



SCAR Sub-Group

PLASTIC-AG

SG

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Person  
Responsible:

Claire Waluda

## SCAR Delegates Report 2020

# Plastic in Polar Environments (PLASTIC-AG) 2018-2020 Report

## Summary

### Report Author(s)

Claire Waluda (UK), Cath Waller (UK), Ilaria Corsi (Italy), Elisa Bergami (Italy), Clara Manno (UK)

### Summary of activities from 2018-20

#### Activities/achievements

1. POLAR 2018 Open Science Conference, 17 June 2018, Davos, Switzerland. Establishment of “Plastic at the Poles” Action Group (PLASTIC-AG) attended by members from 23 countries. Report available at: <https://www.scar.org/library/science-4/life-sciences/plastic/5180-plastic-workshop-2018/>
2. Establishment of the mission, declaration of the expected achievements, logo design agreed.
3. Development of the PLASTIC-AG webpage on the SCAR website, set up of mailing list and organization of AG events.
4. First AG workshop entitled “Plastic in the Polar Environment: sources, impacts and solutions” (October 28-29 2019), hosted by the Energy and Environment Institute (EEI), University of Hull (UK) and sponsored by AirB&B and Hurtigruten. This was attended by 45 scientists from 14 countries. Report available at: <https://www.scar.org/scar-news/plastic-news/workshop-report-2019/>
5. Special issue of Environment International (Elsevier, IF 7.943) entitled “Plastics in Polar Regions”. Guest editors (Ilaria Corsi & Elisa Bergami). The special issue includes 10 key research papers from the Plastic-AG community on plastic pollution in Arctic and Antarctica. A selection of these are listed in Additional Information below.
6. Establishment of Plastic AG Early Career Researcher network (currently more than 25 members) for sharing activities, upcoming events and opportunities.

## SCAR Plastic AG: 2018-2020 Report, cont.

### Upcoming activities:

1. White paper (scheduled)
2. High impact paper discussing the current state of knowledge of plastics in Polar Regions (Corsi, Aliani, Bergami, Manno, Peeken, Van Sebille, Waller, Waluda) (in preparation)
3. Update database (hosted by SOOS)

### Key challenges faced:

We have had a lot of interest and have a high membership but still have a number of projects and ideas in progress, therefore we feel that a two-year extension to the AG would be beneficial. The justification for this is detailed in 'Future Plans'.

### **Summary Budget 2019 to 2022**

	2019	2020	2021	2022
	Spent	Allocated	Request	Request
(US\$)	\$648	\$2,802	\$1000*	\$1000* (\$3,802 total including 2020 budget carry-over)

Note: In 2019 the AG raised £2500 from external sponsors (i.e., £500 from Hurtigruten and £2000 from Airbnb). All monies were used to fund travel grants for eight early career scientists to attend the "Plastic in the Polar Environment: sources, impacts and solutions" workshop at the University of Hull, UK.

\*We request transferring the 2020 balance to fund a second AG meeting in 2022 alongside an extra \$1000 per year to support ECR and countries with developing Antarctic programmes.

## 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

### Sub-group Cash Flow

*(From previous Delegates meeting to date)*

Sub-group	Allocation	Amount spent		
		2018	2019	2020

## Future plans

The AG comprises a large number of people from a variety of backgrounds (science, industry, NGOs, etc) indicating there is a great deal of interest in plastics in Polar Regions. During the first AG workshop in Hull (October 2019) the AG agreed to establish three Working Groups. These are:

- (1) Methodology and Transport Prediction (Methodologies WG)
- (2) Impacts on Biota, Pathways (Impacts WG)
- (3) Remediation, Solutions and Policy (Remediation WG)

We would like to request a two-year extension to the Plastic-AG to take these subgroups forward (including establishing sub-group leaders, aims and expected achievements). We have also established an ECR network and would like to develop this further.

The working groups will take actions to (a) understand the origin and quantify the scale of the “plastic problem” in Polar environments (b) propose solutions for minimizing the environmental risk and impacts on Polar ecosystems. This will include gathering information on plastic usage in scientific equipment (e.g. clothes and logistics) used in the field with the aim of proposing an international agreement to ban or limit the use of plastics in scientific research and/or replace it with alternative materials.

