

## Arctic Marine Plastic Pollution

### - Lectures and discussion meetings on the marine plastic -

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*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.

*Our 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*, eight lectures and discussion meetings were held on the arctic environment, marine ecosystems, ecosystem simulation, etc.

*Study group member*

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Hironori YABUKI	<i>National Institute of Polar Research</i>
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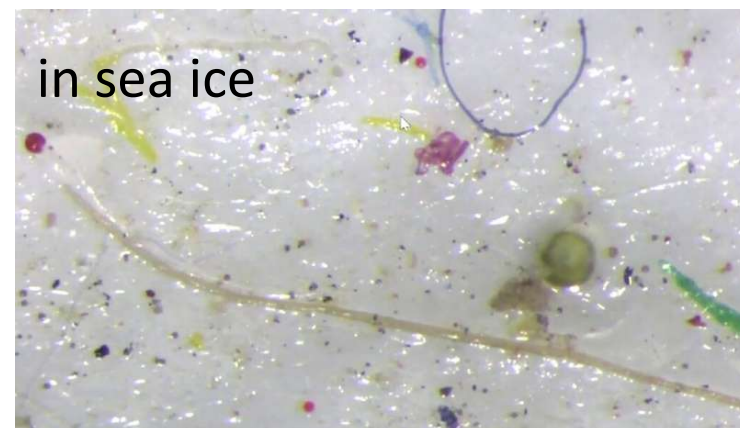
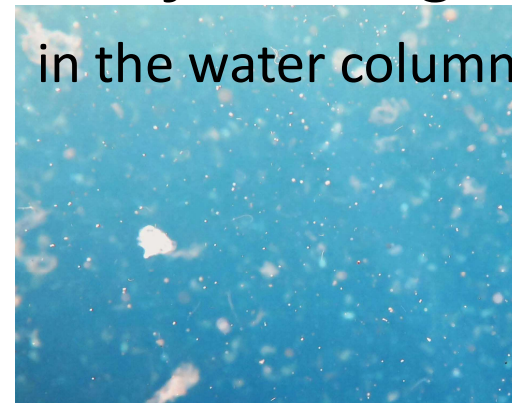
# Background

## *Ocean plastic, “estimation”*

- Over 300 million tons of plastic are produced every year,
- Total 150 to 400 million tons of plastic flowed into the sea to date,
- 8 million tons of plastic enters the ocean every year.

## *Arctic is no exception and plastic is infiltrating the Arctic,*

- *Where in the Arctic???*
  - on Arctic beaches,
  - in the water column,
  - in sea ice,
  - sediments,
  - in the bodies of Arctic birds and mammals.
- *Almost everywhere !*



from outside the Arctic

## Questions?

### *Where does the plastic come from?*

- Sea-based sources:
  - particularly commercial fishing generate large quantities of plastic debris



Source: "Policy and Action on Plastic in the Arctic Ocean," THE POLAR INSTITUTE, 2020.

