



Holtedahlfonna

– a new Svalbard ice core record

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Ice core location



Figure 1. The ice core location on Holtedahlfonna and two earlier core locations on Austfonna and Lomonosovfonna.

Abstract

A number of modern ice cores, with high-resolution chemistry and isotope records, have been drilled at Svalbard during the past 10 years. The most recent one was drilled in April of 2005 at 1150 m asl at Holtedahlfonna (Figure 1), an ice saddle about 40 km NE of Ny-Ålesund. The ice core was 125 m deep and the estimated ice depth at the drill site is about 150 m (Figure 2). Through the pre-site surveys, snow pits and shallow ice cores have been collected and sampled during the springs of 2003 and 2004 (Figure 3). At this point the whole core has been analysed for dielectric profiling (DEP) and ice structures. The complete core is sub-sampled for water isotopes and ion chemistry. The $\delta^{18}\text{O}$ are so far analysed back to about 1925 (Figure 4) and are in line with the instrumental record as well as with previous ice core data (Figure 5). Preliminary analysis suggests that this ice core covers the last 400 years. We are currently running analyses of major ions, deuterium, tritium and pesticides.

Ice depth

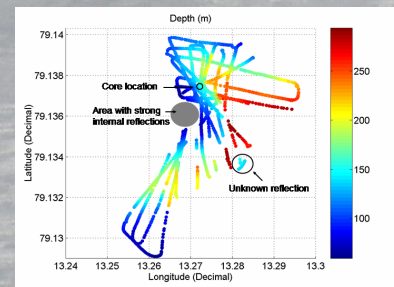


Figure 2. Holtedahlfonna ice thickness map based on a 10 Mhz ice radar survey.

Ion chemistry

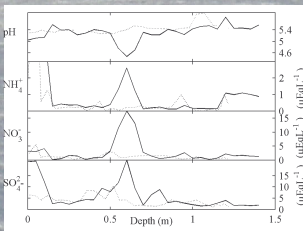


Figure 3. Chemical concentrations and pH in winter snow from Holtedahlfonna in 2003 (solid line) and Lomonosovfonna in 2002 in Pit D (dotted line). The feature at 0.6 m in Holtedahlfonna has a clear Arctic Haze signature that is not seen on Lomonosovfonna.

$\delta^{18}\text{O}$ stratigraphy

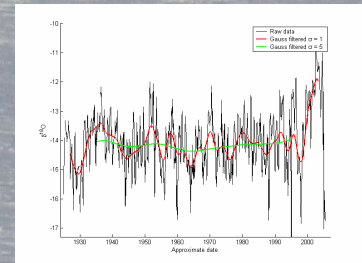


Figure 4. The $\delta^{18}\text{O}$ record from the uppermost 50 m of the ice core from Holtedahlfonna drilled in April 2005. Using a preliminary dating method we estimate that these data are covering the last 80 years. The last year's warm temperatures are clearly visible in this record.

Ice cores and Svalbard climate

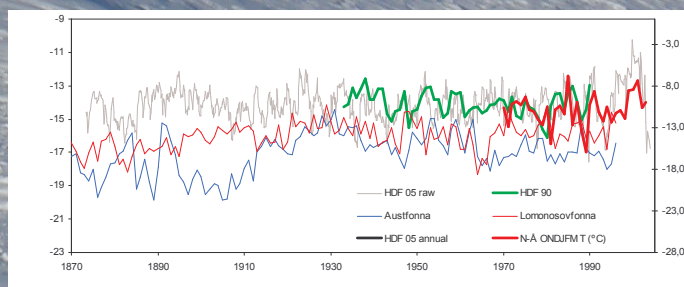


Figure 5. The $\delta^{18}\text{O}$ records from Holtedahlfonna, Lomonosovfonna and Austfonna together with the homogenized Svalbard Airport record. The comparison suggests that the new ice core data from Holtedahlfonna are in line with existing data.