We have been able to save money in our 2018-2020 budget by (a) obtaining sponsorship from commercial companies (see summary budget), (b) securing sponsorship from the EEI, University of Hull for the AG meeting in October 2019 and (c) not funding ECR travel to SCAR 2020 due to covid-19. We propose using this \$2802 underspend from 2020 to fund an extension to the group in 2021 and 2022, with a request for an additional \$1000 per year over the two years.

**Planned activities in 2020 to 2022**

<b>Sub-group</b>	<b>Planned activity</b>
<b>Plastic AG</b>	Participation in Micro 2020 online conference ( <a href="https://micro2020.sciencesconf.org/">https://micro2020.sciencesconf.org/</a> )
<b>Plastic AG</b>	Poster presentation at Arctic Plastics 2020 (postponed to 2-4 March 2021)
<b>Plastic AG</b>	Second AG workshop, University of Siena (late 2021/early 2022). Aim to increase current knowledge on plastic occurrence and impact on Antarctica and enlarge the scientific community working on it.
<b>Plastic ECR group</b>	Develop social media/outreach to attract ECR to the group and develop ideas
<b>Methodologies WG</b>	Development of database (with SOOS)
<b>Impacts WG</b>	Opinion paper
<b>Remediation WG</b>	White paper

**Planned use of funds for 2020 to 2022**

<b>Year (YYYY)</b>	<b>Purpose/Activity</b>	<b>Amount (in USD)</b>	<b>Contact Name</b>	<b>Contact Email</b>
<b>2021</b>	Arctic Plastics 2020 (postponed to March 2021)	\$500	Cath Waller	c.l.waller@hull.ac.uk
<b>2021</b>	Development of ECR group	\$500	Elisa Bergami	elisa.bergami@unisi.it
<b>2022</b>	Delivery of second AG workshop in Siena (Italy)	\$2802	Ilaria Corsi	ilaria.corsi@unisi.it
<b>2022</b>	Travel grants for ECR to attend AG workshop in Siena	\$1000	Elisa Bergami	elisa.bergami@unisi.it
<b>Total</b>		\$4802		

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

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

2020: 0% (No spend is anticipated during the second half of 2020)

2021: 50%

2022:25%

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

2020: 0% (No spend is anticipated during the second half of 2020)

2021: 25%

2022: 25%

## Membership

### Leadership

Role	First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Co-chair	Cath	Waller	University of Hull	UK	<a href="mailto:c.l.waller@hull.ac.uk">c.l.waller@hull.ac.uk</a>	June 2017	Aug 2020
Co-chair	Claire	Waluda	British Antarctic Survey	UK	<a href="mailto:clwa@bas.ac.uk">clwa@bas.ac.uk</a>	June 2017	Aug 2020
Steering committee	Ilaria	Corsi	University of Siena	Italy	<a href="mailto:ilaria.corsi@unisi.it">ilaria.corsi@unisi.it</a>	June 2017	Aug 2020
Steering committee	*Elisa	Bergami	University of Siena	Italy	<a href="mailto:elisa.bergami@unisi.it">elisa.bergami@unisi.it</a>	June 2017	Aug 2020
Steering committee	Clara	Manno	British Antarctic Survey	UK	<a href="mailto:clanno@bas.ac.uk">clanno@bas.ac.uk</a>	June 2017	Aug 2020

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

Note that Co-chairs will be Manno and Corsi, with Bergami taking on the role of secretary if AG extension is approved for 2020-2022. Waller & Waluda will remain on the steering committee.

### Other members

PLASTIC-AG comprises a further 108 group members, from 28 countries.

First Name	Last Name	Affiliation	Country	Email
Stefano	Aliani	National Research Council (CNR-ISMAR)	Italy	<a href="mailto:stefano.aliანი@sp.ismar.cnr.it">stefano.aliანი@sp.ismar.cnr.it</a>
*Lucrecia	Alvarez	University of Hull	UK	<a href="mailto:L.I.Alvarez-Barrantes-2019@hull.ac.uk">L.I.Alvarez-Barrantes-2019@hull.ac.uk</a>
*Francoise	Amelineau	University la Rochelle	France	<a href="mailto:francoise.amelineau@gmail.com">francoise.amelineau@gmail.com</a>
*Carlos	Angulo	University of Barcelona	Catalonia	<a href="mailto:carlospreckler@hotmail.com">carlospreckler@hotmail.com</a>
Conxita	Avila	University of Barcelona	Catalonia	<a href="mailto:conxita.avila@ub.edu">conxita.avila@ub.edu</a>
Michael	Axelsson	Univ of Gothenburg	Sweden	<a href="mailto:michael.axelsson@guse">michael.axelsson@guse</a>
Renuka	Badhe	European Polar Board	Netherlands	<a href="mailto:r.badhe@nwo.nl">r.badhe@nwo.nl</a>
*Teresa	Balbi	University of Genoa	Italy	<a href="mailto:Teresa.Balbi@unige.it">Teresa.Balbi@unige.it</a>

