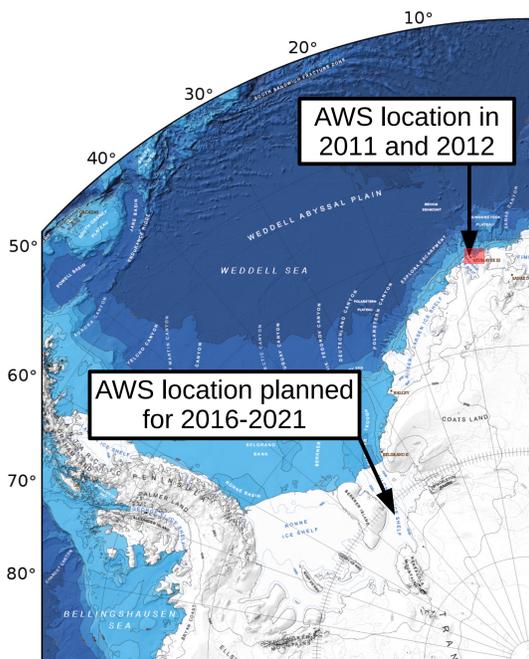


AWS activities of AWI in Antarctica

Location and Times of Operation

Map source: Arndt et al. (2013)¹

The Alfred Wegener Institute (AWI), Division “Polar Meteorology” has (re-)started to operate automatic weather stations (AWSs) in Antarctica in 2011. The first years of operation were used to compare AWS data to meteorological measurements carried out at the all-year manned research station “Neumayer”.

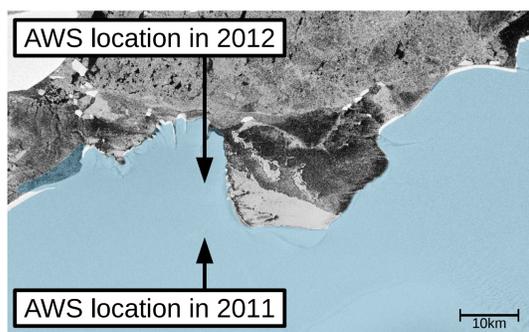
In 2011, one AWS was placed right beside the meteorological mast of Neumayer. This setup allows a comparison of the unmaintained AWS instruments with its daily checked and cleaned counterparts from Neumayer.

In 2012, the AWS was moved about 11 km north of the station, close to the shelf ice break. This location was chosen to judge the spatial footprint of the observatory data³.

For 2016 to 2021 it is planned to place one AWS on the Filchner ice shelf. This will accompany a drilling project, focused on glaciology and oceanography. During this period, the AWS shall also issue SYNOP reports to the Global Telecommunication System (GTS).



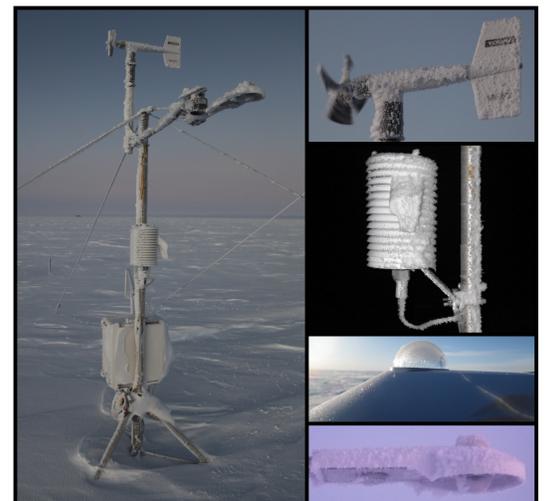
AWS setup next to Neumayer meteorological mast for comparison experiment in 2011. Photo: Jölund Asseng (AWI)

Sentinel-1A (SAR) image subset from 2015-06-09 provided by Polar View². The area of the image is marked in red in the map above.

Instrumentation

The AWSs are equipped with a Campbell Scientific CR3000 data logger connected to the following sensors:

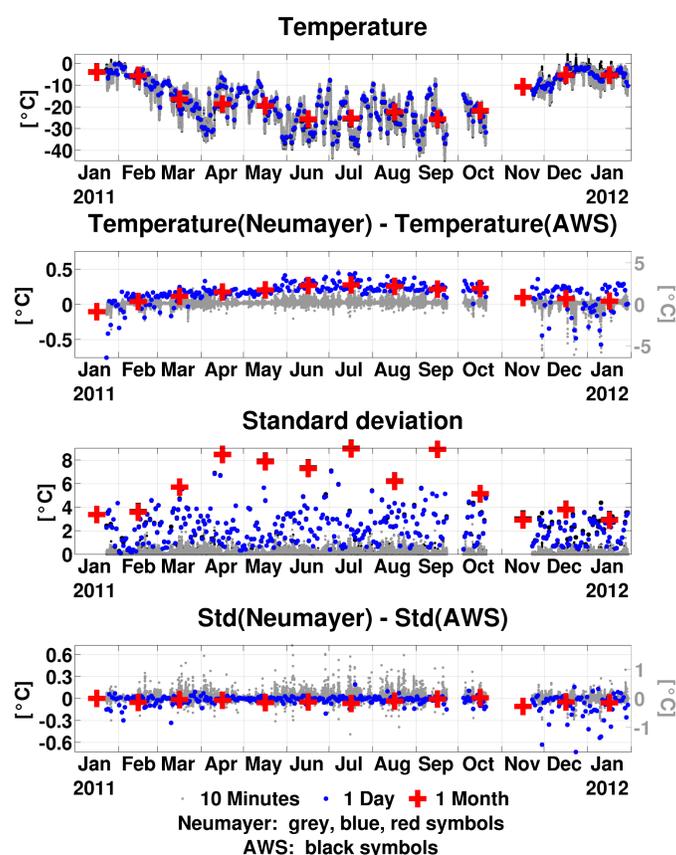
- Temperature and Humidity: HMP155 (Vaisala)
- Pressure: 61302V (R. M. Young Company)
- Wind: Marine Wind Monitor (R. M. Young Company)
- Radiation: CNR 4 (Kipp and Zonen)
- Snow level: SR50A (Campbell Scientific)
- Thermistor chain down to 10 m depth (only 2011)



Snow, hoarfrost and rime on AWS sensors. Photos: Jölund Asseng (AWI)

For telecommunication, an IRIDIUM modem is installed in the AWS, which communicates directly with a receiving unit located in Bremerhaven, Germany.

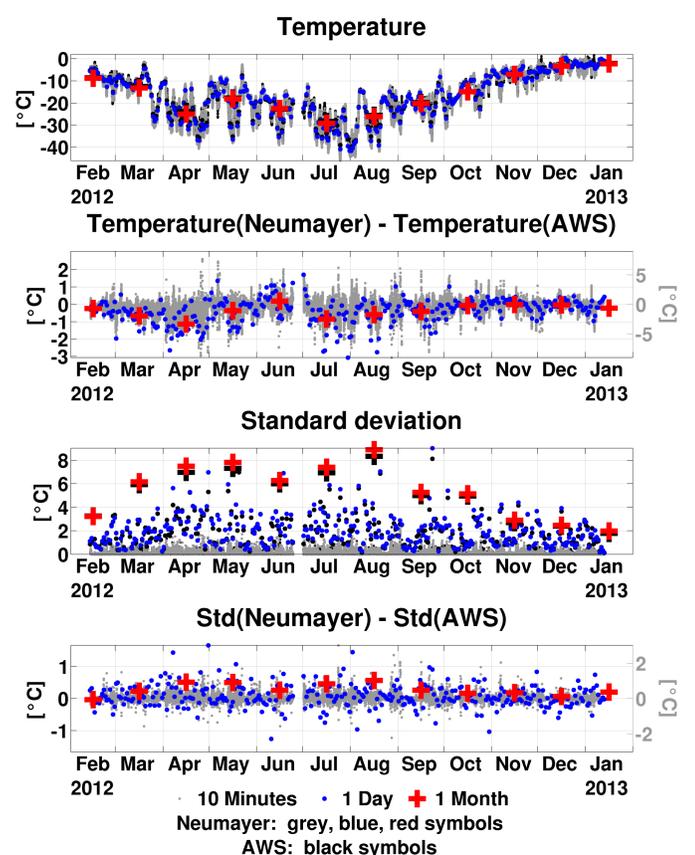
Comparison AWS vs. manned station



The comparison of AWS data with those from a manned observatory in 2011 shows a difference in the yearly averaged air temperature of 0.15°C. This deviation lies within the specified accuracy of the sensors. 10-minute-averages typically agreed within 0.42°C (90% of the values) during that year.

Occasionally there were times when the AWS temperature reading was more than 5°C above the Neumayer value. These deviations typically coincide with times of low wind speed (< 1 m/s), hence missing ventilation is the cause.

The yearly averaged temperature in 2012 at Neumayer was 0.36°C below the AWS value (AWS 11 km north of Neumayer). This quantifies the horizontal gradient to be some 0.5°C / 11 km. 90% of the 10-min-averages agreed within 1.97°C.



References

- ¹ Arndt, JE et al.: The International Bathymetric Chart of the Southern Ocean (IBCSO) - digital chart for printing. doi:10.1594/PANGAEA.905735 (2013)
² Polar View Sea Ice Monitoring Service: Sentinel-1A image subset (c) EC Copernicus/ ESA/ MyOcean Polar View. Original product S1A_EW_GDOM_ISSH_20150609T204837_20150609T204942_006301_008450_B905_SAF6
³ Heupel Santos, Simone: Wie repräsentativ sind die meteorologischen Messungen von Neumayer für das Ekström-Schelfeis? (Bachelor Thesis), Westfälische Wilhelms-Universität Münster (2013)