Community interactive webtool to retrieve Greenland glacier data for 1-D geometry

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Marine-terminating, outlet glaciers are challenging to include in conventional Greenland-wide ice sheet models because of the large variation in scale between model grid size (typically 10 km) and outlet glacier width (typically 1-5km), making it a subgrid scale feature. A possible approach to tackle this problem is to use one-dimensional flowline models for the individual glaciers (e.g. Nick et al., 2013, Nature; Enderlin et al 2013a,b, The Cryosphere).

Here we present a python- and javascript- based webtool to prepare data required to feed in or validate a flowline model. It is designed primarily to outline the glacier geometry and returns relevant data averaged over cross-sections. The tool currently allows to:

1. visualize 2-D ice sheet data (zoom/pan), quickly switch between datasets (e.g. ice thickness, bedrock elevation, surface velocity) interpolated / transformed on a common grid.

2. draw flowlines from user-input seeds on the map, calculated from a vector field of surface velocity, as an helpful guide for point 3

3. interactively draw glacier outline (side and middle lines) on top of the data

4. mesh the outlined glacier domain in the horizontal plane

5. extract relevant data into a 1-D longitudinal profile

6. download the result as a netCDF file

The project is hosted on github to encourage collaboration, under the open-source MIT Licence. The server-side is written in python (open-source) using the web-framework flask, and the client-side (javascript) makes use of the d3 library for interactive figures. For now it only works locally in a web browser (start server: "python run-server.py"). Data need to be downloaded separately from the original sources. See the README file in the project for information how to use it.

Github projects:

- https://github.com/perrette/webglacier1d (main)

- https://github.com/perrette/dimarray (dependency)