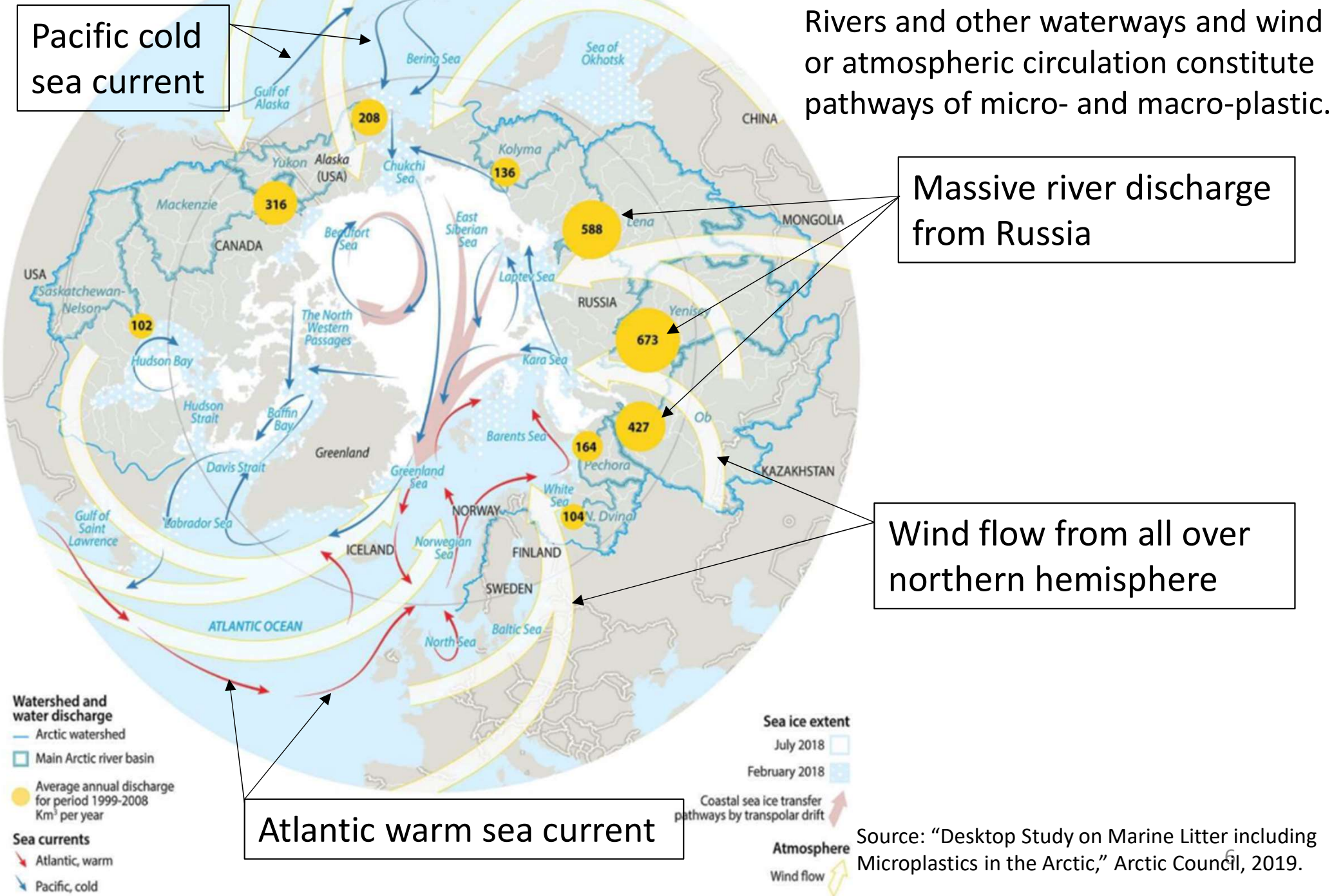
## *Where does the plastic come from?*

- Land-based sources:
  - tourism,
  - industries,
  - water treatment plants,
  - poor landfill management.
- 2 million tons of plastic debris enter the Kara and Laptev Seas each year  
??????????



Source: "Policy and Action on Plastic in the Arctic Ocean," THE POLAR INSTITUTE, 2020.

## Plastic pathways to the Arctic Ocean



# Arctic marine litter sources & drivers

# Arctic Marine Plastic Pollution

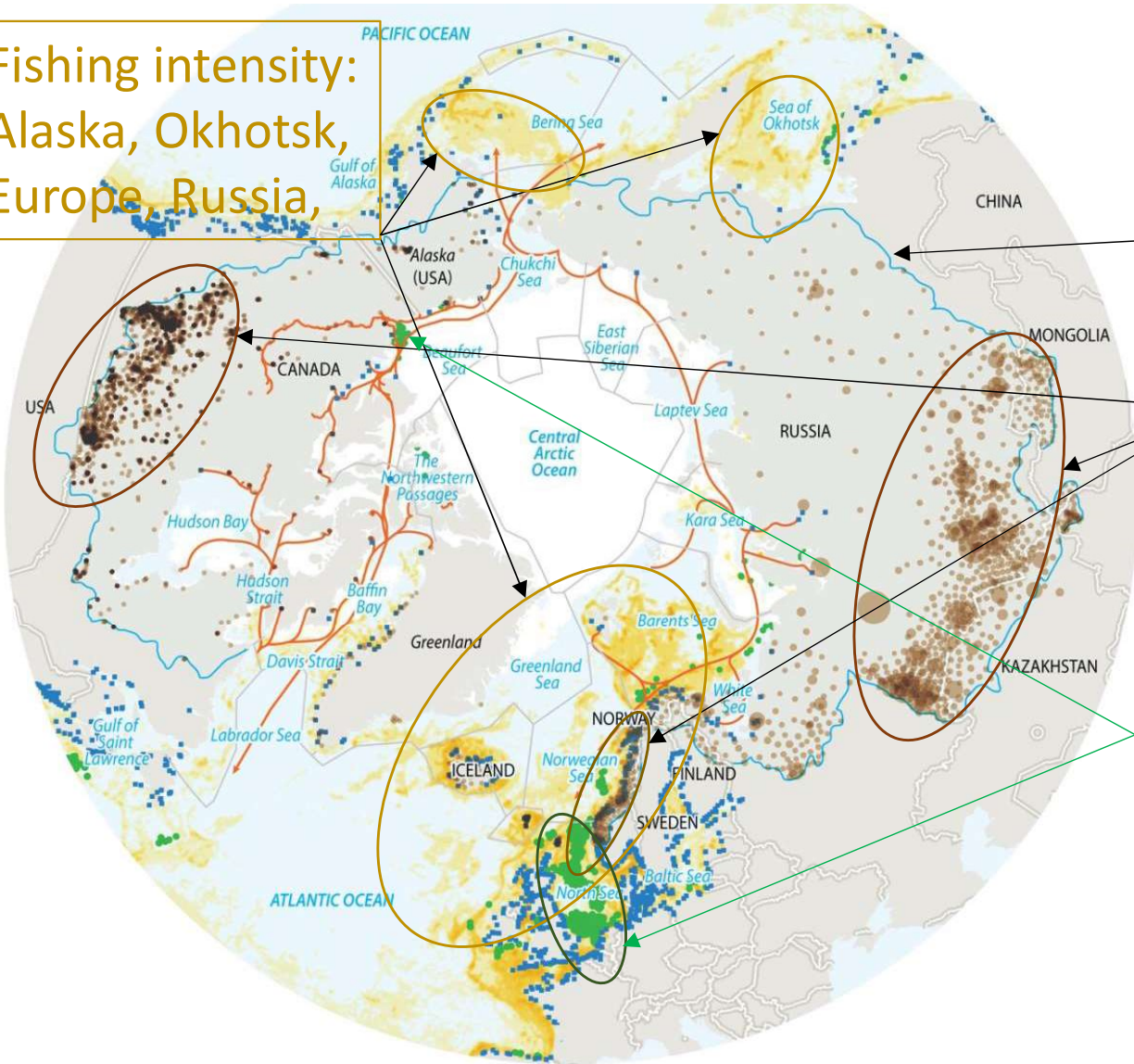
Fishing intensity:  
Alaska, Okhotsk,  
Europe, Russia,

