

## **MOSAiC – Workshop: Summary Report**

The MOSAiC project (**M**ultidisciplinary drifting **O**bservatory for the **S**tudy of the **A**rctic **C**limate) is the first year-around expedition with the focus to explore the coupled climate system in the central Arctic under melting sea ice conditions. The focus of MOSAiC lies on in-situ observations of the climate processes that couple the atmosphere, ocean, sea ice, biogeochemistry and ecosystem. As overarching goal MOSAiC supports improved sea ice forecasting, regional weather forecasting, and climate predictions.

MOSAiC could lead to a quantum leap in our understanding of the main mechanisms acting in the coupled Arctic climate system and its representation in regional and global climate models as well as help to improve weather forecast models. The project has been designed by an international consortium of leading polar research institutions under the umbrella of the International Arctic Science Committee (IASC), led by the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI), Arctic and Antarctic Research Institute St. Petersburg (AARI) and the University of Colorado, Cooperative Institute for Research in Environmental Sciences (CIRES).

The results of MOSAiC will enhance our understanding of the regional and global consequences of Arctic sea ice loss and connected climate change as well as improve weather and climate scenarios. As such it will support safer maritime and offshore operations, contribute to an improved scientific basis for future fishery and traffic along the northern sea routes and improve science-based decision-making and policy development. Improved understanding of the impact of Arctic climate change on a Northern hemispheric scale will provide stakeholders and decision-makers with the necessary knowledge for adapting to climate change and develop target oriented mitigation strategies.

The coordination of such complex observations and the implementation of measurement concepts is a great challenge to ensure the quality and continuity of critical measurements and to maximize the impact of these observations for coupled system studies. This includes the coordination of the modelling activities to improve the sea ice forecast, numerical weather prediction and the climate models.

The first steps of planning the implementation of MOSAiC were made during the Workshop in Prague in spring 2017. During the last month all MOSAiC partners put all their efforts in further proceeding with organizing this huge project. The outcome was presented during the 4-day MOSAiC implementation at AARI in St. Petersburg from November 13<sup>th</sup> to 16<sup>th</sup> 2017. Around 120 scientists from dozens of nations worldwide participated in the workshop.

The first day of the workshop was opened with speeches from the AARI director Alexander Makarov and the MOSAiC coordinator Markus Rex presenting the status of MOSAiC in general. After the welcome, the coordinators of the MOSAiC teams gave an update about the status within the teams. This included talks about the five climate relevant subsystems (atmosphere, ocean, sea ice, bio-geochemistry and ecosystem), remote sensing and aircraft operations. Each presentation focused on the status of planning and organization of the scientific work

during the expedition, the funding situation and the involved institutes. The first block of presentations was finished by an overview about the Chinese contribution to the MOSAiC expedition.

In St. Petersburg a larger focus was on the modelling activity during MOSAiC. Therefore, half a day was covered with talks presented by the modelling and data assimilation community. The modelling team further organized the work that need to be done to make MOSAiC successful in the beginning and during the drift by using sea ice and weather forecasts to find an adequate ice floe to set up the central observatory and the distributed network. Additionally, the organization of the modelling work after the expedition to fulfil the overarching goal of MOSAiC, better representation of Arctic key process in models to improve the sea ice and weather forecasting and the climate predictions makes progress.

One outcome of the workshop in Prague (spring 2017) was the establishment of MOSAiC task groups that are responsible for the observational platforms (RV Polarstern, central ice floe, helicopters, UAVs, tethered balloons, meteorological mast, buoys and distributed network) that are important for the logistical and scientific coordination during MOSAiC. The Coordinators of the task groups were defined right after the workshop and they presented the status of the planning during the second day of the workshop in St. Petersburg.

The day ends with the breakout sessions that were held by each of the MOSAiC teams. The breakout sessions were meant to coordinate and organize the instruments and measurements during the expedition. This helps to define a weekly schedule of measurements that need to be coordinated with all the other teams to improve the collaboration within the teams and to enable the implementation of the interdisciplinary strategy of MOSAiC.

The outcome of the breakout sessions was presented during the morning of the third day of the workshop. Further breakout sessions followed for the cross-cutting teams (modelling, remote sensing, aircraft operations and data management) and the outcome was discussed in a plenum.

During the last day of the workshop that status of the logistical planning was presented by the vice director of AWI, Uwe Nixdorf and the head of Arctic logistics of AARI, Vladimir Sokolow. They explained the current planning of the MOSAiC expedition with a definition of an adequate ice floe for the year-around expedition and presented a strategy and an area to find this ice floe. That leads to a potential starting position around 85° N and 120° E. Additionally, the legs and the schedule of resupply and exchange of crew and scientists was adjusted. The expedition will be split into six legs that range from 1.5 to 3 month length (see Fig. 1). During the first leg, the Russian ice breaker TRYOSHNIKOV (AARI) will join the RV POLARSTERN to the final ice floe and helps to set up the central observatory and the distributed network. That allows having additional personal for the installation work. After leg 1 and leg 2 a vessel from Rosmorport will be used for the resupply and the staff exchange. In spring, after leg 3 the Antonov aircrafts from AARI will be used for personal exchange. The Swedish ODEN and the Chinese XUE LONG follow after leg 4 and 5.

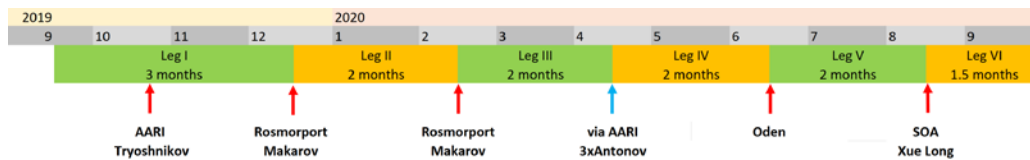


Fig. 1: Schedule of the MOSAiC drift expedition.

The workshop ends with a general plenum and some announcements. As an outcome of the workshop, the implementation plan will be revised to include all the new information and planning. An overview was given about the berths that are requested or funded. MOSAiC is on a very good way and most of the berths are already funded or the scientists wait for the decision of the funding agencies. Leg 4 and 5 are the most questioned legs. The new MOSAiC logo and the individual team logos were introduced and they will be published and available for use end of 2017. In addition, it was decided to held the next MOSAiC workshop in Potsdam at AWI in May 2018. The “official” start of MOSAiC will be in summer 2018 with the establishment of the International Steering committee and in parallel with the start of the *Fram* Expedition on July 21<sup>st</sup> 1893, 125 years ago.

Aside of the general MOSAiC Workshop, the MOSAiC coordinators used the chance to meet with international MOSAiC partners that are responsible for the icebreakers and the resupply of RV Polarstern.

#### Main outcomes and follow-ups:

- all teams made a good progress towards MOSAiC, the planning was much more concrete since the workshop in spring 2017 in Prague
  - team coordinators know what measurements will be done and how often (prepare a schedule)
  - team coordinators know which teams and institutes will be involved in the expedition
- further progress concerning the schedule of MOSAiC, definition of the legs and the resupply schedule (including staff exchange)
- update of Implementation Plan will be published and printed mid of February 2018
- Implementation Workshop at AWI Potsdam: May 28<sup>th</sup> – June 1<sup>st</sup> 2018 (announcement in January 2018)
- “official” start of MOSAiC in summer 2018, establishment of the International Steering Committee, start of *Fram* Expedition 125 years ago
- new MOSAiC logos were introduced