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Rhonda	Bartley	Australian Antarctic Division	Australia	<a href="mailto:rhonda.bartley@aad.gov.au">rhonda.bartley@aad.gov.au</a>
*Dylan	Beard	University of Plymouth	UK	<a href="mailto:dylan.b.beard@gmail.com">dylan.b.beard@gmail.com</a>
Susan	Bengtson Nash	Griffith University	Australia	<a href="mailto:s.bengtsonnash@griffith.edu.au">s.bengtsonnash@griffith.edu.au</a>
*Julian	Blumenroeder	University of Hull	UK	J.Blumenroeder-2019@hull.ac.uk
Sarah	Bouckoms	PEI windowless classroom/Antarctic Heritage Trust	New Zealand	<a href="mailto:sbouckoms@gmail.com">sbouckoms@gmail.com</a>
Christina	Braun	University Jena	Germany	<a href="mailto:chr.braun@gmx.de">chr.braun@gmx.de</a>
Pip	Bricher	Southern Ocean Observing System	Australia	<a href="mailto:data@soos.aq">data@soos.aq</a>
*Jack	Buckingham	University of Hull	UK	<a href="mailto:jwbuckingham@gmail.com">jwbuckingham@gmail.com</a>
Rowan	Byrne	Mott McDonald	UK	<a href="mailto:rowan.byrne@mottmac.com">rowan.byrne@mottmac.com</a>
Simone	Cappello	National Research Council (CNR-IRBIM)	Italy	simone.cappello@irbim.cnr.it
Rachel	Cavanagh	British Antarctic Survey	UK	<a href="mailto:rcav@bas.ac.uk">rcav@bas.ac.uk</a>
*Anatolii	Chernov	Taras Shevchenko National University of Kyiv	Ukraine	achernovp@gmail.com
Han-Gu	Choi	Korean Polar Research Institute	Korea	<a href="mailto:hchoi82@kopri.re.kr">hchoi82@kopri.re.kr</a>
Li	Chuanjin	State Key Laboratory of Computer Science	China	<a href="mailto:lichuanjin@lzb.ac.cn">lichuanjin@lzb.ac.cn</a>
*Jennifer	Cocking	Scottish Association for Marine Science	UK	<a href="mailto:jennifer.cocking@sams.ac.uk">jennifer.cocking@sams.ac.uk</a>
*Clare	Collins	University of Hull	UK	<a href="mailto:c.collins-2019@hull.ac.uk">c.collins-2019@hull.ac.uk</a>
*Rachel	Coppock	Plymouth Marine Laboratory	UK	<a href="mailto:rac@pml.ac.uk">rac@pml.ac.uk</a>
Vonda	Cummings	National Institute of Water and Atmospheric Research	New Zealand	<a href="mailto:vonda.cummings@niwa.co.nz">vonda.cummings@niwa.co.nz</a>
José Bruno	R.M.C. da Silva Danis	University of São Paulo Université Libre de Bruxelles	Brazil Belgium	
				<a href="mailto:bdanis@ulb.ac.be">bdanis@ulb.ac.be</a>
Thalia	Day	A Plastic Planet	UK	<a href="mailto:thaliaday@hotmail.co.uk">thaliaday@hotmail.co.uk</a>
Nina	Dehnhard	Norsk Institutt for Naturforskning	Norway	<a href="mailto:nina.dehnhard@uantwerpen.be">nina.dehnhard@uantwerpen.be</a>
*Vicky	Dewar-Fowler	British Antarctic Survey	UK	<a href="mailto:vicwle19@bas.ac.uk">vicwle19@bas.ac.uk</a>
Gwen	Fenton	Australian Antarctic Division	Australia	<a href="mailto:gwen.fenton@aad.gov.au">gwen.fenton@aad.gov.au</a>
Jerome	Fort	Centre National de la Recherche Scientifique	France	<a href="mailto:jerome.fort@univ-lr.fr">jerome.fort@univ-lr.fr</a>
Geir	W. Gabrielsen	Norwegian Polar Institute	Norway	geir.wing.gabrielsen@npolar.no
Gunnar	Gerdts	Alfred Wegener Institute	Germany	<a href="mailto:gunnar.gerdts@awi.de">gunnar.gerdts@awi.de</a>
Laura	Ghigliotti	National Research Council (CNR-ISMAR)	Italy	<a href="mailto:laura.ghigliotti@ge.ismar.cnr.it">laura.ghigliotti@ge.ismar.cnr.it</a>
Tania	Gibéryen	POLAR.LU	Luxembourg	<a href="mailto:tania.giberyen@polar.lu">tania.giberyen@polar.lu</a>
*Solene	Giraudeau-Potel	Scottish Association for Marine Science	UK	15023599@uhi.ac.uk

