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Spatio-temporal evolution of firn structure on the Greenland ice sheet since the 1950s

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Surface melt and subsequent meltwater runoff plays a prime role in the recent increase in mass loss from the Greenland ice sheet. As melting is seen more intense at low elevation, it also spreads to higher elevations where meltwater can percolate and refreeze in the firn that covers the ice sheet. The near-surface firn density or in other words the available pore space is a determining factor for the firn's storage capacity. Understanding the evolution of pore space is therefore a crucial parameter to understand past, present and future part of high elevation areas to the contribution of Greenland to sea level rise. We brought together a dataset comprising 278 shallow firn cores drilled over the entire ice sheet from the 1950's to present day. We analyze the spatial and temporal evolution of firn density and ice content (when available) in the various cores and estimate the loss of pore space in various regions of the ice sheet in 1997-2012 and 2013-2017 periods compared to the 1950's.