8. OVERARCHING AND SUPPORTING ACTIVITIES

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Grant-No. AWI_PS122_00

8.1 LOGISTIC & SAFETY

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Objectives

The main objective was the overall safe conduction of the expedition.

For MOSAiC a specific safety concept based on the AWI safety standards as well as project specific needs and experiences from previous drift expeditions had been developed by B. König and V. Mohaupt.

Work at sea

A safety briefing, including specific information about MOSAiC as well as general field safety and polar bear safety and awareness was mandatory for all participants before departure in Tromsø, to ensure a good level of general safety awareness and knowledge. During transit the logistics team carried out three introductory sessions; 1) procedures and use of VHF and 2) introduction of the log team and their training and experience with regards to polar bear safety 3) polar bear biology and behaviour.

Conditions on the floe were assessed regularly. If required, the safety concept was adapted to match conditions.

Check of work safety standards was carried out by M. Votvik. Necessary measures were taken if required and participants were briefed accordingly.

The logistic team in general was the controlling body for the predefined safety rules and standards during the expedition. The main tasks were carrying out bridge watch, stern watch/first responder and polar bear watches on the ice. Further duties were the management of infrastructure and the distribution and maintenance of safety equipment including tripwire, rifles and flare guns for polar bear protection.

The general responsibility for generators and vehicles (snow scooter, ARGO and Pistenbully) was in the hands of T. Sterbenz and H. Laubach. An introduction regarding safe use of snow scooters and basic technical knowledge was required for all participants.

Mandatory refresh courses for weapon handling were held on site for all potential polar bear guards among participating scientists. Proper weapon handling was checked throughout the expedition. Regular maintenance of weapons and weapon equipment was carried out.

During the expedition, the tripwire fence was taken down due to ice dynamics, visibility with daylight in relation to the layout of the CO, and planned changes in infrastructure as a result of relocation of Polarstern at the floe.

The bridge watch was in charge of coordination and monitoring of the teams on the ice. In case of events (cracks, bad weather, polar bears, breaks ups) the logistic bridge watch was managing and advising the teams and informing and consulting the cruise leader if needed. All actions were carried out in cooperation with the nautical officer on watch.

During the single polar bear encounter had on leg 3 logistic team lead M. Votvik was called up and – in consultation with the Cruiseleader – took measures to scare the animal away.

According to the developed emergency concept, a member of the logistic team, together with the officer on watch would be in charge of a potential medical evacuation.

An exercise of such situation was carried out to assess the concept in terms of flaws and allow optimization in close contact with the ship's management.

Organisation and management of freight and cargo issues was undertaken in close cooperation with the ship's management.

The logistic team assisted during the build-up, field trips and logistic operations (scouting new routes, evacuation or moving of equipment) and took responsibility in maintenance of infrastructure (power lines, roads, shelters, ice holes, bridges).

At the end of the cruise leg, the logistics team took part in complete evacuation of the ice camp before departing the floe.

Preliminary (expected) results

Not applicable

Data management

Not applicable

References

Not applicable

Special requirements on notations:

Not applicable

Images

Not applicable

8.2 DATA SUPPORT

Heidi Turpeinen[2], Frederic Tardeck[2]

Not on Board[1]: Janik Eilers, Peter Gerchow, Antonia Immerz, Sebastian Immoor, Roland Koppe, Jörg Matthes, Martin Petri, Stefan Pinkernell, Jens-Michael Schlüter, Andreas Thiele.

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Objectives

General accessibility of data requires a central data storage and a common meta data concept. All sensors and sampling devices used in scientific events during the MOSAiC expedition shall therefore be registered in SENSORWeb and all device operations performed during the expedition logged in the ships station book, the DSHIP ActionLog. A predefined structure on the MOSAiC central storage further ensures that data can be found in an organized manner, also after the expedition. In this way all subsequent sample analyses can then be referenced to the original sampling event. A full description of the data management concept in MOSAiC can be found in the MOSAiC Data Policy (see Appendix).

Work at sea

For general tasks, see Work at Sea, Leg1 and Leg 2.

At the beginning of PS122/3 there were fiber optic cables deployed between the ship and two of the main cities, Ocean City and Met City. Remote Sensing Site relied on the installation of radio link but the power supply was provided by Met City. Due to several breakups of the floe during leg PS122/3 the fiber optic cables to Ocean City and Met City got severely damaged. Since deploying the delicate fiber optic cables did not seem further feasible at some point, the solution for the data transfer was the installation of radio links near the power hubs on both sites. Met City was already equipped with radio link from earlier legs (but not in use), the installation in Ocean City was successfully completed on leg PS122/3.

This worked very well in both cities until the power supply to Met City had to be cut. Subsequently, the radio link installations both in Met City and on Remote Sensing site went offline. After re-establishment of power supply via generators on site, both radio link installations could be used again. On Met City the radio link setup was moved from the power hub into the hut and connected to a switch instead of a moxa in the power hub. Given to ongoing ice dynamics, the Remote Sensing site was moved to the Logistics Area and after re-establishment of the site the radio link installation was in use as well. Due to the vicinity of *Polarstern* the radio link on Remote Sensing site was quite sensitive to movements on the floe. Therefore, an adjustment of the radio link antenna was required more often than at sites further away. Until Mid-May 2020, all radio link setups were unmounted parallel to recovery of the main sites before leaving the floe.

Assistance was also provided to scientists when connecting their instruments to the network, both within the vessel and on the main sites. Synchronizing scientific events performed on the ice and logged with the Floe Navi tablet was part of the daily tasks of a data supporter.

