent measurements suggest that permafrost is absent or close to 0 °C in the upper 14 m of the highest ice-free areas (67 m a.s.l.) near Palmer Station. Permafrost temperatures elsewhere along the western Antarctic Peninsula region range from −0.4 to −1.8 °C in the South Shetland Islands (62°-63°S) to −3.1 °C at Adelaide Island (67°34′S). Permafrost at this temperature is susceptible to thawing, which has resulted in historic increases in active-layer thicknesses and in thermokarst features such as debris flows, and active-layer detachment slides.

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Distribution of permafrost in ice-free areas

Bockheim et al. (2013)
A permafrost warming in a cooling Antarctica?

Mauro Guglielmin • Nicoletta Cannone


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Abstract The magnitude and even direction of recent Antarctic climate change is still debated because the paucity of long and complete instrumental data records. While along Antarctic Peninsula a strong warming coupled with large retreat of glaciers occurred, in continental Antarctica a cooling was recently detected. Here, the first existing permafrost data set longer than 10 years recorded in continental Antarctica is presented. Since 1997 summer ground surface temperature showed a strong warming trend (0.31°C per year) although the air temperature was almost stable. The summer ground surface temperature increase seemed to be influenced mainly by the increase of the total summer radiation as confirmed also by the increase of the summer thawing degree days. In the same period the active layer exhibited a thickening trend (1 cm per year) comparable with the thickening rates observed in several Arctic locations where air warming occurred. At all the investigated depths permafrost exhibited an increase of mean annual temperature of approximately 0.1°C per year. The dichotomy between active layer thickness and air temperature trends can produce large unexpected and unmodelled impacts on ecosystems and CO₂ balance.
International Bathymetric Chart of the Southern Ocean (IBCSO) – HW Schenke (Germany)

– Arndt et al., 2013 *Geophysical Research Letters, 40*

• Contributions from 14 different countries
• ALSO [www.ibcso.org](http://www.ibcso.org) – download your own!
IBCSO
Source identification grid

Arndt et al., 2013
IBCSO

Shetland Islands Region

IBCSO results

comparison to GEBCO_08

Arndt et al., 2013
New Involvements

• Proud and excited of our contributions to the Scientific Research Programs:
  – PAIS & SERCE

• Planning 12th ISAES in Gao, India in 2015
  – GSL Special Publication Series is desired
Issues and Requests

• Need increased participation of early career geoscientists
  – Especially from countries whose Antarctic programs are less developed
• Stronger linkages between the SSGs
• Discontinue Seeps and Vents in Antarctica (SAVANT)
• $20,000 for 12th ISAES to invite/support plenary speakers
QUESTIONS ?