



WP 12a
Agenda Item: 4.2.4
Person Responsible: J. Gutt

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Antarctic Thresholds – Ecosystem Resilience and Adaptation (AnT-ERA), 2015/16 report

Executive Summary

Authors: Julian Gutt with SC members

Important Issues or Factors:

Key achievements:

1. Scientific output. Papers, special issues and reviews, published within the scientific scope of AnT-ERA or with specific AnT-ERA support.
2. Capacity building. A cross-program interdisciplinary workshop was organised by AnT-ERA. An opinion survey provides the basis for a mini-symposium during OSC, 2016. Additional workshops were supported.
3. Dissemination. Key "tool" is the AnT-ERA webpage with a total of 72000 hits. Additionally AnT-ERA contributed to SCAR products, e.g. ACCE, AEP, UNFCCC, SCAR strategy plan.
4. Support of early-career scientists. > 20 mini-grants awarded.
5. Research. Leading AnT-ERA scientists acted as PIs of expeditions or their sub-projects.

Recommendations/Actions and Justification:

The plans outlined in the 2013-2016 report / renewal proposal depend on increased contributions to AnT-ERA and assure this is a research community driven "project". This includes a proposal for an event in a continent with emerging national Antarctic programs. Stand-alone features are to be strengthened, administrative word to be skipped.

Budget Implications:

We request US \$ 42 000 for the next 2-year funding period, which is the same yearly amount as provided for 2016 to be allocated according to our financial plan (2013/2016 renewal proposal), dominated by mini-grants for early career scientists, capacity building and dissemination of scientific information.

Introduction/Motivation

The Paris Agreement (UNFCCC COP21) recognized that “climate change represents an urgent and potentially irreversible threat to human societies and the planet...”. The objective of AnT-ERA is to facilitate the science required to determine the vulnerability and resilience of Antarctic biological systems to environmental change.

AnT-ERA is focusing on biological **processes** that reflect a cascade of responses to environmental forcing through three levels of biological organization:

- (1) Molecular and physiological performance
- (2) Population processes
- (3) Ecosystem functions and services.

Activities under the umbrella of AnT-ERA were carried out along our implementation plan. Actions to inform stakeholders and support cross-disciplinary discussions exceeded our goals, however administrative work blocked the scientific success.

AnT-ERA is community-driven, inclusive, and provides independent expertise. It has an active Steering Committee: 17 members from 14 countries and 6 continents incl. APECS representatives and liaison officers; a male:female ratio of 11:8. AnT-ERA is open for all scientists and people interested in Antarctic research, and no membership is required. The mailing list comprises 520 members (May '16).

Progress to Date

I. Five key achievements:

1. **Scientific output** is one of the most important products since AnT-ERA is fundamentally a science program. It contributes to advances in the knowledge on climate-change impacted biological processes. 17 members of the SC published in 2015/2016 >50 peer-reviewed papers. These publications are closely linked to AnT-ERA topics but the very most of them must be considered as the output of the national programs. Concerning interactions between atmosphere/ocean and biosphere we are getting much better informed in where to look, when we are asked to assist in climate change impact assessments. This advance is based on interdisciplinary and cross-program exchange of information to which AnT-ERA contributed significantly.

There are a few exceptional products that had not been published without SCAR (mostly non-financial) support. The review paper, published by Gutt et al. 2015 (GCB 21) in cooperation with ACCE and AntClim²¹ provided results on multiple stressors of SO ecosystems. A special volume of *Biodiversity* highlighted advances at the biomolecular level. A special volume of *Polar Biology* reflects results of a *Polarstern* post-expedition AnT-ERA workshop in Dijon, France in 2015 (chairs: J. Gutt and B. David). Knowledge on the cold limit to adaptation of marine species was reviewed within a novel analysis by Peck (2016).

