Report of the Plastic at the Poles Action Group (PLASTIC-AG) side meeting

17th June 2018 at the Congress Centre, Davos, Switzerland

Compiled and edited by Claire Waluda, Elisa Bergami, Jack Buckingham, Jennifer Cocking, Kirstie-Jones-Williams, Cath Waller, Ilaria Corsi & Clara Manno.

Global production of plastics is increasing rapidly, with over 340 million metric tons produced worldwide in 2016. Recent estimates suggest there will be more plastic than fish in the sea by 2050. While there has been a great deal of research into plastic pollution in the more populated regions of the world, little is known about the Polar Regions. This is an emerging and timely area of research which we believe necessitates a co-ordinated scientific focus.

We propose that research into nano-, macro- and microplastics should be undertaken collaboratively by Polar researchers to examine their presence in the environment and understand their effects on Polar ecosystems. This work will be undertaken as a cross-SSG group including Life, Environmental and Physical Sciences with a strong emphasis on collaborative, multidisciplinary science.

The AG will collate data and expertise on plastics in Antarctica and the Arctic make this freely and publically available through the relevant global data portals. We will engage and collaborate, as required, with all major stakeholders, and Antarctic Treaty parties (via SC-ATS).

PART 1: welcome and keynote talks

Welcome and introduction to the meeting – Clara Manno, British Antarctic Survey (BAS)

Our throw-away society originated in the 1950s, but as plastic pollution is becoming more prevalent at both poles now is an important time to co-ordinate plastic research in the Polar Regions. The PLASTIC-AG action group will last for three years guided by co-chairs and the steering committee and will be open to all interested parties. After three years the AG will summarise the work and provide actions and recommendations to the SCAR executive committee. The key aims are: to set up a network of researchers interested in plastic pollution in the Polar Regions; assess the occurrence, distribution, source and fates of plastics; estimate current levels of pollution and evaluate the impact on the ecosystem; generate a Best Practise protocol for plastic collection and analysis in the Polar Regions and propose methods to limit plastic pollution.

Sources and sink of plastic pollution in the Eurasian Arctic - Ilke Peeken, Alfred-Wegener-Institut (AWI)

Over the past 15 years large plastic litter has increased on the deep sea floor of the inflow gateway to the Arctic Ocean, the Fram Strait. In addition, microplastic has been found from the sea ice to the deep sea floor, particular the latter can be considered as a sink for anthropogenic pollution. To monitor long term trends and identify the sources and sinks of litter and microplastics examples from the AWI pollution observatory within the FRAM project, will be highlighted. Microplastic research further requires best quality research, so a brief introduction to the JPIO BASEMAN project for harmonizing methods will be presented.

Microplastic pollution in Antarctica, how hard can it be to quantify? - Cath Waller, University of Hull

The Southern Ocean has the lowest densities of floating macroplastic litter in the world. It was thought that the region was relatively free of microplastic contamination. However, recent studies and citizen science projects have reported microplastics in deep-sea and shallow sediments and surface waters. Here we present an introduction to the current state of knowledge of macro and microplastics in the Southern Ocean and an evaluation of sampling methods, data recording and quantification of microplastic pollution - how do we standardise measurements and sampling design?

Nanoplastics in the Antarctic environment: an invisible threat? - Ilaria Corsi, University of Siena

Nanoplastics constitute the smallest fraction of plastic litter, still poorly studied due to the current limits of detection and quantification. Evidence of the occurrence of nano-sized polymers has been recently provided in water column under the North Atlantic subtropical gyre and as a consequence of biological degradation by Antarctic krill. To reveal the potential effects of nanoplastics to Antarctic wildlife, an ecotoxicological approach can be adopted, applying the expertise acquired in nanotoxicology. In this view, the results of research performed in the framework of PLANET/NANOPANTA projects on nanoplastics impact on Antarctic model organisms will be presented.

