



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



Progress & Successes 1

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

Fretwell et al., 2013

P. Fretwell^{1,4}, H. D. Pritchard^{1,4}, D. G. Vaughan¹, J. L. Bamber², N. E. Barrand¹, R. Bell³, C. Bianchi⁴, R. G. Bingham⁵, D. D. Blankenship⁶, G. Casassa⁷, G. Catania⁶, D. Callens⁸, H. Conway⁹, A. J. Cook¹⁰, H. F. J. Corr¹, D. Damaske¹¹, V. Damm¹¹, F. Ferraccioli¹, R. Forsberg¹², S. Fujita¹³, Y. Gim¹⁴, P. Gogineni¹⁵, J. A. Griggs², R. C. A. Hindmarsh¹, P. Holmlund¹⁶, J. W. Holt⁶, R. W. Jacobel¹⁷, A. Jenkins¹, W. Jokar¹⁸, T. Jordan¹, E. C. King¹, J. Kohler¹⁹, W. Krabill²⁰, M. Riger-Kusk²¹, K. A. Langley²², G. Leitchenkov²³, C. Leuschen¹⁵, B. P. Luyendyk²⁴, K. Matsuoka²⁵, J. Mouginot²⁶, F. O. Nitsche³, Y. Nogi²⁷, O. A. Nost²⁵, S. V. Popov²⁸, E. Rignot²⁹, D. M. Rippin³⁰, A. Rivera⁷, J. Roberts³¹, N. Ross³², M. J. Siegert², A. M. Smith¹, D. Steinhage¹⁸, M. Studinger³³, B. Sun³⁴, B. K. Tinto³, B. C. Welch¹⁸, D. Wilson³⁵, D. A. Young⁶, C. Xiangbin³⁴, and A. Zirizzotti⁴