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Piotr	Glowacki	Instytut Geofizyki Polskiej Akademii Nauk	Poland	<a href="mailto:glowacki@igf.edu.pl">glowacki@igf.edu.pl</a>
Marcelo	González Aravena	Instituto Antártico Chileno	Chile	<a href="mailto:mgonzalez@inach.cl">mgonzalez@inach.cl</a>
Maria	Granberg	Swedish Environmental Research Institute (IVL)	Sweden	<a href="mailto:maria.granberg@ivl.se">maria.granberg@ivl.se</a>
Huw	Griffiths	British Antarctic Survey	UK	<a href="mailto:hjg@bas.ac.uk">hjg@bas.ac.uk</a>
Emily	Grilly	CCAMLR	Australia	<a href="mailto:emily.grilly@ccamlr.org">emily.grilly@ccamlr.org</a>
*Wray	Grimaldi	University of Otago	New Zealand	<a href="mailto:wrgdot2000@gmail.com">wrgdot2000@gmail.com</a>
Kate	Hendry	University of Bristol	UK	<a href="mailto:k.hendry@bristol.ac.uk">k.hendry@bristol.ac.uk</a>
Kevin	Hughes	British Antarctic Survey	UK	<a href="mailto:kehu@bas.ac.uk">kehu@bas.ac.uk</a>
*Jessica	Hurley	University of Hull	UK	<a href="mailto:J.hurley-2019@hull.ac.uk">J.hurley-2019@hull.ac.uk</a>
*Juliana	A. Ivar do Sul	Leibniz Institute for Baltic Sea Research Warnemü- nde	Germany	<a href="mailto:juliana.sul@gmail.com">juliana.sul@gmail.com</a>
*Kirstie	Jones- Williams	British Antarctic Survey	UK	<a href="mailto:kirnes79@bas.ac.uk">kirnes79@bas.ac.uk</a>
Barbara	Jóźwiak	Fundacja forScience	Poland	<a href="mailto:biuro@forscience.pl">biuro@forscience.pl</a>
Hermann	Kaartokallio	Finnish Environment Institute (SYKE)	Finland	<a href="mailto:hermanni.kaartokallio@ymparisto.fi">hermanni.kaartokallio@ymparisto.fi</a>
Deneb	Karentz	University of San Francisco	USA	<a href="mailto:karentz@usfca.edu">karentz@usfca.edu</a>
Monika	Kedra	Instytut Oceanologii Polskiej	Poland	<a href="mailto:kedra@iopan.gda.pl">kedra@iopan.gda.pl</a>
*Andrew	Krupinski Emerenciano	University of São Paulo	Brazil	
Ana Luzia de F.	Lacerda	Universidade Federal de Rio Grande - FURG	Brazil	<a href="mailto:analuizalacerda@gmail.com">analuizalacerda@gmail.com</a>
*Camille	Le Guen	University of St Andrews	UK	<a href="mailto:cam.leguen@gmail.com">cam.leguen@gmail.com</a>
Jo	Lennan	Sydney Morning Herald	Australia	<a href="mailto:contact@jolennan.com">contact@jolennan.com</a>
Lyndsey	Lewis	Quark Expeditions	Canada	<a href="mailto:lyndsey.lewis@quarkexpeditions.com">lyndsey.lewis@quarkexpeditions.com</a>
*Phoebe	Lewis	AAD/Royal Melbourne Institute of Technology	Australia	<a href="mailto:phoebe.lewis@aad.gov.au">phoebe.lewis@aad.gov.au</a>
*Cecilia	Liszka	British Antarctic Survey	UK	<a href="mailto:ceclis56@bas.ac.uk">ceclis56@bas.ac.uk</a>
Juan	Pablo Lozoya	Universidad de la República	Uruguay	<a href="mailto:jplozoya@gmail.com">jplozoya@gmail.com</a>
Amanda	Lynnes	IAATO	UK	<a href="mailto:alynnes@iaato.org">alynnes@iaato.org</a>
Alison	McQuilkin	University of York	UK	
*Freija	Mendrik	University of Hull	UK	<a href="mailto:F.Mendrik-2018@hull.ac.uk">F.Mendrik-2018@hull.ac.uk</a>
Verena	Meraldi	Hurtigruten	Mexico	<a href="mailto:verena.meraldi@hurtigruten.com">verena.meraldi@hurtigruten.com</a>
*Greg	Merrill	Duke University	USA	<a href="mailto:gregory.merrill@duke.edu">gregory.merrill@duke.edu</a>
*América	Metzdorff	University of Siena	Italy	<a href="mailto:merirebe@gmail.com">merirebe@gmail.com</a>

