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## Identifying multi-day to sub-daily supraglacial lake change in Greenland from Sentinel 2 and Landsat 8 imagery using Google Earth Engine

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Supraglacial lakes (SGLs) are a major component of Greenland's surface hydrology and mass balance. Monitoring their evolution at multi-day to sub-daily timescales has traditionally been performed by relatively low-resolution sensors such as MODIS Terra, though opportunities exist for using higher spatial resolution sensors at high latitudes.

In this study, we take advantage of frequent orbital crossovers of Sentinel 2 and Landsat 8 imagery at high latitudes to monitor lakes at multi-day to sub-day temporal resolution, and spatial resolutions up to/over an order of magnitude higher than MODIS Terra (10 m to 30 m, compared to ~250 m for MODIS Terra). Through leveraging the cloud computing resources of Google Earth Engine (GEE), we have developed a workflow to track the evolution of lakes for all available Sentinel 2 and Landsat 8 images over a melt season.

Our workflow builds on the approach of Moussavi et al. (2020) that was developed for Antarctica, implementing it within GEE to explore its sensitivity and suitability for application to the catchment of the North East Greenland Ice Stream (NEGIS) for the 2019 melt season. To improve the efficiency of analysis, we analyse 282 large lakes ( $>0.125 \text{ km}^2$ ) that were previously identified through analysis of MODIS Terra imagery. All lake outlines are appended with image ID and lake area metadata to facilitate subsequent analysis, and allow each lake outline to be traced back to the original image that it was derived from. Our approach is able to monitor lake growth and drainage at unprecedented spatial and temporal resolutions over a large area, allowing the widespread characterization of seasonal lake evolution.