



MOSAIC Expedition

An entire year trapped in the Arctic ice

The international MOSAIC expedition with the German research icebreaker Polarstern will launch in autumn 2019

[27. June 2018] It could be the largest-scale Arctic research expedition of all time: in September 2019 the German research icebreaker Polarstern will depart from Tromsø, Norway and, once it has reached its destination, will spend the next year drifting through the Arctic Ocean, trapped in the ice. A total of 600 people from 17 countries, who will be supplied by other icebreakers and aircraft, will participate in the expedition - and several times that number of researchers will subsequently use the data gathered to take climate and ecosystem research to the next level. The mission will be spearheaded by the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI).

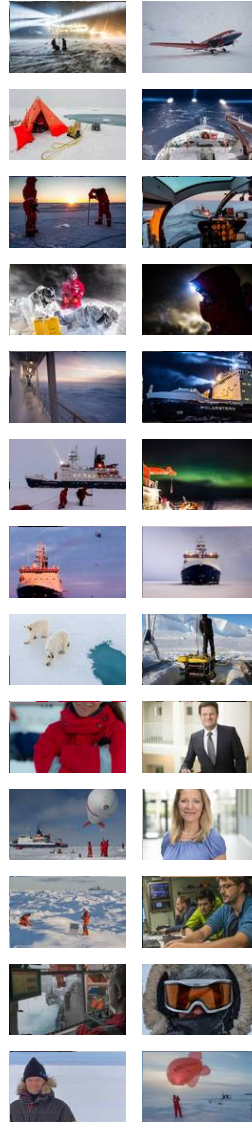


125 years ago, Fridtjof Nansen departed on board his sailing ship Fram for the first-ever drift expedition. But there has never been an expedition like the one currently planned: for the first time, MOSAIC will take a modern research icebreaker, brimming with cutting-edge scientific instrumentation, near the North Pole in winter. Four additional icebreakers will provide logistical support, and a dedicated landing strip will be created, to be used for resupply flights and two research aircraft. Helicopters, snowcats and snowmobiles will also be used. Yet this elaborate polar mission is necessary in order to gather data on the region - which is virtually inaccessible in winter - that is urgently needed for climate research. In turn, the data will offer mankind new insights into the interactions between the ocean, ice and atmosphere. Though the Arctic regions have a tremendous influence on our climate, that influence remains poorly understood.

“The outcomes of the MOSAIC expedition will take our understanding of the Arctic to a new level. We desperately need this data in order to better grasp the impacts of global climate change and refine our prognoses,” says Federal Minister of Education and Research Anja Karliczek. With the Alfred Wegener Institute, Germany has one of the world’s foremost centres for polar research, and one with long-standing international contacts. “The AWI has successfully brought together the world’s leading Arctic research institutes for this unprecedented venture,” the Minister adds. And Arctic research has also sparked international collaboration at the political level. Under the motto “Arctic Science, Challenges and Joint Actions”, in autumn 2018 Germany, the European Commission and Finland will organise the second conference of ministers on Arctic research (Second Arctic Science Ministerial) in Berlin. Representatives from 30 nations and regions, predominantly federal ministers, will gather to discuss the future of Arctic research together with envoys from the indigenous peoples of the Arctic.

During the MOSAIC expedition, the drifting sea ice alone will determine the research icebreaker Polarstern’s route just beyond the Arctic Circle. Icebreakers from Russia, China and Sweden will visit the ice floe to provide the expedition with fuel and exchange personnel. “An undertaking of this scale can only succeed through international collaboration,” explains Prof. Antje Boetius, Director of the Alfred Wegener Institute. Surrounding RV Polarstern, a network of research camps will be formed on the 1.5-metre-thick floe. Here the various teams will set up monitoring points to investigate the ocean, ice and atmosphere, as well as life in the Arctic winter. “What happens in the Arctic doesn’t stay in the Arctic. The climate development in our latitudes greatly depends on what weather the Arctic ‘cooks up.’ We now need to take a closer

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look, and explore the interactions between the atmosphere, ice and ocean there," says expedition head and coordinator of the MOSAiC project Prof. Markus Rex, Head of Atmospheric Research at the Alfred Wegener Institute. Gauging the major project's significance, Boetius adds, "The polar night in the Arctic plays a pivotal role for the adaptation of life forms; as such, we also expect to gain wholly new biological insights." The expedition has five focus areas: the physics of sea ice and snow cover, atmospheric processes, ocean processes, biogeochemical cycles, and the ecosystem of the Arctic.

The Arctic is generally considered to be an early warning system for climate change. The dark water absorbs more energy than the ice, which reflects solar radiation, and thanks to the thinner ice, more heat is making its way from the comparatively warm ocean to the surface and into the atmosphere. In this way, feedback effects are significantly amplifying the warming of the Arctic. What we still lack are the observations needed to grasp individual processes in the ocean, sea ice and atmosphere, as well as their interconnections, and to quantify them in our climate models. "The dramatic scale of Arctic warming isn't adequately reflected in today's climate models, and the uncertainties in climate prognoses for the Arctic are enormous," says Markus Rex with regard to the remaining gaps. "That's why we have to comprehensively study the processes involved in the climate system, especially in the winter." And the effects of what transpires in the Arctic can already be felt in Europe, Asia and North America: the smaller differences in temperature between the Arctic and the Tropics are destabilising the typical atmospheric pressure patterns; as a result, cold polar air is finding its way to the moderate latitudes, while warm, moist air pushing into the Central Arctic is increasingly accelerating the warming.



The budget for the expedition is more than 120 million euros, contributed by all of the international partners involved, but chiefly by the Helmholtz Association, which means 90 percent came from Germany's Federal Ministry of Education and Research (BMBF). Though the expedition launch is still more than a year away, planning began in 2011. Now the preparations are entering their final, hot phase - and the countdown to the most spectacular Arctic expedition of our time has begun.

Video

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