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Rahul	Mohan	National Centre for Polar and Ocean Research	India	<a href="mailto:rahulmohangupta@gmail.com">rahulmohangupta@gmail.com</a>
Nathalie	Morata	Université de Bretagne Occidentale	France	<a href="mailto:nathalie.morata@gmail.com">nathalie.morata@gmail.com</a>
Tudor	Morgan	Hurtigruten	UK	<a href="mailto:tudor.morgan@hurtigruten.com">tudor.morgan@hurtigruten.com</a>
Monica	Muelbert	Instituto de Oceanografia Universidade Federal do Rio Grande	Brazil	<a href="mailto:monica.muelbert@furg.br">monica.muelbert@furg.br</a>
Melissa	Nacke	AECO	Norway	<a href="mailto:melissa@aeco.no">melissa@aeco.no</a>
Bhavani	Narayanaswamy	Scottish Association for Marine Science	UK	<a href="mailto:Bhavani.Narayanaswamy@sams.ac.uk">Bhavani.Narayanaswamy@sams.ac.uk</a>
Adam	Nawrot	Fundacja forScience, Poland	Poland	<a href="mailto:anawrot@igf.edu.pl">anawrot@igf.edu.pl</a>
Joseph	Nolan	European Polar Board	Netherlands	<a href="mailto:j.nolan@nwo.nl">j.nolan@nwo.nl</a>
*Letícia	Palmeira Pinto	Universidade de São Paulo	Brazil	<a href="mailto:leticia.palmeirap@gmail.com">leticia.palmeirap@gmail.com</a>
*Lola	Paradinas	Scottish Association for Marine Science	UK	<a href="mailto:Lola.Paradinas@sams.ac.uk">Lola.Paradinas@sams.ac.uk</a>
Ilka	Peeken	Alfred Wegener Institute	Germany	<a href="mailto:ilka.peeken@awi.de">ilka.peeken@awi.de</a>
*Becky	Peel	University of Bristol	UK	<a href="mailto:becky.peel@live.co.uk">becky.peel@live.co.uk</a>
Eva	Pisano	National Research Council (CNR-ISMAR)	Italy	<a href="mailto:eva.pisano@ge.ismar.cnr.it">eva.pisano@ge.ismar.cnr.it</a>
*Jennifer	Provencher	Canadian Wildlife Service, Environment and Climate Change	Canada	<a href="mailto:jennifer.provencher@canada.ca">jennifer.provencher@canada.ca</a>
Steve	Roberts	British Antarctic Survey	UK	<a href="mailto:sjro@bas.ac.uk">sjro@bas.ac.uk</a>
David	Rootes	Antarctic Logistics and Expeditions	UK	<a href="mailto:david.rootes@antarctic-logistics.com">david.rootes@antarctic-logistics.com</a>
Ricardo	Roura	Antarctic and Southern Ocean Coalition (ASOC)	Netherlands	<a href="mailto:ricardo.roura@asoc.org">ricardo.roura@asoc.org</a>
Emily	Rowlands	University of Exeter	UK	<a href="mailto:er399@exeter.ac.uk">er399@exeter.ac.uk</a>
Thomas	Saucede	Université de Bourgogne Franche-Comté	France	<a href="mailto:thomas.saucede@u.bourgogne.fr">thomas.saucede@u.bourgogne.fr</a>
*Victoria	Scott	University of Hull	UK	<a href="mailto:v.scott@2014.hull.ac.uk">v.scott@2014.hull.ac.uk</a>
Fiona	Shanhun	Antarctica New Zealand	New Zealand	<a href="mailto:f.shanhun@antarcticnz.govt.nz">f.shanhun@antarcticnz.govt.nz</a>
Hyoung	Chul Shin	Korean Polar Research Institute	Korea	<a href="mailto:hcshin@kopri.re.kr">hcshin@kopri.re.kr</a>
*Angelika	Slomska	University of Gdansk	Poland	<a href="mailto:angelika.slomska@ug.edu.pl">angelika.slomska@ug.edu.pl</a>
Alvaro	Soutullo	Instituto Antártico Uruguayo	Uruguay	<a href="mailto:a.soutullo@gmail.com">a.soutullo@gmail.com</a>
*Gabriel	Stefanelli Silva	Univ de São Paulo	Brazil	<a href="mailto:gabrielstefanelli@hotmail.com">gabrielstefanelli@hotmail.com</a>
Giuseppe	Suaria	National Research Council (CNR-ISMAR)	Italy	<a href="mailto:giuseppe.suaria@sp.ismar.cnr.it">giuseppe.suaria@sp.ismar.cnr.it</a>
Franco	Teixeira de Mello	Universidad de la República	Uruguay	<a href="mailto:frantei@fcien.edu.uy">frantei@fcien.edu.uy</a>
*Felicitas	ten Brink	University of Hull	UK	<a href="mailto:f.ten-brink-2019@hull.ac.uk">f.ten-brink-2019@hull.ac.uk</a>



