

Arctic Marine Plastic Pollution

- Lectures and discussion meetings on the marine plastic -

Naoki NAKAZAWA¹, Satoshi AKAGAWA², Shinsuke IWASAKI³, Atsumi KATAISHI⁴,
Shunji KANIE⁵, Shinji KIOKA³, Yuji KODAMA⁵, Tomoe KOMORIYA⁶, Takahiro TAKEUCHI⁷,
Masato TANAKA⁵, Shinya NISHIO⁶, Hotaek PARK⁸, Hironori YABUKI⁹, Kenji YAMASAKI¹⁰

¹ Systems Engineering Associates, Inc., Tokyo, Japan

² Cryosphere Engineering Laboratory, Tokyo, Japan

³ Civil Engineering Research Institute for Cold Region, Sapporo, Japan

⁴ Chuo University, Tokyo, Japan

⁵ Hokkaido University, Sapporo, Japan

⁶ Nihon University, Chiba, Japan

⁷ Hachinohe Institute of Technology, Hachinohe, Japan

⁸ Japan Agency for Marine-Earth Science and Technology, Yokosuka, Japan

⁹ National Institute of Polar Research, Tokyo, Japan

¹⁰ US Army Corps of Engineers, Portland District, USA

Abstract

Increasing concentrations of macro- and micro-plastics have been found in Arctic waters and sea ice, but the impacts of plastics pollution on Arctic environments and species has not yet been widely studied. A study group on the marine plastic pollution in the Arctic started in April 2021 under the program of Hokkaido University Arctic Research Center. In this study, six lectures and discussion meetings were held on the arctic environment, marine ecosystems, ecosystem simulation, etc.

Key words: arctic, marine plastic, environment

1. Introduction

While the Arctic ecosystem is already stressed by the effects of the climate crisis, another threat is emerging: plastics. Plastic pollution has become an environmental issue of the highest concern world-wide, and the plastic pollution tide is also rising in the Arctic. The total volume of plastic waste that has flowed into the sea to date is approximately 150 to 400 million tons, and an estimated 8 million metric tons of plastic enters the ocean worldwide every year, though only 1% of it has been accounted for. This raises the question, where is all the plastic in the ocean?¹⁾

Plastic litter is found in even the most remote locations in the world, and the Arctic is no exception. Currents, streams, waves and wind carry marine litter across the seas, while solid waste and wastewater from Arctic communities, and larger communities up-river, contribute to the problem. Plastic debris is found on Arctic beaches, in the water column, in sea ice, sediments and even in the bodies of Arctic birds and mammals.

Microplastics have been found in the seas of the Arctic and Antarctic, including surface waters and deep-sea and shallow sediments. These tiny particles and plastic fibres have been shown to negatively impact a variety of marine species (*Fig. 1*).

How much is in the Arctic is unknown, but one recent study found plastic particles in all but one of 97

seawater samples, and sea ice is known to contain extremely high levels of microplastics.²⁾



Fig. 1 Seal became tangled in a fishing net.³⁾

2. International Movement

2.1 International Symposium on Plastics in the Arctic²⁾

The Government of Iceland in collaboration with the Nordic Council of Ministers hosted the International Symposium on Plastics in the Arctic and Sub-Arctic Region on March 2-4 and 8-9, 2021. The symposium was organized in co-operation with 11 international partners that address marine pollution in various ways. Iceland had chosen the Arctic marine environment as

3. The Study Group Activities

We held six lectures and discussion meetings on the Arctic marine environment (Table 1) and conducted a field survey in Makuhari Beach, Chiba (Fig. 4).

Table 1 Lectures and discussion meetings
- Invited speakers -

2021.6.18 西尾伸也 日本大学生産工学部土木工学科 「海岸に漂着したマイクロプラスチックの実態調査」
2021.7.30 小森谷友絵 日本大学生産工学部環境安全工学科 「ラテックス凝集反応による CRP タンパク質の測定」、 「セシウムを除去を目的としたフィンバブルを用いた 海洋汚泥分解」、 岩崎慎介 (国研) 寒地土木研究所寒冷沿岸域チーム 「海洋漂流物の輸送過程」
2021.9.27 豊島淳子 笹川平和財団海洋政策研究所 「2020 年に実施された北極海海洋プラスチック調査」 矢吹裕伯 国立極地研究所国際北極環境研究センター 「日本の北極プロジェクトとデータマネジメント」
2021.11.2 朴 昊澤 JAMSTEC 北極環境変動総合研究センター 「北極海の海氷減少と気温上昇に及ぼす暖かい河川 水の影響」
2021.12.6 田島木綿子 国立科学博物館脊椎動物研究グループ 「スタンディング鯨類からわかる海洋環境の今」
2022.2.25 伊勢武史 京都大学フィールド科学教育研究センター 「生態系のコンピューターシミュレーションと海洋プラス チック問題」



Fig. 4 Field survey on plastic in Makuhari Beach, Chiba, November 9, 2021.

4. Conclusion

While the Arctic ecosystem is already stressed by the effects of the climate crisis, another threat is emerging: plastics. Plastic debris is found on Arctic beaches, in

the water column, in sea ice, sediments and even in the bodies of Arctic birds and mammals. Development of protocols and standardization of data to measure trends that is conducive to data sharing through international cooperation is an urgent task.

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- 3) The Belfer Center for Science and International Affairs, Harvard Kennedy School webpage, accessed in Jan. 2022, <https://www.belfercenter.org/publication/global-symposium-plastics-arctic>
- 4) "Desktop Study on Marine Litter including Microplastics in the Arctic," Protection of the Arctic Marine Environment PAME, Arctic Council, 7 May 2019.

Summary in Japanese 和文要約

北極海海洋プラスチック問題研究集会

中澤直樹¹, 赤川 敏², 岩崎慎介³, 片石温美⁴, 蟹江俊仁⁵, 木岡信治³, 兒玉祐二⁵, 小森谷友絵⁶, 竹内貴弘⁷, 田中雅人⁵, 西尾伸也⁶, 朴 昊澤⁸, 矢吹裕伯⁹, 山崎健二¹⁰

¹システム工学研究所(株), ²低温圏工学研究所, ³(国研)土木研究所寒地土木研究所, ⁴中央大学, ⁵北海道大学, ⁶日本大学, ⁷八戸工業大学, ⁸(国研)海洋研究開発機構, ⁹国立極地研究所, ¹⁰米国陸軍工兵隊

近年の北極域研究は、北極海の海洋プラスチック問題を提起している。北極海に流入するプラスチックは、内陸からの流入、大気による運搬、漁業や海運および資源開発からの投棄などが挙げられている。海氷に取り込まれた形で蓄積されたプラスチックが海氷の融解と共に北極海全体に流出する恐れがあることから、国際的な研究体制の確立とデータ収集の標準化が求められている。本研究集会では、文献から北極海のプラスチック問題の現状を調べるとともに、海洋プラスチックの研究者を講師として招き、海洋プラスチック問題の現状と課題を議論した。

Correspondence to:

Naoki Nakazawa, nakazawa@systemseng.jp

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