

# Winters are changing in the Arctic



Photo by Michael Gutsche, Alfred-Wegner-Institute

The MOSAiC expedition is an international cooperation project, in which scientists gathered information in the Arctic over one year. The aim is to study how sea ice, the ocean and the atmosphere interact, and what impact the climate change in the Arctic will eventually have.

An international scientific community comprising experts from all the natural sciences has been preparing for MOSAiC for the past ten years. Global warming is a joint concern, and the Arctic is currently suffering most, with temperatures rising at twice the rate as elsewhere.

## Transpolar Drift

Research Professor Jari Haapala, an expert on sea ice and Head of Marine Research at the Finnish Meteorological Institute, arrived in the Arctic onboard the German polar research vessel *Polarstern* in September 2019.

The vessel anchored in the ice of the Laptev Sea and began its slow journey with the Transpolar Drift Stream. (<https://follow.mosaic-expedition.org>).

Haapala's task was to lead the sea ice and snow team, collect data on ice movement utilizing the ship's radar, and conduct in-situ ice physics measurements.

"We were surprised at how much the ice actually moves. Not only was the speed of the Transpolar Drift higher than on average, but the pack ice experienced constant dynamic movements such as expanding, shrinking, shearing and closing again," Haapala says.

"For those scientists gathering field data, the ice deformation was an unpleasant surprise as some equipment was destroyed, lost or had cables torn off."

"These movements represent the new Arctic. The ice interacts much more with the atmosphere also during winter."

## Every year is different

Climate change is a long-term trend spanning 20 to 30 years. Some winters are colder and some are warmer, which is normal.

This year in the Arctic, the ice extent during January-February was close

to normal and wider than the previous five years had been. However, in May the situation was back to the same amounts as for the past five years.

"It is hard to say how much of this ice will stay during the summer and become multi-year ice. It depends largely on wind strength and direction. In some years, strong winds have pushed the ice to warmer areas where it melts," Haapala ponders.

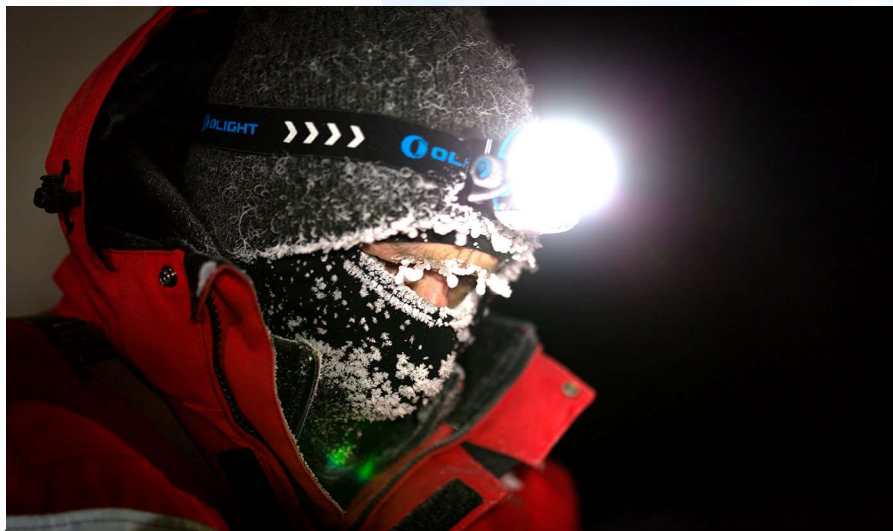
## No doubt of climate change

Arctic ice data is available for the past 40 years. It is evident that the past ten years are different than the 80s and 90s were.

"There are no doubts that climate change is happening in the Arctic. Every indicator is pointing in the same direction; ice extent, ice thickness, multi-year ice, etc. all show that there is less ice than before," Haapala underlines.

Regarding winter transportation, the biggest changes have occurred in the Barents Sea and the next area of change will be in the Kara Sea.





Research Professor and Expert on Sea Ice, Jari Haapala, from the Finnish Meteorological Institute spent four months in the Arctic onboard Polarstern. Picture Stefan Hendricks.

many years in international groups. *Polarstern* will return to Germany in October 2020.

Apart from natural scientists, a group of German naval architects stayed onboard the vessel measuring ice loads on the ship's hull. This data will be combined with ice field measurements, such as ice thickness, ice movement and internal ice pressure.

"In two years, all data will be openly available to everyone, both scientists and companies. Ship designers will then benefit from this research project," Haapala adds. ■

In general, the Siberian coast has already changed substantially and will continue to do so.

### Extreme conditions

"At the same time, it is important to remember that regardless of climate change, the conditions in the Arctic are extremely difficult. During the winter time there are no vessels that can manage there."

According to Haapala, transarctic shipments will not take place for many years to come.

"The Northern Sea Route transport window is widening, but at a very slow pace. In addition, every year is different with ice in varying places, complicating planning even more."

### Ice-free Arctic Ocean

Haapala believes that the Arctic Ocean will be ice-free for the first time in September within fifteen to twenty years from now. The North Pole could be ice-free even earlier.

"We are constantly moving towards a situation where the Arctic ice moves and melts away completely. The last time the Arctic Ocean was ice-free in summer was 130,000 years ago."

This worries scientists because they don't know how it will affect the Earth.

"We don't know how our biosphere can cope with the new situation, nor how the climate and all living creatures will change as we lose the Arctic sea ice," Haapala explains.

### Open data in two years

Data will be gathered in the Arctic until September 2020. Scientists have already begun their first analyses, which will continue for

