

## **MOSAIc Implementation Planning Workshop Summary**

**Background.** The Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAIc) is an international initiative that aims to improve numerical model representations of sea ice, weather, and climate through coupled system observations and modeling activities that link the central Arctic atmosphere, sea ice, ocean, and ecosystem. Planning for the activity has been underway for approximately 5 years and has resulted in a Science Plan that outlines the major scientific drivers and objectives for the initiative. As part of the ICARP III process, one major objective has been to work towards a plan for implementing the cross-disciplinary research of MOSAIc.

**Implementation Workshop.** To facilitate the MOSAIc process, an Implementation Planning workshop was held at the Wissenschaftsetage (WIS) im Bildungsforum in Potsdam, Germany on 22-24 July 2015. Local arrangements were organized by Klaus Dethloff and Sabine Helbig with workshop support being provided by the Alfred Wegener Institute and International Arctic Science Committee. ICARP III funding was used to provide travel support for key attendees to the workshop that could not otherwise attend. Workshop objectives included: Initial discussions on how to implement MOSAIc science objectives in a well-coordinated and coupled manner, identifying specific logistics requirements to support scientific activities, identifying specific roles and scientific contributions, maintaining tight coupling between modeling needs and observational activities, and developing an outline for an eventual written Implementation Plan. While important, the workshop was not focused on solving the major logistics challenge of re-supply for the Polarstern icebreaker, which has been named as the primary drifting platform, because this challenge is better suited for logistics personnel rather than scientific personnel. The workshop was attended by ~60 representatives from 12 different nations, including early career scientists, participants that are new to the MOSAIc community, and key logistics personnel from the Alfred Wegener Institute (Germany) and Department of Energy (US) that have both committed key resources to the initiative. Through a series of plenary presentations, targeted breakout session discussions, and individual efforts, all primary workshop objectives were met and will contribute key information to the Implementation Plan.

**Workshop Outcomes.** The workshop structure and strong participation by attendees helped contribute to a few important outcomes.

- **Familiarity:** During a day #1 open plenary session, participants provided 5-min perspectives on their ideas and planned contributions to MOSAIc. While this included a lot of information it was very useful for understanding the key pieces that can be brought together towards implementing MOSAIc. This session helped to engage the participation of all who attended.
- **Disciplinary requirements:** A set of disciplinary-based parallel breakout sessions on Day #2 supported the development of baseline requirements for implementing the disciplinary building blocks of MOSAIc. While the initiative ultimately targets inter-disciplinary research, it was important to first document these disciplinary requirements as they more clearly map to the traditional, disciplinary way of conducting research.
- **Coupled system experimental design.** Plenary discussions during the second half of Day #2 were useful for outlining some of the important elements of the MOSAIc inter-disciplinary implementation design. These helped to specifically identify the importance of scales and scale interactions that must underlie the experimental design. Parallel breakout sessions on Day #3 were then used to discuss the interdisciplinary implementation on 4 distinct scales: onboard the

ship, near the ship (“you can walk to it”), distributed network, and aerial facilities. Each session built the framework for how the given scale would be designed to accomplish cross-cutting objectives. For example, the first-order distributed network concept shown in Fig. 1 was conceived.

- Building broader support. The final workshop session focused on funding and outreach. The challenge of supporting Polarstern re-supply was discussed briefly. Primary potential sources for this necessary financial support include: EU support through upcoming HORIZON 2020 call (although there remains some skepticism about these possibilities), US contributions through proposals to multiple agencies, other national contributions of resources, and/or a ‘berth fee’ wherein re-supply funding would be effectively distributed across the available scientific berths on the ship. Discussions also touched on the potential for reaching out to private industry and/or foundations. It is clear that some higher-level actions must occur to arrange the major logistics, and ultimately this will be spearheaded by the AWI logistics department; the attendees of this workshop were generally not in a great position to speak to such large expenses. This major challenge notwithstanding, the final discussions during this session regarding general outreach and publicity for the project demonstrated that there is a fair amount of enthusiasm for MOSAiC within the scientific community in attendance.
- Implementation Plan Outline. After the workshop concluded, a smaller group of individuals met for a few hours to integrate workshop information towards an outline for the Implementation Plan that will be constructed based on this workshop and other activities. The discussion also touched on important issues such as data archival and data usage policies. The general plan structure will include: Brief background/introduction information, a section highlighting the specific objectives of the project, a section that provides the general design of the observational constellation (including on-ship, near-ship, distributed network, aerial facilities, and other aspects), operational modeling plan, and general operations (including governance, safety, resupply scheduling, etc.). Additional sections will address specific details such as data management, outreach, and other key aspects to ensure strong linkages with stakeholders.

**Actions and Future Steps.** As a result of the workshop a number of key action items were established and will contribute towards forward progress on MOSAiC planning and implementation. These include:

- Finalize Science Plan so that it can be published in hard copy for distribution to key stakeholders. It was decided that general community input is welcome through 1 November 2015, after which point final edits will be made and the document will be finalized by early 2016.
- Develop full (first draft) Implementation Plan. The objective is to have a solid and complete draft finished by spring 2016 in time for various meetings and workshops, such as Arctic Science Summit Week and important meetings for European Union funding considerations.
- Disciplinary leads (i.e., members from the Science Plan writing team that were also responsible for leading breakout sessions at the Implementation Workshop) will serve as the lead contacts for coordination of MOSAiC projects and will facilitate writing of the Implementation Plan.
- Polarstern onboard logistics tour in spring 2015. There will be a meeting for key workpackage and measurement package representatives to tour the Polarstern and have more explicit discussions about the arrangement and utilization of facilities onboard the research vessel.
- All interested participants should actively engage in outreach to potential funders and scientific collaborators. Additionally, we should engage in broader public outreach where possible.