The drivers or activities leading to the release of man-made materials into the environment.

Arctic watershed

Large population within the Arctic watershed

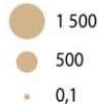
Offshore oil & gas fields:  
North Sea, Barents Sea,  
Beaufort Sea



## LAND-BASED PROXIES

Population within the Arctic watershed

Thousands people per admin area, 2015



## SEA-BASED PROXIES

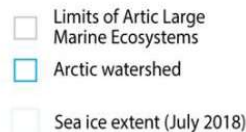
Fishing intensity

Hours per year, 2016



Offshore oil and gas extracting fields

Main port



Sources: Global Fishing Watch; data analysis courtesy of Federico Caruso; Havbase Arktis; NGA Arctic Open Data Application; NASA-SEDAC

Source: "Desktop Study on Marine Litter including Microplastics in the Arctic," Arctic Council, 2019.

## Example

### A close inspection of litter beached on Svalbard



Source: "Desktop Study on Marine Litter including Microplastics in the Arctic," Arctic Council, 2019.

The majority of litter items with identifiable **imprints** originated from

- Norway and Russia (41%),
- other European countries (43%),
- Canada, USA, Brazil, Argentina (9%).

**NOTE** that the identification of the country of production of an object **does not mean** that the actors involved in the release are also from the same country as the object could have been internationally traded.

Similarly, and also very important, the country of production of an object **does not indicate** where the object has been released, as it could have been transported for long distances before being released in the environment.



**Our activities in this study:** Lectures and Discussion Meetings

2021 June 18

**Prof. Shinya Nishio, Nihon U.** 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 July 30

**Prof. Tomoe Komoriya, Nihon U.** 小森谷友絵 日本大学生産工学部環境安全工学科  
「セシウムの除去を目的としたファインバブルを用いた海洋汚泥分解」、  
**Dr. Shinsuke Iwasaki, CERI** 岩崎慎介 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 September 27

**Dr. Junko Toyoshima, Sasagawa Peace F.** 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」  
**Prof. Hironori Yabuki** 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ージメント」

2021 November 2

**Dr. Hotaek Park, JAMSTEC** 朴 昊澤 JAMSTEC北極環境変動総合研究センター  
「北極海の海水減少と気温上昇に及ぼす暖かい河川水の影響」

2021 December 6

**Dr. Yuko Tajima, Natl. Mus. of Nature & Sci.** 田島木綿子 国立科学博物館  
「ストランディング鯨類からわかる海洋環境の今」

2022 February 25

**Prof. Takeshi Ise, Kyoto U.** 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」

## *Our activities in this study:* Field survey in Makuhari-no-Hama beach



## Research Recommendations

from *“Policy and Action on Plastic in the Arctic Ocean, 2019”*.

- development of harmonized protocols and standardization that is conducive to data sharing,
- consistent monitoring throughout the year to account for seasonal fluctuations,
- better data collection from certain parts of the Arctic Ocean region, particularly the Central Arctic Ocean and coastal areas in Siberia, Arctic Alaska, and Canada,
- increased sampling of snow on ice floes to improve estimates of atmospheric transport of litter,
- seafloor sediment monitoring, since plastics of all sizes accumulate there,
- identification of “hot spots”—areas of acute contamination with greatest risk to wildlife and the marine ecosystem.

## Activities on Arctic Marine Plastic Pollution

- International Symposium on Plastics in the Arctic, 2020  
by Arctic Council
- Policy and Action on Plastic in the Arctic Ocean, 2019  
by Belfer Center for Science and Int'l. Affairs, Harvard Kennedy School  
Woodrow Wilson International Center for Scholars
- Ocean Policy Research Institute, Sasagawa Peace Foundation  
(公財) 笹川平和財団海洋政策研究所



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Arctic Marine Plastic Study Group