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## Detecting active subglacial lakes beneath the Greenland Ice Sheet using ArcticDEM

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A total of 63 subglacial lakes have been documented beneath the Greenland Ice Sheet using a combination of radio-echo sounding and surface elevation change measurements. Of these, only 7 lakes have shown evidence of hydrological activity over the period 2001-2018. Draining lakes have been observed to drive transient changes in local ice flow speeds in Antarctica. The sudden discharge of water during a subglacial lake outburst event causes the subglacial lake roof to subside, which propagates to the surface, resulting in the formation of collapse basins (typically ~50-70 m in depth). These surface features can be detected using remote sensing techniques.

Whilst over 100 active subglacial lakes have been identified in Antarctica, predominantly beneath ice streams, little is known about the extent, volume of water stored and residence times of active subglacial lakes in Greenland, together with any potential influence of drainage events on local ice dynamics and sediment evacuation rates. Here, we explore the potential of the high resolution ArcticDEM stereogrammetric digital surface model (DSM) open source dataset, generated from satellite optical imagery, to identify and monitor subglacial lake-derived collapse basins. The ArcticDEM provides 2 m time-stamped surface elevation data, covering ~160 million km<sup>2</sup>, offering an exciting opportunity to map elevation changes between 2009-2017. This study presents the first effort to utilise ArcticDEM data at an ice-sheet scale to identify and monitor active subglacial lakes beneath the Greenland Ice Sheet, which we hope will ultimately improve our understanding of its complex subglacial hydrological system.