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## ArcticDEM in Google Earth Engine: tools for rapid analysis of multi-temporal data covering glacial environments

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ArcticDEM data products include timestamped high spatial resolution (2 and 10 m) digital elevations models (DEMs) covering the period 2009-2017, offering the potential for monitoring ice surface change, structural evolution, geomorphological and proglacial change. However, their varying quality, spatial and temporal data coverage, large file size and requirement for co-registration provide challenges to user accessibility and interrogation of these datasets. Inclusion of these data in the cloud computing based Google Earth Engine (GEE) platform provides opportunities for rapid analysis, though poses its own barriers to access for users through the necessity for familiarity with either JavaScript or Python coding environments. Here we present tools that allow ArcticDEM data to be rapidly queried by users with no coding background through an intuitive graphical user interface, with the aim of improving the accessibility of these datasets for the glacial and earth surface process communities.

The tools are intended to provide a means for users to perform basic data extraction from available DEMs of a given area. These include the extraction of elevation changes occurring along user defined transects, and simple DEM differencing of areas of interest. As part of data pre-processing in GEE, tiles are co-registered using dX, dY and dZ corrections provided within the ArcticDEM metadata, while areas of poor data quality are automatically detected and masked out. A full range of metadata associated with each DEM are also appended to outputs, that will allow users to undertake post-processing of results where needed. While provisional results indicate that the tools perform well, due to inaccuracies in co-registration metadata they are not yet suitable for applications where high levels of precision are required (e.g. snow depth) and in areas of very steep terrain (e.g. rock face changes). We hope to address these issues in the future, though it should be noted that such modifications are likely to significantly increase computation time.