Minimising plastic use and waste in polar research and logistics - Renuka Badhe, European Polar Board

On 16th June 2018, on the occasion of POLAR2018, the major international conference bringing together over 2000 Arctic, Antarctic and alpine researchers, policymakers and professionals from around the world, organised jointly by the Scientific Committee on Antarctic Research (SCAR) and the International Arctic Science Committee (IASC) in Davos, Switzerland, the European Polar Board (EPB) held a workshop, titled “Minimising plastic use and waste in polar research and logistics”. A statement from the workshop participants is available on the European Polar Board website.

Introduction to breakout groups - Claire Waluda, British Antarctic Survey (BAS)

One of the key aims of the meeting is to initiate and formulate a list of actions and strategies to develop a standardised method for monitoring plastic pollution in marine, intertidal and terrestrial habitats of the Arctic and Antarctic. Three breakout groups will discuss (1) methodologies, (2) Impacts on environment and biota and (3) solutions including remediation and mitigation.

PART 2: Reports from breakout groups

1. Methodologies - Cath Waller, Jack Buckingham & Jennifer Cocking

Key points:

1) Identify the real exposure in the environment – validation of laboratory experiments. Future research funding – identification of polymer types in different marine biota
2) Once we have identified the exposure, we can replicate in the laboratory with realistic concentrations and aged polymers and real environmental samples (biofouled polymers).
3) Identify accumulation patterns – evidence of biomagnification.
4) We need to understand impacts on polar biota because: keystone species, ice influenced waters impact metabolism of organisms – energetic impacts, the impact on breakdown of plastics in cold water environments and associated chemistry
5) Identify vulnerable species and habitats – e.g. benthos
6) Cross-disciplinary – use of bycatch for *in situ* uptake of plastics (wary of contamination and need for replicable protocols).

2. Impacts on environment and biota - Ilaria Corsi & Elisa Bergami

Key points:

1) There have been numerous attempts to standardise MP methodologies in the past- Italians currently producing guidelines but main problem is but would it be more effective to determine the best methodologies to answer specific questions? Need to separate what would be the best methods for polar microplastic research from global
2) Need to look at what other people are doing and if the Arctic already has good protocols could we adopt these? Need to look at broader MP protocols
3) Would be good to standardise monitoring around all coastal bases around Ant and all research vessel if possible- would be good to use ships of opportunity
4) Need to produce some sort of large scale model of how plastics move in 3D beyond the scope of the group but could be an output from the Action Group
5) What are the sources of plastics – distant or localised? Are Antarctica/Arctic acting as final sinks for plastics – are they a closed system and to what degree?

3. Solutions: remediation & mitigation - Clara Manno & Kirstie Jones-Williams

Key points:

1) Solutions are global – societal changes and circular economy solutions. Our mandate here is to be responsible for the health of the Polar Regions and to communicate these findings to the public and policy makers.

2) In the field – practice what we preach – introduce practice Guidelines for stations and vessels (workshop yesterday)– hierarchy of plastic alternatives – short term medium term long term. Reasonable alternatives or more readily recyclable. Minimise our footprint – autonomous machinery rather than numerous field cruises

3) Innovations – Circular economy innovations, plastic alternative kit. SILU (Tania Giberyen – Laval University, Quebec)
4) The role of citizen science – beach clean ups provide us with data – finding source of pollution and opportunities to monitor. Provide guidelines for field scientists to report on plastic litter.
5) Raising awareness of pollution in Polar Regions – emotive issue. We need to associate, incorporate Polar Regions with these slogans – not lobby, but put pressure on governments to take action.
6) There needs to be some support system in place to make sure waste is disposed of responsibly – Could coordinate with UN but also University of the Arctic. Namely, having responsibility for Arctic and Antarctic waste which is exported from the regions – often are prohibited from disposing of plastic waste responsibly when come into port – shipping abroad etc. We need to be accountable for our plastic waste (parallel with development of policies for plastic manufacturer accountability).