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Kaustubh	Thapa	University of Utrecht	Netherlands	
Sally	Thorpe	British Antarctic Survey	UK	<a href="mailto:seth@bas.ac.uk">seth@bas.ac.uk</a>
Marino	Vacchi	National Research Council (CNR-ISMAR)	Italy	<a href="mailto:marino.vacchi@ge.ismar.cnr.it">marino.vacchi@ge.ismar.cnr.it</a>
Kat	Valero	University of Hull	UK	<a href="mailto:kc.wollenberg@gmail.com">kc.wollenberg@gmail.com</a>
Erik	van Sebille	University of Utrecht	Netherlands	<a href="mailto:e.vansebille@uu.nl">e.vansebille@uu.nl</a>
*Deniz	Vural	Istanbul Technical University	Turkey	<a href="mailto:vrl.dnz@gmail.com">vrl.dnz@gmail.com</a>
Anton	Van de Putte	Royal Belgian Institute of Natural Sciences	Belgium	<a href="mailto:avandeputte@naturalsciences.be">avandeputte@naturalsciences.be</a>
*Daniel	Wilson	University of Exeter	UK	<a href="mailto:d.wilson@exeter.ac.uk">d.wilson@exeter.ac.uk</a>
*Lisa	Winberg von Friesen	Swedish Environmental Research Institute (IVL)	Sweden	<a href="mailto:lisa.vonfriesen@ivl.se">lisa.vonfriesen@ivl.se</a>
*Osman	Yansaneh	University of Hull	UK	<a href="mailto:o.yansaneh@hull.ac.uk">o.yansaneh@hull.ac.uk</a>
Enrico	Zambianchi	Parthenope University, Napoli	Italy	<a href="mailto:enrico.zambianchi@uniparthenope.it">enrico.zambianchi@uniparthenope.it</a>

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

### Additional information (optional)

Please add any more detail here that you wish, on your subgroup activities, papers published, etc.

