



**SCAR Sub-Group**

SG

**ImPACT**

PS/LS

Person  
Responsible:

Susan Bengtson  
Nash

## **SCAR Delegates Report 2020**

# **Input Pathways for persistent organic pollutants to AntarCTica (ImPACT)** **2018-2020 Report**

## **Summary**

### **Report Author(s)**

*Susan Bengtson Nash (Australia)*

*Simonetta Corsolini (Italy)*

*Cristobal Galban-Malagon (Chile)*

### **Summary of activities from 2018-20**

Our 2018 Action Group Proposal identified the following short-medium term **objectives**.

- Co-ordinate current and ongoing research efforts aligned with the Action Group terms of reference, ensuring data collected meets minimum quality assurance requirements for temporal trend collation.
- Pursue national and multi-national funding strategies for establishment of permanent atmospheric monitoring stations at four sites across the continent (Casey Station, Troll station, Mario Zucchelli Station and Professor Julio Escudero base (or another Chilean base in the Antarctic Peninsula region)
- Publish collaborative synthesis works relating to identified knowledge gaps, arising from coordinated monitoring efforts.
- Identify avenues for scaffolding of the ImPACT Action Group towards establishment of an AnMAP body.

Our activities since inception are delineated against these 4 objectives below:

## 1. CO-ORDINATION OF ONGOING RESEARCH ACTIVITIES

- a) The inaugural ImPACT meeting in Davos, 2018, identified the utility of a shared **Sample Archive Database**. The database would serve as a first point of reference for new student projects or larger research initiatives. Sharing of samples was identified as an effective strategy for limiting collection redundancies, building research impact and fostering international collaboration. As such, all group members submitted a list of samples and ancillary data for uploading to the shared database.
- b) Antarctic access for many nations is inconsistent and subject to political volatility. As such, shared access via active projects was viewed as an effective strategy for achieving low effort sampling between members. In support of this, an **ImPACT Active Project Database** has been developed and is updated annually.
- c) **Input Pathway Representatives (IPRs)** have been appointed to liaise with e.g. researchers setting up new Antarctic research projects, and to co-ordinate ImPACT related tasks.
- d) The need for standardised and quality assured collection, analysis and reporting protocols, has been identified in several review publications on POP contamination in Antarctica. As such, ImPACT have compiled a list of trusted laboratories that members use. This **Laboratories Database** will facilitate further identification of minimum quality assurance requirements. Such a list will be useful for new projects, particularly for nations new to POP analysis in Antarctica. The list is medium specific and remains a task for the IPRs for the next AG interim.

## 2. PURSUE NATIONAL AND MULTI-NATIONAL FUNDING

The following funding applications have been submitted with an ImPACT letter of support, in support of the ImPACT Terms of Reference.

- *“Transport and biogeochemistry of emerging pollutants and ANthropogenic Organic Matter in the Southern Ocean (ANTOM)”* (Dachs et al. Spanish Antarctic Program) – **successful**
- *“ROSSs Sea ecosystem aNd emeRging cOntaminants: new chaLLenges and potential threats in a changing WorLd (ROSS'n'ROLL)”* (Coriolini et al., Italian National Programme of Research in Antarctica) – **successful**
- *“Input Pathways of persistent organic pollutants to AntarCTica (ImPACT): SCAR Action group initiative for installation of atmospheric sampling infrastructure”* (Bengtson Nash et al.; Australian Antarctic Division) – **unsuccessful**
- *“Microbial response to human Pollutants in polAr lake (MicroPolArS)”* (Papale et al.; Italian Antarctic Program) – **successful**
- *“Long-Range Transport of Xenobiotics and Microorganisms: Teleconnections and Influence on Terrestrial Ecosystem”* (Galbón-Malagón et al.; Chilean Antarctic Program) – **successful**

- “Input Pathways of persistent organics pollutants to AntarCTica (ImPACT, SCAR Group): an Italian and Australian collaboration to disentangle the chemical input pathways to relation to global change in East Antarctica” (Ademollo et al.; Italian Antarctic Program) – **pending**
- “Microplastics and emerging pollutants in the Antarctic marine ecosystem - MPs-Antar” (Montone et al.; Brazilian Antarctic Programme, National Council for Scientific and Technological Development (CNPq), Call 21/2018) – **pending**
- “Impact of Sedimentary Fluxes of Algal Blooms on the Bioaccumulation and Biomagnification of Persistent Organic Pollutants” (Galbán-Malagón et al.; Chilean National Science and Technology fund (ANID-FONDECYT), Call 21/06/2020 – **pending**
- “Antarctic Porifera as Sentinels of anthroPogenic disturbances. Linking sponge-associated ProkarYotic CommUnities to Environmental - SPYCULA – **pending**