2. **Capacity building.** Discussions of cutting edge issues in ecosystem- and climate-relevant research organized by AnT-ERA:
 - Cross-Program Workshop *Interactions between Biological and Environmental Processes*, 2015, Barcelona. This workshop integrated disciplines and ecosystems to summarize current knowledge of global and regional processes of antarctic ecosystems.
 - Opinion survey *Time for changes after COP21?*, 2016
 - Mini-workshop (planned) *Time for changes after COP21?*, OSC, 2016.

3. Dissemination.

- 16 web-articles and updated news on the web-site, >72000 clicks since 2013,
- ACCE update,
- contributions to Antarctic Environments Portal (AEP),
- chair sessions and mini-symposia of SCAR events,
- membership of SCAR conference organizing committees,
- mailing list, >520 members,
- contributions to SCAR report to ATCM
- Major contribution to the stakeholder targeted Science Communication Workshop *Antarctic Systems in a Changing World*, Auckland, New Zealand, May 2016.

4. Support of early-career scientists. >20 mini-grants awarded, with emphasis on attending meetings, SCAR (and other) conferences and workshops, e.g. APECS.

5. Research projects. Field work comprised expeditions under the leadership, or with major contributions of SC-members: Isla et al. studied biogeochemical processes at the climate-sensitive Filchner Outflow System (*Polarstern*, 96). Xavier et al. investigated during *James Clarke Ross 15004* dynamics of zooplankton and krill. Cummings was part of the 2015/16 *Cape Adare Expedition* – to understand the impact of environmental change. Di Prisco has been member of the planning committee and participated in three cruises of the *TUNU Euro-Arctic Marine Fishes (TEAM-Fish)* program. The *McMurdo Dry Valley Water Pulse and Press Project* examines the resilience of soil biodiversity and biogeochemical processes (Adams, Wall). *FjordEco* cruise on *RV L.M. Gould* (2015) to study fjord ecosystem dynamics had scientists from five countries including Smith.

II. Primary publications in peer-reviewed journals

>50 AnT-ERA relevant publications on biological processes were published by SC members, supported by national programs. The no. of additional AnT-ERA relevant publications is estimated to be approx. 70.

III. Major reports, including linkages to major SCAR activities

- ACCE update
- *Antarctic Environments Portal*: two web-articles
- 1st SCAR *Antarctic and Southern Ocean Horizon Scan*: major contributions by 5 AnT-ERA SC members
- *IPBES*: reviewing and application to become a member of the work programme
- *COMNAP Antarctic Research Challenges (ARC) Project*: reviewing
- *EU-PolarNet (EPB)*: J. Gutt being member of the *General Assembly*
- *UN-World Ocean Assessment*: J. Gutt being member of the *Pool of Experts*

IV. Other reports and grey literature

- *SCAR Biogeography Atlas*, co-edited by J. Gutt and many scientific contributions
- *Global Soil Biodiversity Atlas* published by the *Global Soil Biodiversity Initiative* that includes text on Antarctic ecosystems chaired by D. Wall
- MPA initiative (Weddell Sea): Major contributions to working papers (Gutt & Isla)

V. Workshops and key meetings organized or supported by AnT-ERA

- SCAR OSC Kuala Lumpur, 2016. Co-convener of conference: I. Schloss; co-convener of sessions and mini-symposia J. Gutt (also IOC), C. Smith, A. Takahashi, J. Xavier
- UNFCCC COP21, Paris, 2015. Talks in events *Irreversible Thresholds* and *Species Conservation in a Changing Climate*: J. Gutt.
- SCAR-EXCOM meeting, Tromsø. J. Gutt
- PEI workshop, Hannover, 2015. co-convener: J. Xavier.
- APECS World Summit, Bulgaria, 2015. Co-convenor: J. Xavier
- VII Portuguese Polar Conference, Évora, 2015. Co-convener: J. Xavier.
- ANTOS-workshop, Hamilton, NZ, 2015. Co-convener: V. Cummings.
- Antarctic Earth Science Meeting, Loveland, USA, 2015. Co-convener: B. Adams.
- Gordon Research Conference on Polar Marine Science, Lucca, Italy, 2015. Invited: A. Takahashi

VI. Capacity building and education outreach activities

Capacity building was a major task of workshops organized by AnT-ERA (see section V, above). Another objective was supervision of students.

