Antarctic Thresholds – Ecosystem Resilience and Adaptation (AnT-ERA)

2018-19 Report

Report Author(s)
Julian Gutt with contributions from SSC members (from Argentina, Canada, Germany, Italy, Japan, New Zealand, Portugal, South Korea, Spain, UK, USA).

Summary
1. Capacity building. (a) A course on "Biological Processes in Antarctic Ecosystems" in Buenos Aires, Argentina, for 44 graduate, PhD students and post-docs from ten countries held by ten AnT-ERA lecturers and local experts, hosted by the Instituto Antártico Argentino and made possible by SCAR support.

2. Support for early-career scientists. (a) Most of the 2018 budget used for spring course for ECS, see above. (b) In addition, nine mini-grants were awarded in 2018 to ECS from six countries.

3. Scientific output. (a) A half-day workshop on "Antarctic and Arctic Ecosystems" chaired by AnT-ERA (Gutt) and IASC/Marine Working group (Kedra & Cooper) with approx. 100 participants as side event of the 2018 OSC. The protocol provides the basis for a unique SCAR manuscript to be published in 2019.

4. Dissemination. (a) AnT-ERA contributed significantly to the 2019 ACCE update to the ATCM, (b) to the first Global Assessment of the IPBES, (c) to SOOS initiatives. (d) The article on "Antarctic Marine Biodiversity" was published online by the "Antarctic Environments Portal" with contributions from AnT-ERA. (e) Announcements for events and job opportunities are sent regularly, approx. twice per months, to the approx. 520 mailing list members.

5. Final scientific outcome of AnT-ERA. A synthesis workshop "Most important findings 2010-2020 on biological processes in Antarctica and the Southern Ocean" in Coimbra, Portugal is in an advanced stage of preparation. The structure will provide the basis for a paper, being a unique SCAR output, eventually partly in assessment style, to be published before the 2020 OSC, where the results are to be presented.

6. Miscellaneous. (a) Support of the 2018 OSC with key notes and chairman-ship of sessions. (b) International events were co-chaired by AnT-ERA SC members and key notes were given, e.g. on sea-ice and polar environments.
SRP updates since 2018 Delegates Meeting

What has been achieved?

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 June ‘18</td>
<td>&quot;Antarctic and Arctic Ecosystems&quot; brainstorming workshop, chaired by AnT-ERA/IASC, OSC, Davos.</td>
</tr>
<tr>
<td>23 - 29 Sept ‘18</td>
<td>Spring Course &quot;Biological Processes in Antarctic Ecosystems&quot; for ECS, Buenos Aires, Argentina.</td>
</tr>
</tbody>
</table>

What lies ahead?

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 - 27 June ‘19</td>
<td>Synthesis-workshop &quot;Biological Processes in Antarctic Ecosystems – Advances and Highlights&quot;, Coimbra, Portugal.</td>
</tr>
<tr>
<td>June ‘19 – July ‘20</td>
<td>Outreach on major findings of the synthesis workshop, implementation to be discussed during the workshop.</td>
</tr>
<tr>
<td>June ‘19 – July ‘20</td>
<td>Writing a synthesis paper.</td>
</tr>
<tr>
<td>August 2020</td>
<td>Presentation of final output at SCAR OSC, Hobart.</td>
</tr>
</tbody>
</table>

SRP planned final products (including related to OSC2020)

<table>
<thead>
<tr>
<th>Date</th>
<th>Output/product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before August 2020</td>
<td>Publication of the results of the &quot;Antarctic and Arctic Ecosystems&quot; brainstorming workshop in a peer-reviewed journal</td>
</tr>
<tr>
<td>Before August 2020</td>
<td>Publication of the results of the &quot;Biological Processes in Antarctic Ecosystems – Advances and Highlights&quot; synthesis workshop in a peer-reviewed journal</td>
</tr>
<tr>
<td>August 2020</td>
<td>Presentation of final output, details to be discussed and decided during the Coimbra workshop in June 2019</td>
</tr>
</tbody>
</table>

Budget

Changes to planned use of funds for 2019 and 2020

<table>
<thead>
<tr>
<th>Year (YYYY)</th>
<th>Purpose/Activity</th>
<th>Amount (in USD)</th>
<th>Contact Name</th>
<th>Contact Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>Coimbra synthesis workshop</td>
<td>34,000</td>
<td>J. Gutt</td>
<td><a href="mailto:Julian.gutt@awi.de">Julian.gutt@awi.de</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>J. Xavier</td>
<td><a href="mailto:jxavier@zoo.uc.pt">jxavier@zoo.uc.pt</a></td>
</tr>
<tr>
<td>2020</td>
<td>ECS/OSC</td>
<td>4,000</td>
<td>Several NN</td>
<td></td>
</tr>
<tr>
<td>2019/20</td>
<td>ECS/Miscellaneous</td>
<td>4,000</td>
<td>J. Gutt</td>
<td><a href="mailto:Julian.gutt@awi.de">Julian.gutt@awi.de</a></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>42,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Membership

No changes since 2018, no changes expected until the end of the AnT-ERA life period in 2020.

SCAR Fellowship Reviewers

(Please list any people (name and email address) volunteered by the SRP who would be willing to serve as reviewers for the next few years, along with 1-3 keywords on their principal expertise.)

