Research vessel Polarstern returns with new findings from the Central Arctic during the 2012 ice minimum

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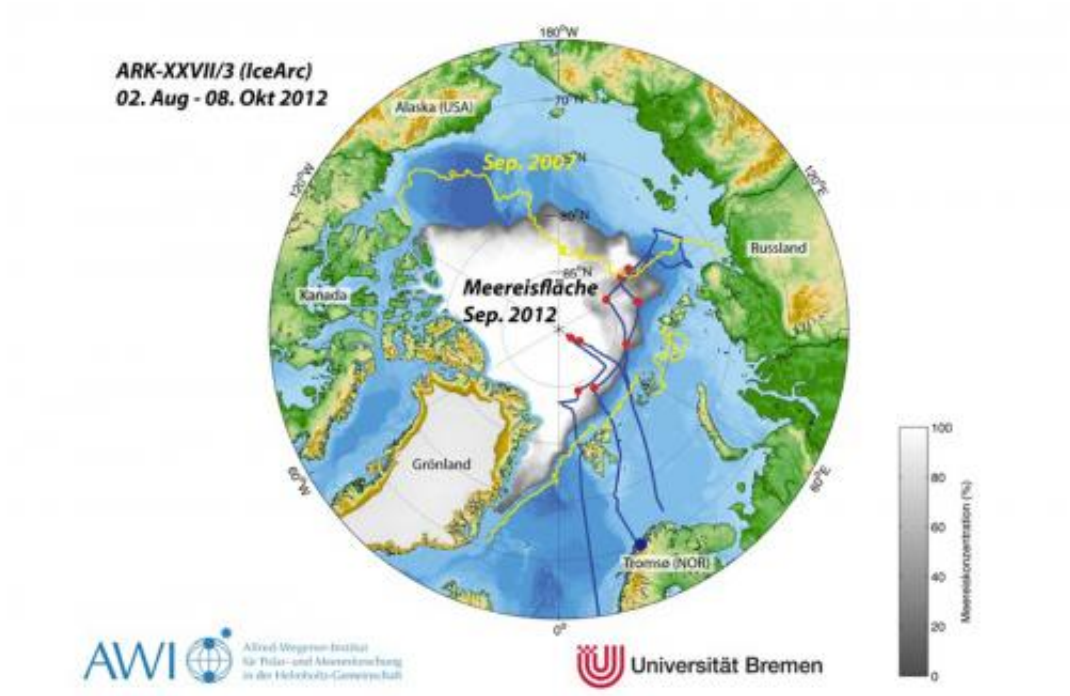
Melt Pond sampling site; in the front: llka Peeken (MARUM/AWI), Anique Stecher, Christiane Uhlig (both AWI) and Luisa Galgani (GEOMAR), to the right: Stefan Hendricks (AWI) on bear watch (© M. Fernandez, Alfred Wegener Institute)

Polarstern is expected back from the Central Arctic expedition "IceArc" in Bremerhaven on 8 October 2012 after a good two months. 54 scientists and technicians from twelve different countries conducted research on the retreat of the sea ice and the consequences for the Arctic Ocean and its ecosystems over a period of two months in the High North. A number of new technologies were used for to film and photograph life in and below the ice down to a depth of 4400 metres. Since its departure from Tromsø (Norway) on 2 August 2012 Polarstern has travelled some 12,000 kilometres and conducted research at 306

stations. These included nine ice stations where the ship moored to an ice floe for several days to examine the ice, the water beneath it and the bottom of the sea.

Many measurements were concerned with responses to the rapid retreat of the sea ice this summer. The researchers determined that the thick multiyear sea ice in the area of investigation had declined further. With the so-called EM-Bird (electromagnetic sensor to record the thickness of sea ice) an area of 3,500 kilometres of sea ice was measured from a helicopter. As early as July 2012 the Siberian shelves including the Laptev Sea were free from ice, whereas in the summer of 2011 Polarstern had still encountered multiyear ice in this region. This means that the volume of ice is greatly reduced by melting. The fresh water content of the sea surface has increased accordingly as a result of the melting ice. "The Arctic of the future will consist of thinner sea ice which will therefore survive the summer less frequently, will drift more quickly and permit more light to penetrate the ocean. This will lead to great changes in the composition of sea life", says head of the expedition Prof. Dr. Antje Boetius, who manages the Helmholtz-Max-Planck Research Group for Deep-sea Ecology and Technology at the Alfred Wegener Institute.



Credit: Marcel Nicolaus, Alfred-Wegener-Institut

With a new type of under-ice trawl, the researchers headed by Dr. Hauke Flores from the Alfred Wegener Institute for Polar and Marine Research in the Helmholtz Association were able for the first time to conduct large-scale investigations of the communities living directly on the lower side of the Arctic pack ice. "We had a polar cod in our net almost every time. This species is particularly adapted to life below the ice; it does not occur without ice", explained Flores on the significance of the sea ice as a habitat. The sea ice physicists from the Alfred Wegener Institute also used an under-ice robot to record the light incidence and distribution of algae on the lower side of the ice. They were able to detect the diatom Melosira artica in high concentrations also under the first-year ice in the central basin of the Arctic. These single cell algae can produce metre-long chains and form dense accumulations beneath the ice. Photos from the deep sea have shown that the algae

largely dropped to the bottom of the sea as a result of the melting ice.

According to the findings of the returning Polar researchers, the rapid changes in the Arctic were not therefore restricted to the sea surface. Atlantic water flowing into the Arctic at a depth of several hundreds had an elevated temperature and salinity which could be measured down to a depth of several thousands of metres in the Arctic Basins. Images and measurements of the bottom of the sea showed for the first time that the deep sea of the Central Arctic is not a desert, but that frequently accumulations of sea cucumbers, sponges, feather stars and sea anemones gather to feed on the sea algae.

The warm temperatures, the retreat of the ice and the greater light availability beneath the ice causes the seasonality of the Central Arctic to shift. The production and the export of algae is taking place earlier compared with previous years, as the results of annually anchored sediment traps show. As a result of the extremely thin ice cover, Polarstern was able to navigate far into the North later in the year than usual. The sea ice physicists were therefore able to collect important data at the start of the freezing period. The measurements on the new thin ice are important, because this sea ice will occur more frequently in the future.

More information: www.geo.de/blog/geo/polarstern-expedition

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