We got new groups involved, e.g. the SCOR sea-ice group BEPSII.

AnT-ERA SC members are active in the SCAR CBET, reviewing fellowships proposals.

VII. New data and/or meta-data (including plans for archiving)

Primary data are uploaded to public repositories, such as *ANTABIF*, *GenBank*, *PANGAEA*, *Polar Data Centre* (BAS), *McMurdo LTER*, *Palmer LTER* and *NCBI SRA* (Bethesda, Maryland, USA).

VIII. Communication and promotion activities.

The AnT-ERA webpage is the central tool for the program's outreach. Since 2015 16 web-articles have been uploaded. The number of visits for 3 years is >72 000 (June '16). It also comprises *News* providing information on events, opportunities for jobs, expeditions, courses etc. Documents are available, e.g. mission statement, implementation plan, reports.

Outreach activities of SC members are numerous. Merchandizing articles have been produced.

J. Gutt is member of the writing team of the new SCAR Strategic Plan.

IX. Linkages to other SCAR groups, international programmes and other activities

Major contributions by SC members to *1st SCAR Antarctic and Southern Ocean Horizon Scan*.

SCAR Cross-Program Workshop in 2015, Barcelona, Spain, organized primarily by AnT-ERA SC members and linking ideas by AntEco, AntClim²¹, ICED, BEPSII, PAIS, EGBAMM, and IPCC.

AnT-ERA activities are linked to the LSSSG. For other events with AnT-ERA cooperation see Section V (above).

AnT-ERA representatives supported the *Interdisciplinary Antarctic Earth Sciences Meeting and Shackleton Camp Planning Workshop*, Sept. 2015.

L.S. Peck was awarded the *Plymouth Marine Science and Education Foundation* silver medal in 2015.

Plans for 2016/2017

- Discussions on new interdisciplinary concepts, next step is the mini-workshop "*Time for changes after COP21?*" OSC, 2016.
- Contributions to the SCAR Biology Symposium in 2017 in Belgium.
- Preparation of the SCAR/IASC OSC in Davos, Switzerland
- Improved inclusion of emerging national programs holding a topical workshop in a country with emerging Antarctic program (after 2017).
- AnT-ERA offered to contribute to an IPCC "Special Report" and to IPBES.
- Contribution to research activities.
- Strengthening an Arctic-Antarctic scientific dialogue.

Recommendations

AnT-ERA has an active SC and is also "community driven". We encourage the delegates to promote AnT-ERA within their nation research communities to the benefit of the national programs and of the AnT-ERA community. To extend the community interaction AnT-ERA will have a request for a proposal to organise a summer school hosted by a country with an emerging national program.

An improved cooperation between SCAR Development Council and SRPs and identification of third-party funding opportunities could improve SCAR-specific research.

The involvement of established experts in AnT-ERA issues, e.g. acting as new SC members or contributing significantly to AnT-ERA workshops was successful. The inclusion of newly emerging programs is a major vision of AnT-ERA. It demands intensive communication over longer periods to identify common ideas and to develop joint actions.

If SCAR agrees with the recommendation of reviewers to increase the outreach efficiency and carry out bibliographic surveys additional resources must be provided or mini-grants have to be cut down substantially. As an alternative we propose to strengthen our core competence and stand-alone features (see implementation plan) and skip administrative duties, which blocked the scientific output of AnT-ERA.

Sound statistics separating emerging national programs from others, as recommended by one reviewer, is only feasible if a generally acceptable definition is provided.

Expected Outcomes

AnT-ERA will

- continue to focus on the five categories of key achievements (above),
- improve its performance based on the 2016 review and SCAR recommendations and
- refer to its plans for 2016/2017 (see above and implementation plan).