Geophysical Research Abstracts
Vol. 20, EGU2018-8444, 2018
EGU General Assembly 2018

Results from a Ground-Based Radar Survey of the Abandoned Camp Century Station, Greenland

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The recent changes in climate have resulted in increasing temperatures on the Greenland Ice Sheet but also in changes to the equilibrium line altitude. Thus, areas that were previously in the accumulation zone may soon experience mass loss as well as increased surface melt and thereby changes in firn structure and density. These changes are particularly important in the context of the subsurface Camp Century station in northwestern Greenland. The station was built 8m below the surface in the late 1950s and was abandoned in 1967. With a few exceptions, the infrastructure was left to be buried by subsequent snowfall.

If global warming continues the Camp Century site may transition into an ablation area, and ultimately the once buried waste may resurface. In 2017, the Government of Denmark in agreement with the Greenland Government decided to establish the Camp Century Climate Monitoring Programme. This programme includes the collection of ice-penetrating radar observations to map the extent and burial of the waste on site.

Here, we present results from the radar survey campaign undertaken at the Camp Century site in summer 2017. We collected over 130km of radar lines with a frequency of 250MHz and some additional lines with a frequency of 100MHz. The data show clear internal layering – most likely annual layers – and we have mapped three such layers for the entire dataset with tentatively assigned dates of 2010, 1963 and 1930 CE. The layers indicate an accumulation gradient across the site in spite of the relatively small spatial scales. In addition, we have identified multiple sub-surface reflectors and based on this we identify the past extent of the camp, as well as signs of surface activity, buried depots and collapse of structures.