### 3. PUBLICATIONS AND SYNTHESIS WORKS

1. Cipro, C.V.Z., Bustamante, P., Taniguchia, S., Silva, J., Petry, M.V., Montone, R.C. 2019. Seabird colonies as relevant sources of pollutants in Antarctic ecosystems: Part 2 - Persistent Organic Pollutants. *Chemosphere*. 214, pp 866-876. <https://doi.org/10.1016/j.chemosphere.2018.09.030>
2. Eulaers, I.; Wild, S.; Covaci, A.; Bossi, R.; Hawker, D.; Cropp, R.; Southwell, C.; Emmerson, L. M.; Bengtson Nash, S. M., South Polar skua (*Stercorarius maccormicki*) as a vector of persistent organic pollutants to Antarctica; Comparison of chemical profiles with endemic Adélie Penguins (*Pygoscelis adeliae*) **Submitted**.
3. Bengtson Nash, S.; Wild, S.; Bohlin-Nizzetto, P., Brominated Flame Retardants in Antarctic Air in the Vicinity of Two All-Year Research Stations **in preparation**
4. Cuevas-Inostroza, M., Chiang, G., Corsolini, S., Pozo, K., et al. Organic Pollutants Biomagnification in Antarctic Marine Biota: State of the Art. **In preparation**
5. Fuoco, R.; Giannarelli, S.; 2019. Integrity of aquatic ecosystems: An overview of a message from the South Pole on the level of persistent organic pollutants (POPs)..*Microchemical Journal*, 148, pp.230-239.  
DOI:10.1016/j.microc.2019.04.076
6. Giannarelli, S.; Onor, M.; Abete, C.; Termine M.; Fuoco, R.; 2019.Effect of altitude and distance from the sea on fractionation processes of Persistent Organic Pollutants (POPs) associated to atmospheric aerosol from Ross Sea to Dome C, Antarctica., *Microchemical Journal*, 149, pp 103911; DOI:10.1016/j.microc.2019.05.012.

### 4. AnMAP BODY

A \$5m, internationally collaborative, application was made for the establishment of the Antarctic Monitoring and Assessment Program (AnMAP). It was made under the Australian Research Council Special Research Initiative (SRI) scheme for Antarctic science. Ultimately, the total funding went to just two Australian teams, including one led by SCAR president, Steven Chown (\$36m).

**OTHER**

- The SCAR Open Science Conference session “Human Impacts in a Changing Climate”, chaired by Susan Bengtson Nash, was designed to (among other research) showcase ImpACT’s activities.
- A full day AG meeting was scheduled in Hobart and will move to a virtual meeting.
- ImpACT has held four formal AG meetings and one informal gathering in association with the World Marine Mammal Conference in Barcelona, in 2019.
- A PhD student has been appointed at Griffith University with the project title “Input Pathways of POPs to Antarctica”. Andrea Zimbelli’s PhD project will draw on the ImpACT network for each project component.
- The above activities and progress of ImpACT have been in spite of the significant challenges associated with: 1 year’s maternity leave by the Chair; cancellation of the 2019/2020 Antarctic season for several members, and cancellation of the SCAR Open Science Conference.

**Summary Budget 2019 to 2022**

	2019	2020	<b>2021</b>	<b>2022</b>
	Spent	Allocated	Request	Request
(US\$)	\$0	\$2,000	\$4,000	\$4,000

## Progress to date

### Sub-group Outcomes Summary

*(Summarize the above and in each case provide your sub-group name in left hand column to assist Science Group COs in compiling their reports)*

Sub-group	Activity/Outcome/Benefit/Achievement
ImPACT	Establishment of the ImPACT Active Project Database
ImPACT	Establishment of the ImPACT Trusted Laboratory Database
ImPACT	Establishment of the ImPACT Sample Archive Database
ImPACT	Formal ImPACT support of 10 x member Funding Applications for ImPACT-aligned activities
ImPACT	6 journal articles against AG ToR
ImPACT	SCAR Open Science Conference session "Human Impacts in a Changing Climate"
ImPACT	4 x formal (minuted) AG meetings; 1 x informal/opportunistic AG meeting
ImPACT	1x ImPACT-aligned PhD appointment

### Sub-group Cash Flow

*(From previous Delegates meeting to date)*

ImPACT have not yet incurred any group expenditures. \$2000 were allocated for a student travel grant to the SCAR Open Science Conference in Hobart (7 applications received) but could not be spent due to travel restrictions/conference cancellation.

