Guided Tour
05.05.2022
Ice core laboratory
Building D

Contact persons:
Ilka Weikusat

Ice core experience - haptic impressions

Ice cores are unique climate archives and deliver important information on ice dynamics and microstructure – a large deformation experiment in nature. We can reconstruct climate changes of the past and investigate the densification, deformation history and the flow dynamics' processes from ice cores. However, it is a long and cold way for our colleagues from the AWI Glaciology section to retrieve a paleo-climate record or a crystal-orientation data set ready for interpretation.

During this guided tour we show the coolest working place at AWI: Ice core analysis laboratories. In our labs we process and analyse ice cores from Greenland, Antarctica and Alpine glaciers. Our ice core processing set-up for sample aliquotation from the cores is used by our national and international partners. Exemplary of many of the methods applied in our ice laboratories we will show you the principle of microstructure measurements on ice crystals and how these data are linked to large scale ice flow dynamics and how we search for micro particles in ice. We will further introduce our worldwide unique ice core Computer Tomography to measure firn core structure with x-rays, helping us to understand the enclosure of air in polar ice. Finally, you can visit our newly developed Continuous Flow Analysis system for the measurement of impurity concentrations and stable water isotopes in ice cores to retrieve past climate records. For refreshment you will be able to enter our cooling cell operated at -10 degree and you will feel it yourself: Ice core research is coolest research at AWI.

http://www.awi.de/expedition/labore/eislabor.html

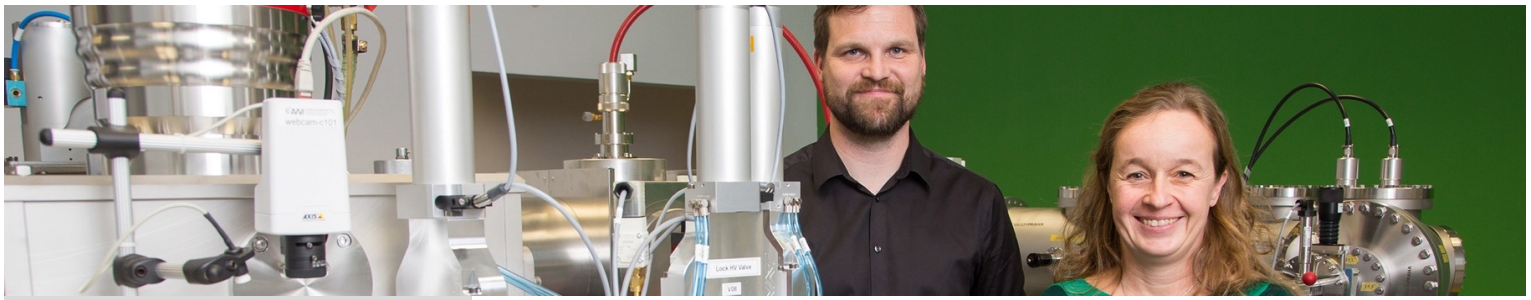
Guided Tour
05.05.2022
Geological laboratory
Building D

Contact persons:
Oliver Esper
Jens Matthiessen

Geological laboratory

In our geological laboratory, newly gained sediment cores are opened, described and sampled to reconstruct and understand the mechanisms and impacts of past climate variability related to natural driving forces. The diverse scientific questions in Marine Geology and Paleoceanography require a multi-proxy approach that integrates many established sedimentological and geochemical methods, as well as currently developed and improved paleo-climatic proxies (e.g. isotope studies, biomarkers). We will present a key sediment core from the Pacific sector of the Southern Ocean, a scaled-down model of a piston corer used for retrieving sediment records from the ocean floor, and give insight into basic analytical methods.

The sediment record comprises the climate history of the last 450,000 years and reveals pronounced visible changes in sediment composition related to glacial/interglacial climate variability. The age model - the backbone of any paleoclimate reconstructions – has directly been linked via element concentrations (e.g. Fe) to a well-dated Antarctic ice core record. The element variations have been measured by our XRF core scanner, which allows rapid and non-destructive analytical measurements, thereby providing ultra-high-resolution records. The scanner will be shown in action as well.



Guided Tour
05.05.2022
Building C
Room C-101

Contact persons:
Gesine Mollenhauer
Torben Gentz

^{14}C dating laboratory (MICADAS)

Many areas of scientific research use radiocarbon (^{14}C) measurements to determine the age of carbon-containing materials. In the Earth and Environmental sciences, ^{14}C analyses are mainly used a) for age determination of paleoclimate records and b) to study carbon cycling on various spatial and temporal scales.

