

## **Tracking cold air outbreaks and polar lows with controllable meteorological balloons and comparison with an operational forecast model**

**Lars R. Hole**(lrh@met.no) , Alena Dekhtyareva, Marina Dütsch, Marvin Kähnert, Sander Løklingholm, Harald Sodemann, Trygve L. Søvik, Paul B. Voss.

The ISLAS22 field campaign was carried out 20 March-8 April 2022. ISLAS (Isotopic links to atmospheric water's sources) is a project funded by the European Research Council and lead by the University in Bergen. The purpose of the project is to follow the water as it moves through the atmosphere. From changes in the stable isotope composition of the water, an unprecedented picture of how the atmospheric part of the water cycle works is obtained. ISLAS22 was an aircraft campaign coordinated from a base in Kiruna, with supplementing measurements carried out from RV Helmer Hanssen in the Norwegian Sea, and from Andenes and Ny-Ålesund, Norway. For details see [www.uib.no/en/rg/meten/112875/isotopic-links-atmospheric-waters-sources-islas](http://www.uib.no/en/rg/meten/112875/isotopic-links-atmospheric-waters-sources-islas) . During the campaign, six Controlled Meteorological Balloons (CMETs) were launched from Ny-Ålesund, Svalbard (79N,12E). The CMETs have a unique design with an inner helium tank to facilitate remote control of the buoyancy. The balloons can float at almost constant altitude or provide controlled soundings between surface and about 4000 masl ([www.science.smith.edu/cmet/](http://www.science.smith.edu/cmet/)). During flights balloons are controlled via the Iridium network and data are provided in near real time. The balloons launched during the campaign measured air humidity, air temperature and wind from GPS positions. The flights lasted up to 20 hours reaching about 1000km towards mainland Norway. A strong cold air outbreak from the Svalbard area and reaching Scandinavia and continental Europe prevailed during the entire campaign. Several polar lows were generated in the region between Svalbard and the mainland. During these ideal conditions, the CMETs could track the dry air masses as they travelled over the relatively warm ocean and gained humidity. The Arome Arctic 2.5km operational forecast model from MET Norway as used to predict where the balloons would reach the convective and humid regions where polar lows started to form. Here we present some comparisons between our observations, the forecasts as well as satellite imagery.