### Notable Papers

(Five to ten most notable papers – see the example below, which includes a brief statement (shaded) indicating the link to the group)

Bergami E, Rota E, Birarda G, Vaccari L, Corsi I. 2020. Plastics everywhere: first evidence of polystyrene fragments inside the common Antarctic collembolan *Cryptopygus antarcticus*. *Biology Letters* **16**: 20200093.

This work provides the first field-based evidence of microplastics entering Antarctic terrestrial food webs. It is related to the outcomes of the Impacts Working Group of the PLASTIC-AG Workshop in Hull, October 2019.

Horton, A. A. and Barnes D. K. A. (2020) Microplastic pollution in a rapidly changing world: implication for remote and vulnerable ecosystems. *Science of the Total Environment*, 738, 140349.

<https://www.sciencedirect.com/science/article/pii/S0048969720338717>

This discussion paper considers the implications of microplastics as a multi-stressor for vulnerable marine ecosystems (including the deep sea and coastal Antarctica), in combination with other anthropogenic contaminants and global environmental change.

Jones-Williams, K., Galloway, T., Cole, M., Stowasser, G., Waluda, C., Manno, C., 2020. Close encounters - microplastic availability to pelagic amphipods in Sub-

Antarctic and Antarctic surface waters. *Environ. Int.* 140, 105792. <https://doi.org/10.1016/j.envint.2020.105792>

This work provides comparative concentrations of microplastics in surface waters and pelagic amphipods from a Sub-Antarctic - Western Antarctic Peninsula transect, demonstrating that even low concentrations of microplastics are potentially encountered by near-surface dwelling zooplankton.

Lacerda, A.L.d.F., Rodrigues, L.d.S., Van Sebille, E., Rodrigues, F.L., et al. 2019. Plastics in sea surface waters around the Antarctic Peninsula. *Scientific Reports*, 9:3977. <https://doi.org/10.1038/s41598-019-40311-4>

This work reports the abundance, types and potential sources of micro and mesoplastics to the sea surface around the Antarctic Peninsula, and also describes the diversity of plastic biofilms of the region.

Le Guen, C., Suaria, G., Sherley, R.B., Ryan, P.G., Aliani, S., Boehme, L. and Brierley, A.S., 2020. Microplastic study reveals the presence of natural and synthetic fibres in the diet of King Penguins (*Aptenodytes patagonicus*) foraging from South Georgia. *Environment International*, 134, 105303. <https://doi.org/10.1016/j.envint.2019.105303>

This article demonstrates the presence of natural and synthetic microfibers in the diet of King Penguins (*Aptenodytes patagonicus*) foraging from South Georgia

Suaria, G., Perold, V., Lee, J.R., Lebouard, F., Aliani, S. and Ryan, P.G., 2020. Floating macro-and microplastics around the Southern Ocean: Results from the Antarctic Circumnavigation Expedition. *Environment International*, 136,105494. <https://doi.org/10.1016/j.envint.2020.105494>

This work presents the results of a floating macro and microplastics survey carried out in the Southern Ocean during the Antarctic Circumnavigation Expedition.

Van Sebille, E., Aliani, S., Law, K.L., Maximenko, N., Alsina, J.M., Bagaev, A., Bergmann, M., Chapron, B., Chubarenko, I., C  zar, A. et al. 2020. The physical oceanography of the transport of floating marine debris. *Environmental Research Letters*, 15(2), 023003. <https://doi.org/10.1088/1748-9326/ab6d7d>

This comprehensive review about the physical factors affecting the movement and distribution of plastic debris in the global ocean, also includes a section on how ice formation, melting and ice drift can influence the transport of plastics in Polar Regions.

Waluda CM, Staniland IJ, Dunn MJ, Thorpe SE, Grilly E, Whitelaw M, Hughes KA (2020) Thirty years of marine debris in the Southern Ocean: annual surveys of two island shores in the Scotia Sea. *Environment International* 136: 105460

This work provides an analysis of one of the longest timeseries of beached debris in the Southern Ocean and links the work of the SCAR AG with the CCAMLR marine debris program.

### **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)*

1. Air B&B £2000 (~\$2500)
2. Hurtigruten £500 GBP (~\$625)  
This money was used to fund Early Career Scientists (ECR) attendance at Hull 2019 workshop 8 ECR fellowships including 3 from the UK and 5 from EU/overseas.
3. Direct (in-kind) support received from APECS to develop the online form for travel fellowship applicants and help with candidate selection.
4. Energy and Environment Institute, University of Hull: funded room hire and catering costs for Plastics AG workshop.