The MICADAS, a "**Mi**niature **Ca**rbon **Da**ting **S**ystem" installed at AWI in November 2016, is an accelerator mass spectrometer exclusively dedicated for ^{14}C analysis.

The system is equipped with a "hybrid ion source", which allows, beside the measurement of graphitized samples, the introduction of CO_2 gas, enabling dating of very small samples (down to ~10 µg C). This allows a multitude of applications of the method in the polar and marine sciences, including the determination of ages in sediments poor in carbonate micro-fossils, compound-specific radiocarbon analysis, and development of novel methods for small samples of the important carbon pools of dissolved inorganic or organic carbon, or even CO_2 and CH_4 sampled from the environment.

During this tour, we will show our facilities, explain the advantages and disadvantages the setup comes with, and discuss our latest methods developments. We hope for lots of questions, discussions, and potentially new ideas.

http://www.awi.de/en/science/geosciences/marine-geochemistry/micadas.html

Guided Tour
05.05.2022
Laboratory complex
Parking level E

Contact persons:
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Albert Benthien

ICP MS laboratory (Proxy Lab)

The “Proxy Lab” is equipped with a boron-free cleanroom (Picotrace), 4 separate analytical labs and a workshop for the development of new instrumentation. For geochemical analysis we have: Six mass spectrometers, including a multiple collector ICP-MS (MC-ICP-MS, Nu Plasma II), two high-resolution ICP-MS (HR-ICP-MS, Nu AttoM & Thermo Element2), and a double-focusing sector field ICP-MS based on a Mattauch-Herzog geometry (ICP-MS, Spectro MS). We can determine ultra-trace elements and natural radionuclides like ^{231}Pa and ^{230}Th in femtogram quantities in marine sediments and in sea water. Using wet chemistry, we can determine the δ^{11}B isotope composition on samples containing 3 ng B. Using our UV femtosecond laser ablation system we can measure the δ^{11}B isotope composition on single foraminiferal shells. Another focus of this laboratory is on biomineralisation. Hereto, geochemical analyses are combined with structural analysis of biogenic carbonates applying a confocal Raman microscope (spatial resolution in the sub µm range), an atomic force microscope (nm resolution) and a thermogravimetric analyser.

The facilities are used by many sections within the AWI (Biogeosciences; Marine Geochemistry; Marine Geology; Periglacial Research, Glaciology; Functional Ecology; Bentho-pelagic processes; Integrative Physiology) and we have many external cooperations (e.g., MARUM in Bremen; ZMT Bremen, ICMB Oldenburg; Cambridge University, UK; JAMSTEC, Tokyo, Japan; IPGP, Paris, France; Royal NIOZ, Texel, The Netherlands)

www.awi.de/en/science/biosciences/marine-biogeoscience/tools/proxy-laboratory.html

Guided Tour
05.05.2022
AWI Technikum

Contact persons:
Martina Löbl
Bernhard Meyer-Heye

Technical Centre / AWI Technikum

Planning of the AWI Technical Centre Rasmus Willumsen Haus started in 2013, groundbreaking was in 2019, and by the end of 2022 the new building will be completed. Designed by the architects Kister, Scheithauer and Gross, the AWI Technikum will be a central place to bring together AWI developers and inventors working on technological innovations used on expeditions around the globe including underwater robotics, new sensors and payload developments. Various workshops and testing facilities include a diving basin, cold rooms and a tower for tests of ice core drilling equipment. Goal is to ensure technologies are ready for in situ use on expeditions in extreme environments like polar regions and deep seas. Container spaces and a high rack storage will are available to enable logistical expedition preparations in the Technikum as well.
Once finalized, the AWI Technikum will be a multidisciplinary state of the art environment to support synergies across AWI groups in a new way: working spaces for about 40 technicians, engineers, and scientists throughout various AWI sections are complemented by meeting and conference rooms. The name Rasmus Willumsen Haus refers to the engineering companion of Alfred Wegener Rasmus Willumsen and honors his outstanding support during their last Greenland expedition in 1930, from which both never returned.

https://www.awi.de/en/about-us/service/press/single-view/technikum-virtuelles-richtfest.html