<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>E-mail</th>
<th>Principal Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>José</td>
<td>Xavier</td>
<td><a href="mailto:jxavier@zoo.uc.pt">jxavier@zoo.uc.pt</a></td>
<td>Marine ecology, trophic interactions</td>
</tr>
<tr>
<td>Vonda</td>
<td>Cummings</td>
<td><a href="mailto:Vonda.Cummings@niwa.co.nz">Vonda.Cummings@niwa.co.nz</a></td>
<td>Shallow water marine ecosystems</td>
</tr>
<tr>
<td>Cinzia</td>
<td>Verde</td>
<td><a href="mailto:c.verde@ibp.cnr.it">c.verde@ibp.cnr.it</a></td>
<td>Biochemistry, physiology, genomics</td>
</tr>
<tr>
<td>Akinori</td>
<td>Takahashi</td>
<td><a href="mailto:atak@nipr.ac.jp">atak@nipr.ac.jp</a></td>
<td>Marine megafauna, tracking</td>
</tr>
</tbody>
</table>

Significant Deviations from the Implementation Plan

The Spring Course for ESC was held in 2018 instead of 2015, since in 2015 we organized a cross-disciplinary brainstorming workshop in Barcelona in addition to the planned events.

The Antarctic-Arctic workshop in 2018 in Davos was an additional event stimulated by the joint SCAR/IASC conference.

A planned meeting to discuss the future of AnT-ERA had been replaced by the idea to identify and publish the most important results of the AnT-ERA life period. Planning of future SRPs is underway within the PPGs, including AnT-ERA SSC members.

The final workshop planned for 2020 will be held in 2019 since the publication of the outcome which was originally not planned demands time before the 2020 OSC.

Additional information (optional)

Outreach, communication and capacity-building activities

We focus on a wider dissemination of our outcome of the Coimbra synthesis workshop for stakeholders in 2019/2020.

José Xavier was co-coordinator of the Polar Educators International (PEI) Workshop, Cambridge, UK, 7-11 April 2019.

Vonda Cummings gave an invited presentation at "Art & Climate", Auckland, New Zealand.

Support of the 2018 OSC with key notes and chairman-ship of sessions.

Notable Papers

Only papers which focus on biological processes, the key object of AnT-ERA, are presented here and only papers with AnT-ERA SSC members as co-authors:

   This paper reports a unique benthic food web built on intense bloom of a rarely reported benthic diatom in a rapidly warming Antarctic fjord.

   The paper describes drivers of the Antarctic shelf benthos at both sides of the tip of the Antarctic Peninsula.

   The author reviewed the isolation, history and unusual environmental conditions of Southern Ocean biota, which have resulted in the fauna producing a range and scale of adaptations to low temperature and seasonality. He evaluated the impacts these adaptations have on capacities to resist, or respond to change in the environment.

   This paper presents a comprehensive synthesis of the actual knowledge on the WAP ecosystems.

   Two future possible scenarios for Antarctica and the Southern Ocean are discussed, with a “worst” scenario, in which greenhouse gas emissions remained unchecked, the climate continued to warm, with worldwide impacts.

   doi: 10.3389/fmars.2018.00232
   A spatial analysis of coastal Antarctic benthic epi- and infaunal communities and their relationships to multiple environmental characteristics.

This research article focuses on the properties of the genome of the Antarctic cold-adapted bacterium *Pseudoalteromonas haloplanktis* TAC125 (PhTAC125) and the role of oxygen-binding proteins in protection against oxidative and nitrosative stress.

   This paper describes the winter diving activity of Adélie penguins for the first time, and highlight how penguin movement and behavior are closely associated with the seasonal polar environment.

   *This is an important paper with no AnT-ERA SSC member as co-author but the issue links closely to the AnT-ERA ecosystem theme and AnT-ERA SSC members often and intensively discussed this issue especially with Paul Dayton but also the other authors:*

   This paper describes 40+ years observations of environmental conditions and the responses of benthic epifauna. It highlights perturbations resulting in shifts in food particle size, and those forming barriers to recruitment.

**Direct support from outside organisations received for your activities**
(Numbered list with values indicated if direct cash support. Please restrict in-kind support to substantive in-kind support only)

None

**Major collaborations your group has with other SCAR groups and with organisations/groups beyond SCAR**

**Within SCAR**
1. AntEco
2. BEPSII
3. ACCE
4. SOOS
5. MEASO (ICED)
6. EG-BAMM
7. ANTOS

**Outside SCAR**
1. IPBES
2. IPCC
3. IASC

**Updates for your group’s SCAR web page**
Due to time limitation (also due to a high priority of other SCAR/AnT-ERA obligations) we did not have the capacity to familiarize with the new software and update our webpage ourselves. During the Coimbra synthesis meeting we will develop a "low-effort" plan, how to publish the most important issues on the webpage with the support of the SCAR secretariat.
Other information for publicity purposes
(Please add here details of, or links to any other information we may use for publicity purposes, such as photos, infographics, quotes and layperson's summaries of your research.)

All such activities focus on the output of the Coimbra workshop to be published in 2020. A short report on the Spring Course for ECS was published on the SCAR webpage.