

MSD Master Thesis Project:
Microplastics in the Antarctic Environment

Background

Microplastics (MP) represents a new form of global environmental pollution. It has now been found in all ecosystems studied, also in the Southern Ocean. However, little is known about the extent of this pollution and the potential threat it might pose to the environment. MP in the environment can become bioavailable and may be ingested by animals and cause adverse effects. For more than ten years, our group is studying microplastics and we are so far the only group who sampled the waters of the remote Weddell Sea on three former Polarstern cruises¹. In addition, penguins and Antarctic fish were studied, the latter in a MSD master thesis project. We now offer a master thesis project to sample and investigate the occurrence of microplastics in snow, ice and fauna of the Southern Ocean and Antarctica. We are collaborating with other researchers on board of Polarstern, who will sample benthic and pelagic fauna, and will provide selected animal species to be investigated for the occurrence of ingested microplastics.

Aim

The aim is to study the occurrence and concentration of MP in the Antarctic marine ecosystem. Specifically, the project aims at:

- sampling and analyzing of (1) snow surface and sea ice, and (2) selected animal species of the Southern Ocean;
- characterizing the detected MP with respect to particle size, morphology, colour, and polymer types to assess origin and possible (former) uses

Methods

Sampling of sea ice and snow (presumably at the ice shelf or on ice floes during the route). Sampling of benthic animals will be done by collaborators, but help by the student is mandatory. Preparation of the samples will partly be done on board, depending on the amount of samples, continued in the home laboratory. Analysis of the samples will be carried out by established methods in our lab, using Fourier-transform infrared spectroscopy (FTIR), and/or micro-FT-IR (or similar methods).

What we offer

To fulfill the proposed project, the prospective student is offered to participate in the cruise (PS129², which takes place in 2022, from week 9 (March), Punta Arenas – week 17 (April), Cape Town), and the transfer Basel- Punta Arenas - Cape Town.

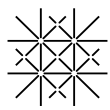
Subsequently, the analysis of the samples will be done, partly onboard, but mostly in our home laboratory in Basel. Access to necessary facilities, including office space and computer, as well as laboratory and aquaria room will be provided.

With a successful completion of the project, we also strongly support the student to publish their research in an academic journal, as demonstrated with past students (Blarer and Burkhardt-Holm, 2016; Bosshart et al., 2020; Mani et al., 2015; Straub et al., 2017), thus bolstering the student's career prospects in academia.

During the whole cruise and in the home laboratory, the Master student will be supervised by an experienced Post Doc (Dr. Gabriel Erni Cassola) and be supported by other members of the team.

¹ <https://mgw.unibas.ch/en/research/anthropogenic-pollution-of-the-environment/current-projects/microplastics-in-the-southern-oceans/>

² Our project is part of HAFOS, see: <https://www.awi.de/en/about-us/logistics/schedules/polarstern-longterm-cruise-planning.html>



Your Profil

Even though a background in natural sciences is not strictly necessary, such a background would be beneficial. You should enjoy working systematically and carefully and should have a tenacious attitude. You should be eager to explore the scientific literature on the topic and acquire knowledge independently. Living on a research vessel for two months is an adventure and offers great insights into research work and facilitates network building. It also poses challenges, such little private space and irregular working hours.

Application deadline

Please submit your application till Friday, 18 June. After this, I will open this opportunity to other students.

If you are interested, please contact Prof. Dr. Patricia Holm Patricia.Holm@unibas.ch or Dr. Gabriel Erni Cassola gabriel.ernicassola@unibas.ch

References

- Blarer, P., Burkhardt-Holm, P., 2016. Microplastics affect assimilation efficiency in the freshwater amphipod *Gammarus fossarum*. *Environ. Sci. Pollut. Res.* 23, 23522–23532.
- Bosshart, S., Erni-Cassola, G., Burkhardt-Holm, P., 2020. Independence of microplastic ingestion from environmental load in the round goby (*Neogobius melanostomus*) from the Rhine river using high quality standards. *Environ. Pollut.* 267, 115664.
- Mani, T., Hauk, A., Walter, U., Burkhardt-Holm, P., 2015. Microplastics profile along the Rhine River. *Sci. Rep.* 5, 17988.
- Straub, S., Hirsch, P.E., Burkhardt-Holm, P., 2017. Biodegradable and petroleum-based microplastics do not differ in their ingestion and excretion but in their biological effects in a freshwater invertebrate *Gammarus fossarum*. *Int. J. Environ. Res. Public Health* 14.