Besides trainings and assistance in using the provided infrastructure with all its components including fileserver, virtual machines, the sensor registry SENSORWeb and the DSHIP ActionLog, large focus of leg PS122/3 data support was also put into refining the discussed meta data workflow for specific scientific activities such as the coring events, the logging of buoy deployments and other continuously measuring instruments. This was done in joint sessions with data representatives of every team.

Preliminary results

An expedition leg is subdivided into so-called Science Activities in DSHIP, which in turn are composed of numerous device operations. In MOSAiC the weekly schedule for scientific work is represented by weekly incrementing Science Activities. For leg PS122/3 the following Science Activities were defined:

- Science Activity 0: Continuously measuring instruments always running on *Polarstern* (e.g. Ferrybox, Thermosalinograph, etc.) and therefore normally logged by the system administrator.
- Science Activity 28: All continuously measuring or sampling instruments that are deployed on *Polarstern* or the ice for MOSAiC (i.e. buoys, radars, sediment traps amongst others)
- Science Activity 29 - 41: Discrete sampling or short-term measurement events performed within the scope of the weekly scientific schedule starting with Science Activity 29 on 24.02.2020. Generally, a new Science Activity starts at 00:00 UTC every Monday.
- Science Activity 42: Discrete sampling or short-term measurement events performed during the transit phase from the floe to Svalbard. This last Science Activity of leg PS122/3 ended at 06:30 UTC on 04.06.2020 with the begin of leg PS122/4.

A total of 1755 Device Operations comprising one or more Actions were logged during leg PS122/3.

Altogether, approximately 50 Terabytes of data, including 70.000 directories and 3.6 Mio files, were uploaded to the MOSAiC Central Storage on *Polarstern*.

8.3 Media

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Objectives

AWI

Comprehensive set of communication activities before, during and after the expedition, including web formats, regular service for news and other daily reporting formats, social media activities, photo and video documentation, exhibition, virtual reality formats, a planetarium show.

During each leg, the communication manager coordinates media and outreach requests from shore to ship and vice versa, and ensures a constant service and flow of information to media and the communication departments of participating organizations. Communication managers also create the blogposts for follow.mosaic-expedition.org and social media channels. This person also produces a podcast with the expedition leader in German language and with selected participants in English.

The photographer's responsibilities include creating a professional pool of photo/video/audio material during his/her leg and in all conditions that will be made available to the public and also serve a variety of communications needs.

UFA film crew

The German production company UFA produces a 90 minutes documentary about the entire MOSAiC Expedition. The Film is going to be shown on German TV at the end of 2020. There are other formats for German TV and there are other international programs in development as well. All scientific fields of the expedition shall be explored in the 90 minutes film. The viewer shall get an experience of the complex processes of the Arctic climate system as well as the global influences of the Arctic for the climate in other regions of the world.

Work at sea

AWI

Documenting leg 3 involved numerous photo-shooting days onboard the supply vessel *Kapitan Dranitsyn* as well as onboard *Polarstern*. Doing so, the entire period from polar night through twilight conditions into polar day could be documented. Thematically the pictures included research work of scientists on board as well as on the ice in the Central Observatory and in the Distributed Network, logistical challenges and life on board of both mentioned ships. The photographer Michael Gutsche left *Polarstern* on April 22. Since then, photos for the purpose of documentation and media/outreach have been used from a broader group on board but especially from Christian Rohleder (DWD).

National and international media outlets have used MOSAiC photo and video database for reporting about the expedition. In German language, a podcast with chief scientist Torsten Kanzow was recorded and edited. International and national phone interviews of scientists and *Polarstern* crew members, and media requests have been managed onboard from *Polarstern*. The major topic of all these requests have been the Coronoa pandemic and the consequences for the individual cruise members.

In addition, the communication officer checked regularly blog posts written by individual cruise members.

UFA film crew

Already the long and complicated journey with *Kapitan Dranitsyn* has shown us, that working in the arctic is not plannable at all. Our time on the MOSAIC-floe with all the breaking up should not change this realization. That is why we were not only interested in the scientific work, but also in all the occurring logistical problems (breaking up of the floe, delayed exchange, Corona pandemic), their solutions and the resulting consequences for all scientists and crew.

We portrayed one or more scientists of each science team, filming them outdoors on the floe and on board *Polarstern* in their Labs.

The strong features of this leg were the recurring light, during the change from polar night to polar day, the very cold temperatures at the beginning with temperatures down to -40 degrees Celsius and the strong storms with the blowing snow. These were not only visually exciting, but also very challenging for our work in the field.

Preliminary (expected) results

AWI

The public visibility of MOSAiC was also during Leg 3 enormous. This is not only represented by the constantly increasing follower of the daily blogposts on follow.mosiac-expedition.org. Twitter, Instagram and other social media accounts. We also got numerous positive personal feedbacks from national and international parties on the outreach work.

UFA

During our filming on *Polarstern* we decided to focus on the following protagonists:

Team Atmos: Julia Schmale, Gina Jozef & John Cassano
Team Ocean: Janin Schaffer
Team ECO: Serdar Sakinan, Carin Ashijian
Team BGC: Torsten Sachs, Jacqueline Stefels, Jeff Bowmann
Team ICE: Amy Macfarlane, Robert Ricker
Chief scientist Torsten Kanzow
Captain Stefan Schwarze

Our footage will show the beauty of the Arctic spring, the challenging work in this cold environment and the emotional ups and downs, caused by the logistical problems, climaxing in leaving the MOSAIC-floe with *Polarstern* way earlier than planned.

Data management

AWI

The produced photo and video material will be uploaded to the media libraries multimedia.awi.de/mosaic (photos), and multimedia.awi.de/mosaicvideo (videos). All material will be made available under a creative commons license to support all MOSAiC partners as well as journalists.