

Non-Technical Project Proposal Description

One Ocean II Expedition – Arctic Future Pathfinders

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One Ocean Expedition is a global project, and a recognized part of the UN Decade of Ocean Science for Sustainable Development (2021-2030). The main goal is to create attention, stimulate ocean science, and share knowledge about the crucial role of the ocean for sustainable development in a global perspective. Statsraad Lehmkuhl is one of the largest and oldest tall ships in active use, and she is run by a non-profit foundation. In 2022/23, she completed the first One Ocean Expedition, a 20-month long circumnavigation of the world. In April 2025, One Ocean II will embark on another expedition, starting in 2025 in Bergen with a stop in Nice, France, where it will be a part of the One Ocean Science Congress and the UN Ocean Conference.

The general research questions addressed during the circumnavigation of the One Ocean II expedition are:

- How do biodiversity and indicators of human pressures vary over the world's ocean?
- What is the distribution and vertical displacement of mesopelagic sound scattering layers across the world's ocean?
- What are the physical characteristics of the regions and water masses we pass through?
- Is there a correlation between observations, models and satellite measurements, and can the measurements be used to improve weather and ocean forecasting?

UiT The Arctic University of Norway has chartered the vessel to sail through the Northwest Passage in the autumn of 2025 and the homeland of Inuit, Yupik, Unangan and Athabaskan peoples. The backbone of the voyage will be an interdisciplinary course for master's students and doctoral fellows. There will also be a scientific program for this portion of the expedition.

Our aim is to identify local Arctic challenges and make them visible on a wider public scale. We are interested in contributing to a better understanding of the Arctic biome and environment, as well as the future challenges local and global communities are facing by climate-driven changes in the Arctic. Research and teaching with a focus on social sciences are of interest for amplifying voices of Indigenous rights holders to a larger scientific and public audience. Our research evolves around:

Assessment of fish and zooplankton populations

Biodiversity assessment using physical sampling, morphological and molecular (environmental DNA) analyses

Biotechnology: exploring marine bioactive compounds

Understanding changes in sea ice thickness

Technology: safe and sustainable operations in remote areas with demanding weather conditions

Arctic Memoryscapes – documenting changes in Arctic coastal and underwater heritage

Information literacy by integrating Indigenous knowledge, experiential learning, and Extended Reality technologies

Ocean literacy: understanding and stewardship of marine environments through integrating diverse knowledge systems and emotional literacy

Documenting, revitalizing, and integrating management and conservation practices of Indigenous peoples

Creative futures thinking using experiential learning and worldbuilding through the course running on-board

International relations: interplay between the Arctic and Arctic local and Indigenous societies with global political, economic, security processes

Arctic linguistic landscapes

Didactics: students' perspectives on teaching and learning processes in collaborative interdisciplinary project work

Epidemiology and impact of diet transitions in Indigenous populations

Health studies: impact of onboard watch system on health and wellness of OOI participants

There are a range of sensors mounted to the ship which will measure the occurrence of marine mammals, currents, weather patterns, ocean temperature, and ocean light conditions. A vessel flow through system will continuously collect water samples. At certain stations along the voyage, water and organism samples will be collected from the marine environment. For this, we will use Niskin bottles (water samples), towed nets and fishing rods (zooplankton and fish), and boxcorers (sediment extraction from the seafloor). Most of the social sciences will take place on board and involve studies with the cruise participants themselves and their experiences. Extended reality and artificial intelligence are some of the tools that will be used. Some researchers will conduct interviews with local communities.

Marine data collected with the vessels sensors will be made publicly and globally available through NMDC (<https://nmdc.no/en>) following FAIR data principles within 12 months. Preliminary results generated under way will be shared with the community at organized events during the planned stops on land. The voyage through the Northwest Passage will start in Nuuk on August 5th, 2025, and end in Anchorage October 4th, with planned stops in:

Miitimatilik/Pond Inlet (August 14) OR Resolute/Qausuittuq (August 17) (for border and immigration – weather and ice depending)

Uqsuqtuuq/Gjoa Haven (August 22-26)

Ikaluktutiak/Cambridge Bay (August 29 to September 2)

Signazuaq/Nome (for US border and immigration)