



Abstract ID : 285

Balloon cast subsurface ice drilling and ice core analysis trenches - evolution and fate.

Content

After a successful three-year test (2012-2015) at the NEEEM site in Greenland, the EGRIP deep ice coring site became the first with a full subsurface trench system made from cast snow using the balloon technique. At EGRIP, the technique was also tested in making storage caves, cable and pipe ducts, tunnels and vertical shafts. Main construction occurred in 2016, and since then the deformation in most trenches has been measured year by year. As EGRIP operations were cancelled in 2020 and 2021 due to covid, we are going to re-measure the subsurface structures this summer 2022 after three years. We will report on our observations of the fate of the caves and compare the balloon cast trenches with open trenches covered by wooden roofs. Also, we will report on whether snow cast ducts for electrical cables and pipes will allow for retrieval of cables and pipes after several years of burial.

With the snow blower casting technique, we can make a homogenous snow/ice material with a density of 550 kg/m³. This density is typically reached at depths of 15 – 20 m in a cold firn pack. We will report on tests to increase the initial density beyond 550 kg/m³, with the aim of creating a snow material that can support heavy structures.

We will present data comparing construction times, manpower needed, carbon footprint from transport and fuel, and the amount of leftover material between “classical” ice coring camps and camps that make full use of snow as a construction material.

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Track Classification: Advances in drilling engineering and borehole observations