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

*(Numbered list of substantive collaborations)*

#### **Within SCAR**

1. SOOS
2. IMPACT
3. ANTECO

#### **Outside SCAR**

1. European Polar Board (EPB)
2. International Association of Antarctica Tour Operators (IAATO)
3. Association of Arctic Expedition Cruise Operators (AECO)
4. Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)
5. Energy and Environment Institute (EEI), University of Hull
6. Association of Polar Early Career Scientists (APECS)
7. SCOR working group, Floating Litter and its Oceanic Transport Analysis and Modelling (FLOTSAM)
8. Polar Educators International (PEI)
9. Sila.lu (Zero Waste Luxembourg)
10. Polar.lu (Luxembourg's Polar program)
11. Service de Coordination de la Recherche et de l'Innovation pédagogiques et technologiques (SCRIPT) from the Ministry of Education => Ministère de l'Éducation nationale, de l'Enfance et de la Jeunesse.
12. Antarctic Logistics and Expeditions (ALE)

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

*Brief highlights of any activities undertaken since the SCAR Delegates meeting in 2018.*

1. IAATO and AECO's Clean Seas project: This aims to reduce single-use plastic in the polar regions within the expedition cruise industry. The two organisations work collaboratively to understand the use of plastics across their areas of operation, support relevant research, engage with stakeholders and develop guidance for members and polar visitors on reducing its use. AECO and IAATO were both invited to join the UN Environment Clean Seas Campaign in 2018.

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2. “Think outside” – Citizen-science project, funded by Fonds National de la Recherche Luxembourg (FNR) : Zero-waste initiatives during a one-week live-aboard regatta.lu event involving 200 people, mostly high school students (140 high school students and 60 adults), as well as macro-, micro- and nanoplastics sampling by the students on a scientifically planned beach clean-up during the regatta. Luxembourg, and Brittany (F), April 2019. (collab. BAS) (Tania Gibéryen)
  
3. Selected talks and public outreach activities from the AG committee:
  - October 2019: *Interaction between microplastic and zooplankton* (Women’s Institute: invited talk)
  - July 2019: *School in 4D. Summer School of the University of Siena for secondary level schoolteachers* (Scientific Degree Project).
  - May 2019: *Microplastic pollution in the Southern Ocean* (University of Third Age: invited talk)
  - May 2019: *Sustainability and Ecotoxicology course, University of Siena* (Scientific Degree Project).
  - May 2019: *Finding nanoplastics in the sea: from the Mediterranean to the Antarctic* (Pint of Science: public talk).
  - April 2019: *Microplastics in the sea: a growing threat for the marine environment* (EcoMed 2019: conference talk/capacity building).
  - April 2019: *Antarctic Plastics: what do we know and what can we do about it?* (Polar Educators International meeting: invited keynote)
  - November 2018: *Marine plastic pollution in the Southern Ocean* (Micro2018 conference talk/capacity building)
  - October 2018: *Big Biology Day, Cambridge: Plastic in Polar Regions* (Big Biology Day, Cambridge: public outreach).
  - September 2018: *Microplastics in the Polar Region* (Pint of Science: public talk)
  - May 2018: *Antarctic and Arctic: the dead end of plastic pollution* (Cambridge Science Festival: public talk)

## 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
Stefano	Aliani	<a href="mailto:stefano.aliანი@sp.ismar.cnr.it">stefano.aliანი@sp.ismar.cnr.it</a>	Oceanography, plastic litter, ocean mooring platforms, transport of particles
Clara	Manno	<a href="mailto:clanno@bas.ac.uk">clanno@bas.ac.uk</a>	Carbon export, zooplankton dynamics, microplastics in the ocean
Ilka	Peeken	<a href="mailto:ilka.peeken@awi.de">ilka.peeken@awi.de</a>	Polar ecosystems, sea ice biota, sea ice biogeochemistry
Ilaria	Corsi	<a href="mailto:ilaria.corsi@unisi.it">ilaria.corsi@unisi.it</a>	Nanoplastics, ecotoxicology
Claire	Waluda	<a href="mailto:clwa@bas.ac.uk">clwa@bas.ac.uk</a>	Macroplastics, impact on higher predators