Final summary and thanks - Claire Waluda, BAS

Thanks to all speakers and everyone for attending. We will write up a report from today's meeting and circulate around all attendees. We will report to the SCAR life sciences group, generate a mailing list and GoToMeeting access for future discussions and collaboration.

Acknowledgements

Thanks to our speakers and all participants, to SCAR and the Davos Conference Centre for hosting the meeting.

Organising Committee:

Dr Clara Manno, British Antarctic Survey

Dr Ilaria Corsi, University of Siena

Dr Cath Waller, University of Hull

Dr Claire Waluda, British Antarctic Survey

Elisa Bergami, University of Siena

Rapporteurs

Jack Buckingham, University of Hull

Jennifer Cocking, Scottish Association for Marine Science

Kirstie Jones-Williams, British Antarctic Survey

APPENDIX 1: AGENDA

17 June 2018 09:00-12:00 Room B Pischa

9:00 Clara Manno (British Antarctic Survey): Welcome and introduction to the meeting

9:10 Ilke Peeken (Alfred-Wegener-Institut): Sources and sink of plastic pollution in the Eurasian Arctic

9:30 Cath Waller (University of Hull): Microplastic pollution in Antarctica, how hard can it be to quantify?

9:50 Ilaria Corsi (University of Siena): Nanoplastics in the Antarctic environment – an invisible threat?

10:10 Renuka Badhe (European Polar Board) Reporting from meeting on "Minimising plastic use and waste in polar research and logistics" held on 16th June 2018.

10:20 Claire Waluda (British Antarctic Survey): Introduction to breakout groups and guidelines

10:30 Coffee

10:45 Breakout groups, (each with a chair and rapporteur)

11:35 Re-convene to share results/ideas of breakouts and input into guidelines framework

11:50 Claire Waluda (British Antarctic Survey) Final summary from the PLASTIC-AG and next steps

12:00 Meeting ends

APPENDIX 2: List of attendees

First name	Surname	Country
Francoise	Amelineau	France
Carlos	Angulo	Catalonia
Conxita	Avila	Catalonia
Michael	Axelsson	Sweden
Renuka	Badhe	Netherlands
Rhonda	Bartley	Australia
Elisa	Bergami	Italy
Sarah	Bouckoms	USA
Christina	Braun	Germany
Pip	Bricher	Australia
Jack	Buckingham	UK
Han-Gu	Choi	Korea
Li	Chuanjin	China
Jennifer	Cocking	UK
Ilaria	Corsi	Italy
Vonda	Cummings	New Zealand
Vicky	Dewar-Fowler	UK
Gwen	Fenton	Australia
Jerome	Fort	France
Laura	Ghigliotti	Italy
Tania	Giberyen	Luxembourg
Piotr	Glowacki	Poland
Huw	Griffiths	UK
Wray	Grimaldi	USA
Kate	Hendry	UK
Kevin	Hughes	UK
Juliana	Ivar do Sul	Brazil
Kirstie	Jones-Williams	UK
Hermanni	Kaartokallio	Finland
Deneb	Karemtz	USA
Monika	Kedra	Poland
Jo	Lennan	Australia
Phoebe	Lewis	Australia
Cecilia	Liszka	UK
Clara	Manno	UK
América	Metzdorff	Italy
Rahul	Mohan	India
Nathalie	Morata	France
Monica M C	Muelbert	Brazil
Joseph	Nolan	Netherlands
Ilke	Peeken	Germany
Eva	Pisano	Italy
Steve	Roberts	UK
Ricardo	Roura	Netherlands

Thomas	Saucede	France
Fiona	Shanhun	New Zealand
Hyoung Chul	Shin	Korea
Angelika	Slomska	Poland
Alvaro	Soutullo	Uruguay
Giuseppe	Suaria	Italy
Marino	Vacchi	Italy
Anton	Van de Putte	Belgium
Catherine	Waller	UK
David	Walton	UK/Switzerland
Claire	Waluda	UK
Enrico	Zambianchi	Italy