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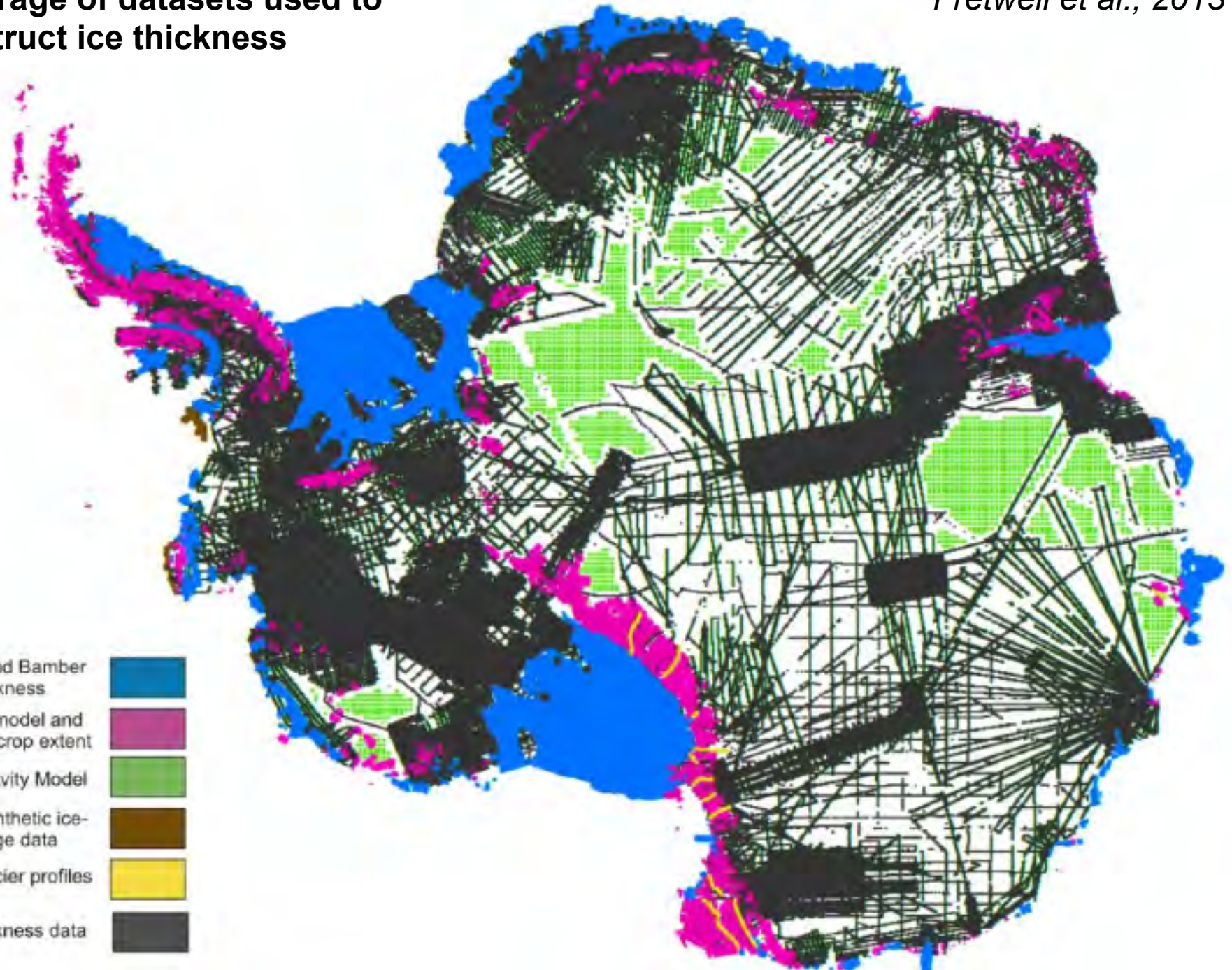
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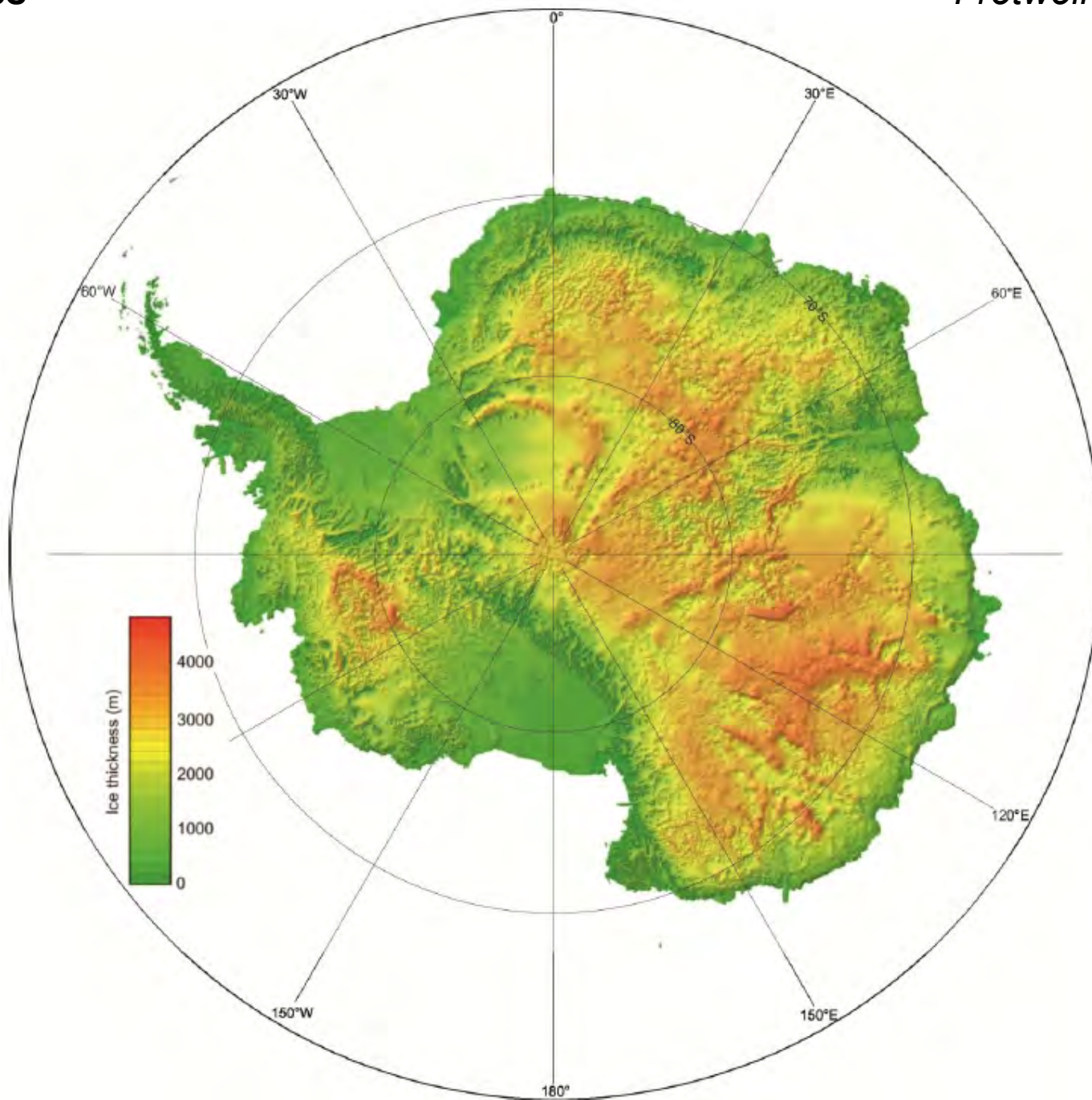
Coverage of datasets used to construct ice thickness

