

Summary of the R/V Mirai Arctic Ocean cruise in 2020

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Since spatial and temporal variability is inherently large in the Arctic Ocean, we urgently need baseline data for the Arctic Ocean as a whole to prepare for the further changes to come. Critically needed understandings would be advanced from a coordinated multi-ship, multi-nation pan-Arctic ship-based sampling campaign, based on shared state-of-the-art protocols for data collections and sharing and carefully planned ship tracks during the same period. This could allow for a synoptic view of the totality of hydrographic and ecosystem changes taking place in the Arctic Ocean and facilitate advancing model development using integrated data sets to predict the future state of the Arctic. To obtain such baseline data, we have planned a pan-Arctic research program, the Synoptic Arctic Survey (SAS), with a goal of conducting it in 2020 and 2021.

In 2020, under the SAS program, the Research Vessel (R/V) MIRAI will conduct hydrographic and biogeochemical surveys, including plankton, microplastic, and bottom sediment samplings, from the Chukchi Sea shelf to marginal ice zones of the Canada Basin. Moorings will be recovered and sediment traps will be deployed on the pathway of the Pacific-origin water to monitor its transport and impact on marine ecosystem. In a marginal ice zone, flying drones will be used to assess the conditions of sea ice and waves. Various drifting buoys will be launched to measure the ocean waves, currents, and temperature. This cruise will be carried out under the project of Arctic Challenge for Sustainability II (ArCS II).

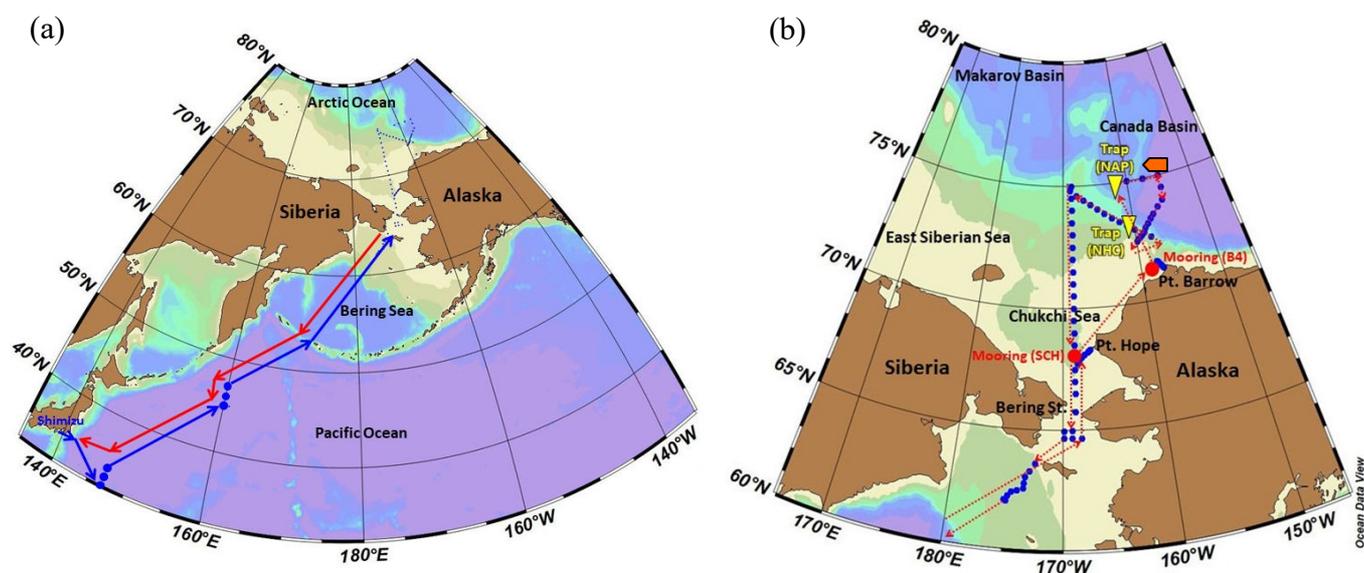


Figure 1. (a) Geographical areas of the intended work in the Pacific Ocean and the Bering Sea. Blue and red arrows indicate outward and return routes of the cruise, respectively. We will have a COVID-19 quarantine on the sea near the coast of Japan for 14 days (19 September – 2 October, 2020). During the quarantine, stationary observations are planned at 6 blue-dotted positions. (b) Geographical areas of the intended work in the Arctic Ocean. Dotted red arrows represent routes of the cruise. Planned points of stationary observations are represented by blue dots. Locations of moorings and sediment traps are represented by red circles and yellow triangles, respectively. The candidate sites for the sediment trap are primarily the Northwind Abyssal Plain (NAP) and secondarily the north of Hanna Canyon (NHC), depending on the sea ice condition. An orange pentagon indicates a planned observation site near a marginal ice zone using flying drones and various types of buoys.