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Apart from the crew and scientists on board, there are lots of data, samples and animals from the Southern Ocean that will soon be examined more closely in the laboratories of the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI). They stem from the area of the Filchner-Ronne Ice Shelf in the very south of the Weddell Sea, where scientists conducted research on sea ice, oceanic currents and the biocoenoses on the last Antarctic cruise leg of the expedition. Polarstern covered over 64,000 nautical miles in the past 18 months, which corresponds to about 120,000 kilometres and thus three times the circumference of the Earth at the equator. However, the icebreaker sailed through these tropical regions only on the way there and back. The main research area was the Antarctic Weddell Sea. The last expedition prior to the return to Bremerhaven again took the vessel to the very south of Antarctica, to the marine region off the Filchner-Ronne Ice Shelf. "Even in the Antarctic summer this area is not easily accessible and we had to struggle with very difficult ice conditions, reports Dr. Rainer Knust, head of the expedition and biologist at the Alfred Wegener Institute. He coordinated a multidisciplinary team from eleven countries on board that conducted investigations on sea ice physics, hydrography and biology.
In close consultation with the captain, Knust laid down the work programme according to the ice conditions. The sea ice physicists were thus delighted about large ice floes on which they were able to place their measuring buoys. The latter measure whether an ice floe is growing or thawing and how quickly and in what direction it is drifting. The installed measuring buoys remain on the ice floes and transmit their data via satellite to the Alfred Wegener Institute in Bremerhaven.
The oceanographers were dependent on gaps in the ice to make use of their devices. They were able to conduct extensive oceanographic measurements of water depth, salinity, temperature and oceanic currents in the research area. In addition to these measurements directly on board, they recovered long-term moorings and deployed new ones. They record oceanographic measurements over a period of more than two years. In this way it is possible to continuously measure changes in salinity and temperature of the seawater. The objective of this work is to record and monitor the very cold melt water plume from the Filchner-Ronne Ice Shelf and its mixing with warmer water from the deeper Weddell Sea.
The work of the oceanographers is supported by Weddell Seals equipped with sensors and transmitters during the expedition. They not only supply measurements on diving behaviour during their dives, but also data on the salinity and water temperature under the ice that cannot be obtained otherwise. These data, too, are transmitted to AWI via satellite. The initial results on the biocoenoses in this still extensively unexplored region show that settlement and species diversity on the seafloor are closely connected with the ice cover and hydrography. Wherever very cold water flows out or in areas that are covered with sea ice for a very long time, species diversity and settlement density are considerably lower than in open regions that are not as greatly influenced by glacier runoff.
"Earlier findings concerning the unexpected occurrence of elephant seals on the northern shelf slope of the Filchner Trench gave the impetus to study in more detail the previously only presumed connection between hydrographic conditions and increased food supply for seals in the course of our expedition with Polarstern, reports Knust. Prior to RV Polarstern, AWIs research aircraft Polar 6 was also in operation on the edge of the Filchner-Ronne Ice Shelf in order to record the number of seals from the air. Using Polarsterns on-board helicopters, biologists also undertook aerial counts. Their first impression before detailed evaluation appears to substantiate the hypothesis that there is indeed a connection between seal numbers and oceanographic conditions.
The Filchner-Ronne Ice Shelf is the second largest ice shelf in Antarctica. Coupled ocean-atmosphere model calculations at AWI indicate that dramatic changes with 20-fold higher melting rates can be expected there at the end of this century. "This expedition is the first of a series of further Polarstern voyages aimed at gaining an understanding of the actual state of the Filchner-Ronne Ice Shelf system and measuring the water masses off and under the ice shelf. Then we will compare them to the little historical data available and can then check the calculated models, says the head of the hydrographic team on board, Dr. Michael Schröder from AWI. The future expeditions in this region will also be carried out on a multidisciplinary basis in order to examine the connection between ice, seawater and biology.
Polarstern will undergo scheduled maintenance and repair work at the Lloyd shipyard in the coming weeks before the Arctic season begins in mid-May.
Notes for Editors:
We will be glad to provide you with video material on the expedition on request. Please find printable images at www.awi.de/en/news/press_releases/ .

