

A portable Lightweight In Situ Analysis (LISA) box for ice and snow analysis

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ABSTRACT Polar researchers spend enormous costs transporting snow and ice samples to home laboratories for “simple” analyses used for constraining annual layer thicknesses and identifying accumulation rates. It is well known that depositional noise, incurred from wind drifts, seasonally-biased deposition, melt layers and more, can influence individual snow and firn records and that multiple cores are required to produce statistically robust timeseries’. Thus at many sites core samples are measured in the field for densification, but the annual accumulation and the content of chemical impurities are often represented by just one core to reduce transport costs. We have developed a portable Light weight in Situ Analysis (LISA) box for ice and snow analysis capable of constraining annual layers through the continuous flow analysis of melt water conductivity and peroxide under field conditions. The box can run using just a small gasoline-generator and weighs less than 50 kg. The LISA box was tested under field conditions at the deep ice core drilling site EastGRIP in Northern Greenland. Analysis of the top 2 metres of snow from 7 sites in Northern Greenland (Figure 1) allowed the reconstruction of regional snow accumulation patterns for the period 2015-2019.