Fretwell et al., 2013



Ice thickness

Fretwell et al., 2013



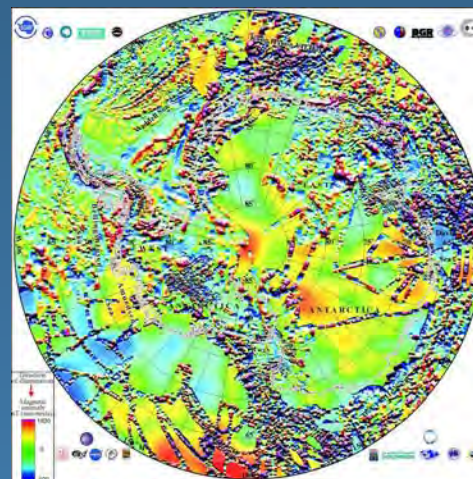
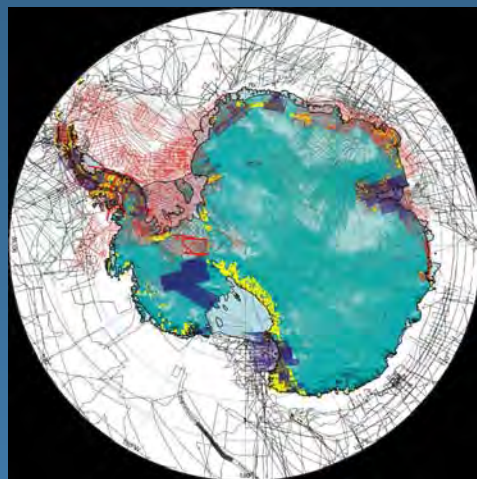


Progress & Successes 2

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

– Meeting in Korea next week to:

- Establish ADMMap-2
- Compile data collected over the last decade



<http://www.dna.gov.ar/mararg/admap/>





Progress & Successes 3

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

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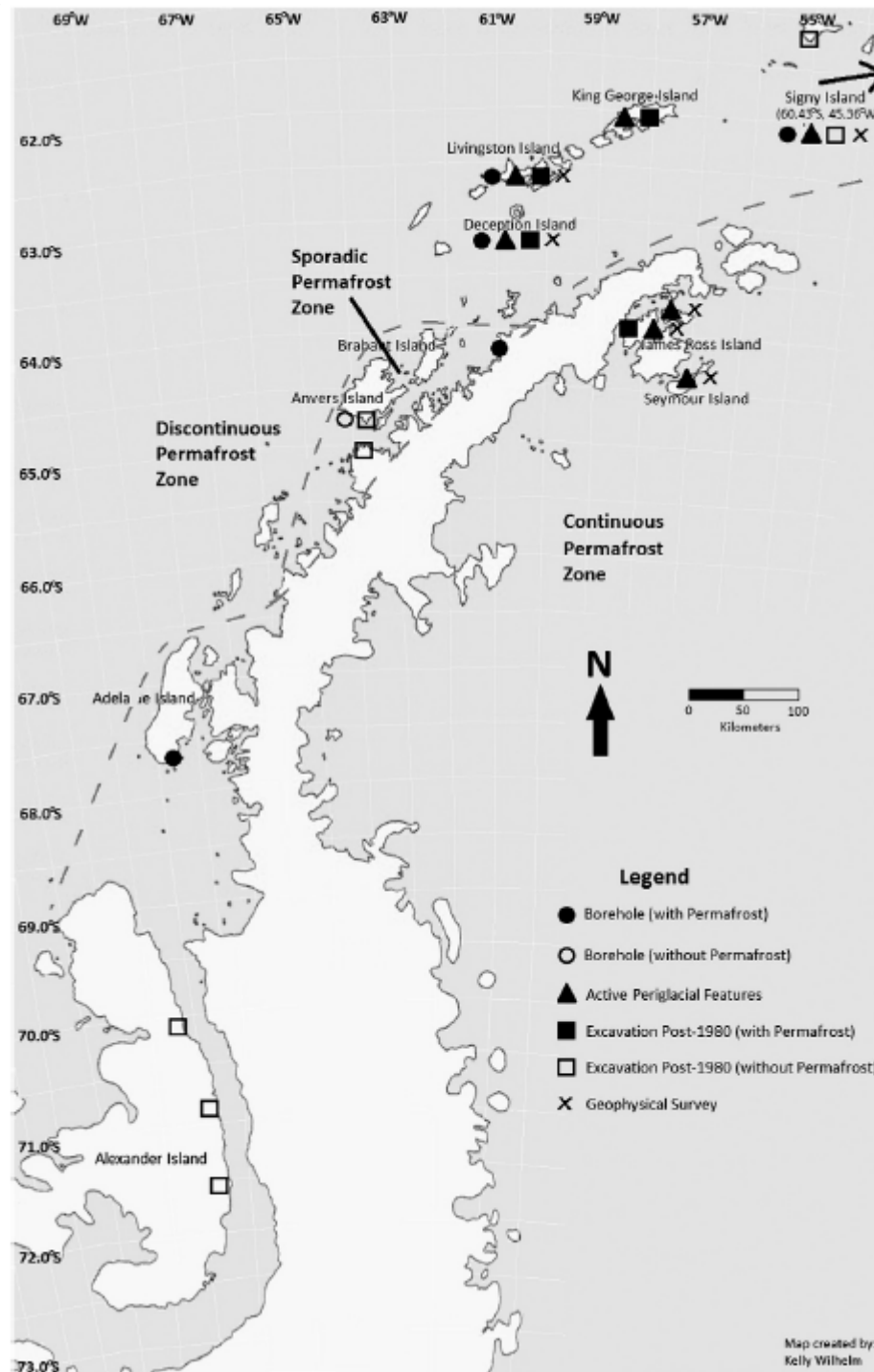
Periglacial features

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 (63–65°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

(2012) *Climatic Change*, **111**, 177-195

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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 CO_2 balance.



