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## Investigations of meltwater refreezing and firn density variations in the percolation zone of the Greenland Ice Sheet

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The proportion of surface generated meltwater that subsequently refreezes in the snowpack and firn plays a critical role in controlling the mass balance of polythermal ice masses. In Greenland, changes in the volumes of meltwater that refreeze in the superimposed and percolation zones are likely in response to any future climate change with a consequent impact on local mass balance regimes. However, determining how density of the firn (and thus mass) varies during the course of a melt-season is extremely problematic. In this study, we determine density in the upper 10m of the snowpack and firn both before the onset of spring melt and following the cessation of summer melt. We thus determine the extent to which refreezing impacts on firn densification during a single melt-season. Our study site is located at  $\sim$ 1950m elevation in Greenland's percolation zone on the EGIG line (T5 - 69 51N 47 15W). We compare firn densities down to 10m depth at 9 sites in a 1km<sup>2</sup> area between pre-melt (April-May) and post-melt (September) conditions during 2004. Density measurements were obtained using a down-borehole neutron probe calibrated against firn core and snowpit density measurements. The results help determine the spatial variability of refreezing mechanisms at short (<1 km) length-scales.