Sub-group	Allocation	Amount spent		
		2018	2019	2020
ImPACT		\$0	\$0	\$0

## Future plans

### Planned activities in 2020 to 2022

Sub-group	Planned activity
ImPACT	2020 SCAR Open Science AG Meeting (virtual)
ImPACT	2021 SCAR Biology Symposium, Christchurch NZ
ImPACT	2020-2022 Quarterly meetings

### Planned use of funds for 2020 to 2022

Year (YYYY)	Purpose / Activity	Amount (in USD)	Contact Name	Contact Email
2020	e.g. RA hours for building databases;	2,000	Susan Bengtson Nash	s.bengtsonnash@griffith.edu.au
2021	Student Travel to SCAR Biology Symposium, Christchurch	4,000	Susan Bengtson Nash	s.bengtsonnash@griffith.edu.au
2022	Student Travel to Open Science Conference	\$4,000	Susan Bengtson Nash	s.bengtsonnash@griffith.edu.au
<b>Total</b>		<b>12,000</b>		

### Any additional detail on funds usage and desired results/outcomes

In light of the 2020 travel restrictions, ImPACT request spending of AG funding for a research assistant to compile and customize the AG databases.

### Percentage of the budget to be used for support of early-career researchers

2020: 0%  
 2021: 100%  
 2022: 100%

### Percentage of the budget to be used for support of scientists from countries with developing Antarctic programmes

2020: 0%  
 2021: 0%  
 2022: 0%

## Membership

### Leadership

Role	First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
<b>Chair</b>	Susan	Bengtson Nash	Griffith University	Australia	s.bengtsonnash@griffith.edu.au	June 2018	June 2022
<b>Co-chair</b>	Pernilla	Bohlin-Nizetto	NILU	Norway	pernilla.bohlin.nizetto@nilu.no	June 2018	June 2022

Please identify early-career researchers with \* in first column

### Other members

First Name	Last Name	Affiliation	Country	Email
Cristobal	Galban-Malagon	Universidad Mayor	Chile	cristobal.galban@umayor.cl
Simonetta	Corsolini	University of Siena	Italy	corsolini@unisi.it
Stefania	Giannarelli	University of Pisa	Italy	stefania.giannarelli@unipi.it
Roger	Fuoco	University of Pisa	Italy	roger.fuoco@unipi.it
Alessandra	Cincinelli	University of Florence	Italy	alessandra.cincinelli@unifi.it
Jordi	Dachs	Institute for Environmental Assessment and Water Research, Spain	Spain	jordi.dachs@idaea.csic.es
Ana	Cabrerizo	Institute for Environmental Assessment and Water Research, Spain	Spain	ana.cabrerizo@idaea.csic.es
Olivier	Chastel	French National Center for Scientific Research	France	chastel@cebc.cnrs.fr
Maria	Vila	Institute for Environmental Assessment and Water Research, Spain	Spain	maria.vila@idaea.csic.es
Begona	Jimenez	Spanish National Research Council	Spain	bjimenez@iqog.csic.es
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Tom	Harner	Environment Canada	Canada	tom.harner@ec.gc.ca
Qinghua	Zhang	Chinese Academy of Sciences	China	qhzhang@rcees.ac.cn
Caio	Cipro	University of Sao Paulo, Brazil	Brazil	caiovzc@usp.br
Jung-Ho	Kang	Korean Polar Institute	Korea	jhkang@kopi.re.kr

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Natalia	Barboza	Uruguay National Environmental Protection Agency	Uruguay	natalia.barboza@mvo tma.gub.uy
Andres	Perez	Universidad de la República, Uruguay	Uruguay	aperez@cure.edu.uy
Natalia	Venturini	Universidad de la República, Uruguay	Uruguay	frantei@fcien.edu.uy
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Matthias	Brenner	Alfred Wegener Institute	Germany	Matthias.Brenner@a wi.de

*Please identify early-career researchers with \* in first column*

## Additional information (optional)

### Notable Papers (Other)

**(NB\* Peer-reviewed Journal Articles are listed in ImpACT Activities above)**

1. Corsolini S., Galbán-Malagón C., Montone C.R., 2019. Persistent Organic Pollutants in Antarctica. Antarctic Environments Portal. DOI: <https://doi.org/10.18124/k4r5-m743>.