Progress & Successes 4

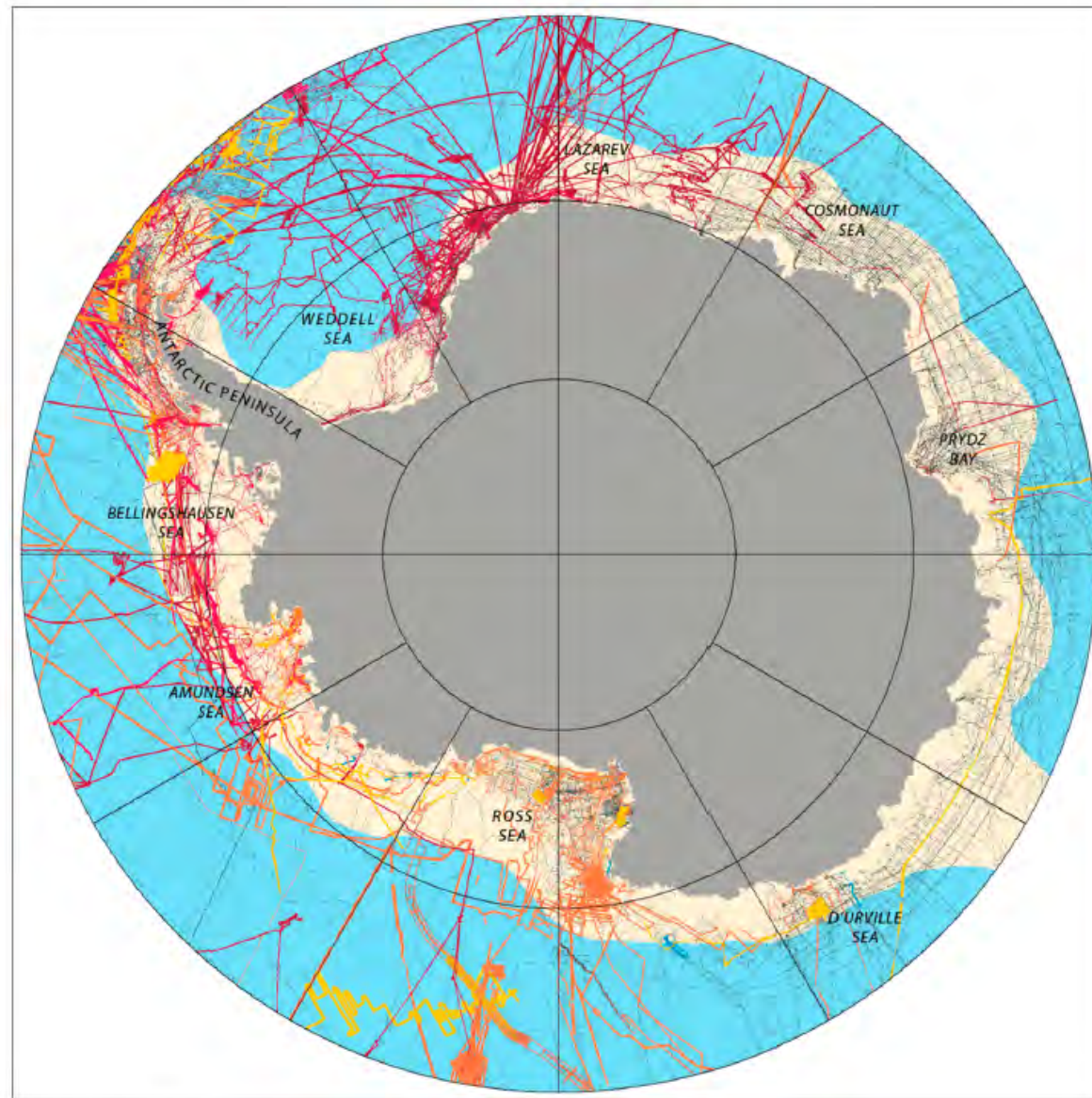
International Bathymetric Chart of the Southern Ocean (IBCSO) – HW Schenke (Germany)

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

- Contributions from 14 different countries
- ALSO www.ibcso.org – download your own!