Your contact persons are Dr. Rainer Knust (tel.: 0049 471 4831-1709, e-mail: Rainer.Knust(at)awi.de) and Dr. Folke Mehrtens, Dept. of Communications and Media Relations (tel.: 0049 471 4831-2007; e-mail: Folke.Mehrtens(at)awi.de).

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The Alfred Wegener Institute conducts research in the Arctic, Antarctic and oceans of the high and mid-latitudes. It coordinates polar research in Germany and provides major infrastructure to the international scientific community, such as the research icebreaker Polarstern and stations in the Arctic and Antarctica. The Alfred Wegener Institute is one of the 18 research centres of the Helmholtz Association, the largest scientific organisation in Germany.
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Pressekontakt

Alfred-Wegener-Institut für Polar- und Meeresforschung

27515 Bremerhaven

Rainer.Knust(at)awi.de) and Dr. Folke Mehrtens, Dept. of Communications and Media Relations (tel.: 0049 471 4831-2007; e-mail: Folke.Mehrtens(at)awi.de).

Firmenkontakt

Alfred-Wegener-Institut für Polar- und Meeresforschung

27515 Bremerhaven

Rainer.Knust(at)awi.de) and Dr. Folke Mehrtens, Dept. of Communications and Media Relations (tel.: 0049 471 4831-2007; e-mail: Folke.Mehrtens(at)awi.de).

Das Alfred-Wegener-InstitutZentrum der deutschen Polar- und Meeresforschung Polar- und Meeresforschung sind zentrale Themen der Erdsystem- und globalen Umweltforschung. Die Stiftung Alfred-Wegener-Institut führt wissenschaftliche Projekte in der Arktis, Antarktis und den gemäßigten Breiten

durch. Sie koordiniert die Polarforschung in Deutschland und stellt die für Polarexpeditionen erforderliche Ausrüstung und Logistik zur Verfügung. Zu den Aufgaben in der Meeresforschung gehören die Nordseeforschung, Beiträge zum biologischen Monitoring in der hohen See, Untersuchungen zur Meeresverschmutzung und zu marinen Naturstoffen sowie meerestechnische Entwicklungen. 1980 wurde das Institut in Bremerhaven als Stiftung des öffentlichen Rechts gegründet. Die Stiftung Alfred-Wegener-Institut für Polar- und Meeresforschung umfasst das Alfred-Wegener-Institut für Polar- und Meeresforschung in Bremerhaven, die Forschungsstelle Potsdam (1992), die Biologische Anstalt Helgoland und die Wattenmeerstation Sylt. Sie ist Mitglied der Hermann von Helmholtz-Gemeinschaft Deutscher Forschungszentren (HGF) und wird zu 90% vom Bundesministerium für Bildung und Forschung (BMBF) finanziert. Das Land Bremen ist mit 8% beteiligt, die Länder Brandenburg und Schleswig-Holstein mit je 1%. Die Stiftung hatte 1999 einen Etat von 165 Mio. DM und beschäftigt rund 700 Mitarbeiterinnen und Mitarbeiter. Forschungsinstitut und internationaler Partner Ziel der wissenschaftlichen Arbeit ist ein besseres Verständnis der Beziehungen zwischen Ozean, Eis und Atmosphäre, der Tier- und Pflanzenwelt der Arktis und Antarktis sowie der Entwicklungsgeschichte der polaren Kontinente und Meere. Da diese Gebiete das Klima unserer Erde entscheidend prägen, widmet das AWI den globalen Veränderungen besondere Aufmerksamkeit. Das AWI arbeitet in zahlreichen internationalen Forschungsprogrammen und steht in engem Kontakt mit zahlreichen Universitäten und Institutionen in Europa und Übersee. Es entsendet Wissenschaftler an Institute in aller Welt, auf andere Forschungsschiffe und Stationen und lädt Wissenschaftler anderer Nationen auf die "Polarstern" und nach Bremerhaven und Potsdam ein. Etwa ein Viertel der Teilnehmer an "Polarstern"-Expeditionen sind ausländische Wissenschaftler.