Sea Ice Thickness

Sea ice thickness and sea ice extent play a key role in research into climatic changes in the Arctic. While sea ice extent can be measured with the aid of satellite data, there are today no satellite sensors that can measure sea ice thickness. However, sea ice thickness measurements can be made on the ice itself by drilling, a procedure which is accurate but time-consuming. With the use of electromagnetism, the sea ice can be measured faster and more efficiently, either on foot on the ice or from a helicopter.

Ground Measurements

… but always watch out for the “big white”

Classical sea ice thickness measurements are carried out in 5 cm broad drill holes with a measuring tape. In addition, measurements are made of the snow thickness and the distance between the ice surface and the water surface in the drill hole. The measurements are often made along a profile in order to obtain a good overview of the ice thickness in a more extensive area.

With an electromagnetic (EM) instrument, ice thickness can be measured more quickly but a few drill holes (direct measurements) are necessary to calibrate the instrument.

Measurements from a helicopter

Examples of ice thickness along a 10 km long line in the Fram Strait

The “EM Bird” instrument

Using the EM Bird, it is possible to make ice thickness measurements along a long profile (approx. 250 km) with an accuracy of less than 10 cm. An EM Bird measures the distance to the snow surface (laser) and to the ice undersurface (electro mechanics). The difference between these two measurements gives us the ice thickness.