IBCSO

Source
identification
grid



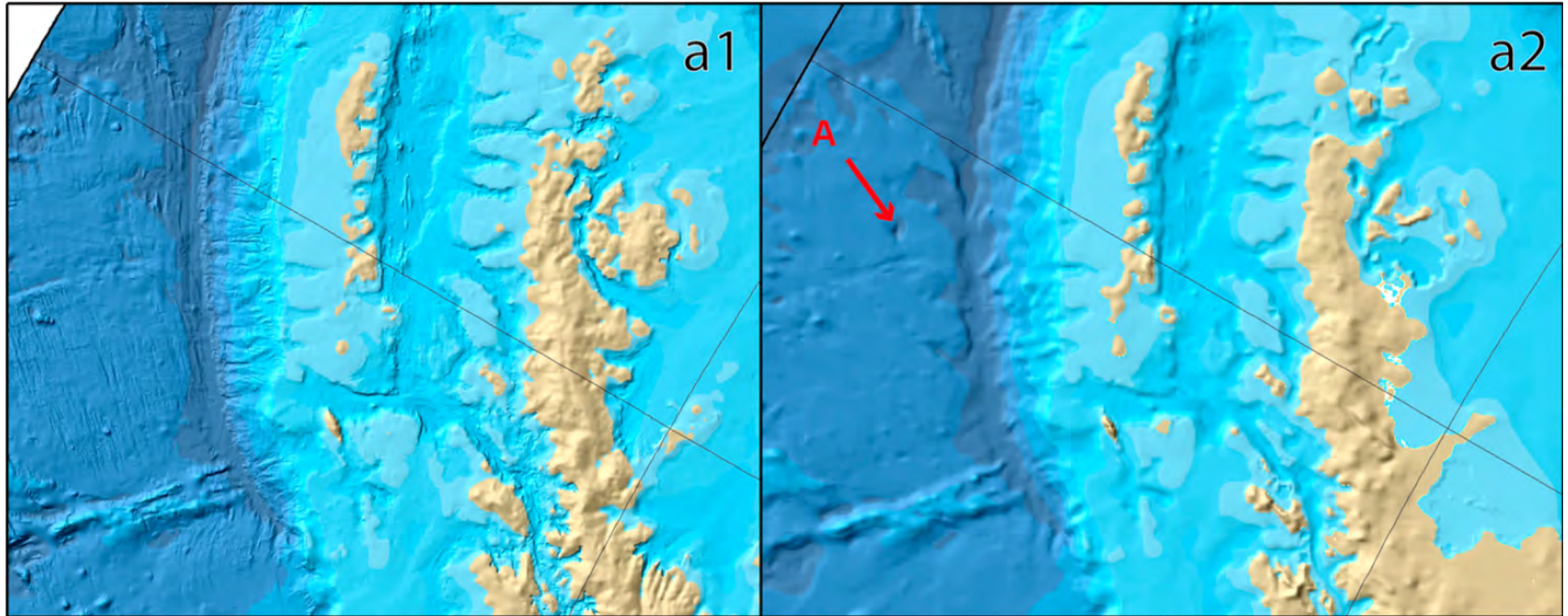
Data Sources

- Multibeam from AWI
- Multibeam from BAS
- Multibeam from MGDS & NGDC
- Multibeam from other institutions
- Singlebeam

- Various Data
- Interpolated
- GEBCO_08
- Bedmap2
- Pseudo Data

IBCSO

Shetland Islands Region



IBCSO results

comparison to GEBCO_08



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 ?