This work provides knowledge on concentrations and distributions of contaminants in Antarctic ecosystems for evaluating the overall environmental health and other possible consequences on a global scale. The work is addressed to Antarctic Treaty Parties to fulfil their obligations under the Antarctic Treaty and the Protocol; it also provides independent and relevant scientific information available to a wider audience.

2. Galbán-Malagón, C., Luarte, T., and Collins, B. (2019) Antarctic Pollution Pathways. ILAIA: Advances in Chilean Antarctic Science. Ed. Instituto Antártico Chileno. Punta Arenas (Chile). Vol 5 pp 22-23.



3. Galbán-Malagón, C., Luarte, T., and Collins, B. (2018) Las Rutas de Contaminación Antártica. Boletín Antártico Chileno Ed. Instituto Antártico Chileno. Punta Arenas (Chile) Vol 37 (1-2). pp 46-47.

### **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)*

Whilst no grant was ultimately secured, it is notable that the SRI application involved commitments (including funding) between the Australian Federal Government, the Arctic Monitoring and Assessment Program, the Australian Antarctic Division, Aker Biomarine, the Norwegian Institute for Air Research, as well as researchers from Spain, Norway and Australia. As these partnerships are intact, they are primed for future applications.

### **Major collaborations your Science Group has with other SCAR groups and with organisations/groups beyond SCAR**

*(Numbered list of substantive collaborations)*

#### **Within SCAR**

1. Susan Bengtson Nash contributed pollution context to the MEASO Birds and Mammals Synthesis paper submitted to *Frontiers in Ecology and Evolution*.
2. Susan Bengtson Nash is a member of the Cetacean in the Southern Ocean (CiSO) and the Plastics Action Groups under SCAR.

#### **Outside SCAR**

As mentioned above (support from outside organisations), these relationships are with existing collaborators.

### **Outreach, communication and capacity-building activities**

N/A

### **Continuation of ImPACT as a SCAR Action Group for Another Term**

The rapid growth and productivity of the ImPACT Action Group over its inaugural term is a product of ImPACT meeting a long existing need within the SCAR community, offering an opportunity for members to mobilise in a co-ordinated manner to address the escalating threat of chemical pollution in Antarctica.

Globally, on average (over the past 10 years), around 1 million new chemicals have been registered annually. A proportion of chemical emissions from temperate and equatorial regions are inevitably destined for the polar regions. Despite the remoteness, and the 'shielding' nature of oceanic and atmospheric systems surrounding Antarctica, pollution from lower latitude source regions represents a growing but largely unmonitored threat due to an absence of routine surveillance and measuring systems in Antarctica. This is staggering considering the attention afforded this threat in the Arctic and other global regions. ImPACT represents a 'first step' to tackling this limitation and a stepping-stone towards a SCAR Expert Group, with a long-term focus as a coordination body for pollution research and monitoring in Antarctica. It is envisaged that ImPACT will conduct the groundwork for the latter in collating and synthesising existing research in order to identify the priority research gaps for funding investment. This will start with a focus on 'input pathways' before eventually also incorporating environmental chemodynamics and biological effects.

The productivity of ImPACT through its inaugural term has been in spite of the significant disruptions presented by the 1-year maternity leave of the Chair (Susan Bengtson Nash), and COVID-19 related disruptions to Antarctic and conference travel. An additional term as AG will allow this group to consolidate its efforts, maximise outputs, and progress towards securing infrastructure and funding identified in the original AG objectives whilst scaffolding towards an Expert Group under SCAR.

## SCAR fellowship reviewers

*Please list one or more people (name and email address) from your group who would be willing to serve as reviewers for the next few years, along with 1-3 keywords on their principal expertise.*

First Name	Last Name	Email	Principal Expertise
Andres	Perez	aperez@cure.edu.uy	Environmental analytical chemistry
Susan	Bengtson Nash	s.bengtsonnash@griffith.edu.au	Environmental Chemistry and toxicology
Cristobal	Galban Malagon	cristobal.galban@umayor.cl	Environmental chemistry and biogeochemical cycling
Simonetta	Corsolini	simonetta.corsolini@unisi.it	Environmental biology and toxicology