Invitation

Planning workshop for expedition with I/B Oden 2023

The icebreaker Oden will conduct an expedition in the North-Atlantic sector of the Arctic Ocean and the Marginal Ice Zone during early/mid May to mid/late June 2023. The expedition called ARTofMELT aims to study the onset of the annual surface melt of the Arctic pack ice and the impacts from intrusions of warm and moist air from the open ocean to the south.

The workshop welcomes

- International researchers interested in participating on board I/B Oden, or shore-based projects
- National polar research and logistic funders
- Other interested parties

All participating projects must be able to adapt to the basic plan of the expedition.

Workshop details

The aim of the workshop is to identify potential contributions and collaborative efforts within the ARTofMELT concept (see description on the following pages). Additionally we want to clarify logistical limitations and already now identify, if possible, logistical challenges and also discuss funding options.

When	9–10 November 2021, 15.30–18.30 CET
Where	Online
Registration	Please register here

The workshop will also serve as a workshop within the ARICE project (Arctic Research Icebreaker Consortium) where it will contribute towards the ARICE goal of implementation of joint international research cruises in the Arctic Ocean.

SWEDISH POLAR RESEARCH SECRETARIAT
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Arctic Research Icebreaker Cons.
ARICE

Expedition planning and research background

The ARTofMELT expedition was proposed within a Swedish Polar Research Secretariat call by the main authors Michael Tjernström and Paul Zieger (both at Stockholm University).

Geographic location

There will not be a fixed route beforehand of the expedition. The goal is to predict the position of warm air intrusion and if possible, navigate I/B Oden there. The current plan, subject to discussions, is to go up to the marginal ice zone (MIZ) and explore MIZ-targeted science objectives, while waiting for a forecast predicting an intrusion. This calls for a very flexible and nimble science planning, since we will let the atmosphere decide where we will be going at any given time. The plan will be further developed with the participating projects.

I/B Oden

I/B Oden has about 40 berths available for researchers. Oden is equipped for flexibility, with research containers, scientific laboratories, and deep ocean winches. For more information regarding Oden facilities, please visit our website.

Logistic planning

The start of the detailed logistic planning will be approximately one year before the expedition, and will be performed in close collaboration with participating research projects. All participating projects should be available for meetings and workshops regarding their logistic needs onboard I/B Oden.

Tentative time plan 2023

Early May: ETD Helsingborg
Early/mid May: ETD Tromsö
Mid May ETA MIZ
In between: Operations
Mid/late June ETD MIZ
Late June: ETA Tromsö

Cost

Swedish Polar Research Secretariat is reserving up to 20 berths onboard I/B Oden for international cofounding. Each berth comes to the cost of approximately 1 MSEK. The final cost will be determined when the research program with all participating projects is determined. Associated shore-based projects are also welcomed at no additional cost. In addition to the cost of berths all participating projects should have research funding.

Background to the ARTofMELT project

The science objective of ARTofMELT is to study the onset of the annual surface melt in the North-Atlantic sector of the Arctic pack ice and the impacts on this from intrusions of warm and moist air from the open ocean to the south; these intrusions often occur in the form of filaments of air transported northward and are sometimes referred to as atmospheric rivers. There are very few in-situ observations from the melt onset. Previous in-situ observations of atmospheric rivers have only happened when an expedition by chance happened to be at the right location. At the same

time, few expeditions endeavour into the pack ice at this time of the year. ARTofMELT will deploy an innovative strategy to remedy this. This strategy is simple and based on two tenets:

1. Be early. Deploying the Oden in the Arctic Ocean pack ice north of the Fram Strait in the spring of 2023.
2. Be at the right location. Using ensemble forecasting of so-called extreme forecast indexes, we will pinpoint timing and area for atmospheric rivers at 5-10 days' lead time. Oden will then navigate towards that area, while ensemble trajectories will help pinpoint an optimal observing location. Arriving there before the event, we will wait for it to happen and can observe the evolution when it does.

The project is spearheaded by the ACAS (Arctic Climate Across Scales) project at Stockholm , University, and within this we will attempt to cover many aspects of atmospheric science (boundary layer meteorology and the surface energy budget, aerosols and clouds, atmospheric structure, etc.). But no group can cover all aspects, and we are always looking for partners that can either complement or supplement observations with additional instruments or other sampling techniques or else take advantage of our strategy. For the benefit of ARTofMELT following priorities are wished for:

1. Complimentary atmospheric projects: For example, continuous remote-sensing wind profile observations and more advanced lidar observations. Additional aerosol observations are also welcome.
2. Projects that directly relates to the surface energy budget, for example dealing with the physics or chemistry of the sea ice or snow, the upper ocean vertical structure and energy budget etc.
3. Other projects 1: Projects that relate to the atmospheric transport theme, e.g. transport of pollutants or trace gases or projects with an environmental or a climate focus.
4. Other projects 2: Any other project that can coexist with ARTofMELT and take advantage of this particular cruise profile. Such other topics can be i.e.:
    - » Remote sensing and ice/snow physics
    - » Geophysical mapping and water-column acoustics
    - » Trace gas biogeochemistry and surface gas fluxes
    - » Physical and chemical oceanography
    - » Productivity and decomposition (the biological carbon pump)
    - » Functional biodiversity

A necessity for participating is that most observations use Oden as a base. Measurements on the ice will be possible when Oden is stationary, for example when waiting for a favourable forecast or when on location waiting for a forecasted atmospheric river to show up. Such measurements need to be designed so they can be interrupted at a relatively short notice (< 1 day) and possibly redeployed at a different location. As we do not govern what the atmosphere does, measurements that target pecific geographic areas will also be suboptimal. Since our in-situ air observations will be conducted mainly on the 4th deck of Oden (with the ship turned into the main wind), activities in front of the ship and access to the foredeck will be regulated; not impossible but permanent work on the foredeck should be avoided.