More Data and Better Tools for the GLIMS Glacier Database

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http://www.glims.org

Background

Earth's glaciers are changing rapidly in response to a changing climate, and this has implications for people in numerous ways, such as increased hazards from glacial lake outburst floods, changes to water resources, and increasing sea level. To understand these changes, it is vitally important to monitor glaciers through time, measuring their areal extent, changes in volume, flow velocities, snow lines, elevation distribution, and changes to associated water bodies. The glacier database of the Global Land Ice Measurements from Space (GLIMS) initiative is the only multi-temporal glacier database capable of tracking all these glacier measurements and providing them to the scientific community and broader public.

Recent GLIMS Activity

- Expansion of the GLIMS Glacier Database in geographic coverage by drawing on the Randolph Glacier Inventory (RGI) and other new data sets (see timeline below)
- New tools for visualizing and downloading GLIMS data (see New online map application below)
- New data model in development for handling multiple glacier records through time while avoiding double-counting of glacier number or area (outline groups and states within groups)
- Establishment of new system of collaboration between all members of the glacier mapping community to streamline the process of meeting various community needs. ==> Do you have data to contribute to GLIMS and/or RGI? Write to us at glacierdata@nsidc.org

Future Work

- Continued ingest of new glacier data
- More options for downloading GLIMS data (choice of data models)
- More complete data included in download
- Complete implementation of the new data model for handling multiple glacier records through time
- Mapping of glacial lakes added to work flow (to better understand lakes' role in ablation).
- Systematic mapping of snow lines.
- Systematic extraction of topographic parameters such as center lines, elevation statistics, and area-elevation distributions.
- Systematic mapping of debris cover.

  (The GLIMS Glacier Database can already accommodate all these data types.)

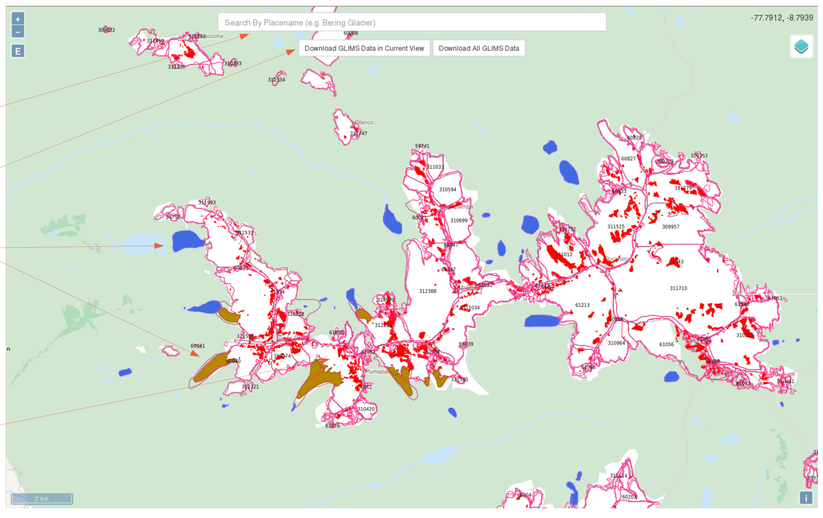
Timeline for merging RGI into GLIMS

- New Zealand (2010)
- Greenland (December 2014)
- Antarctica and sub-Antarctic islands (spring 2015)
- Arctic Canada (summer 2015)
- Low-latitude glaciers (autumn 2015)
- South America (autumn 2015)
- Alaska (early 2016)
- Central Asia (early 2016)
- Kamchatka, other (early 2016)

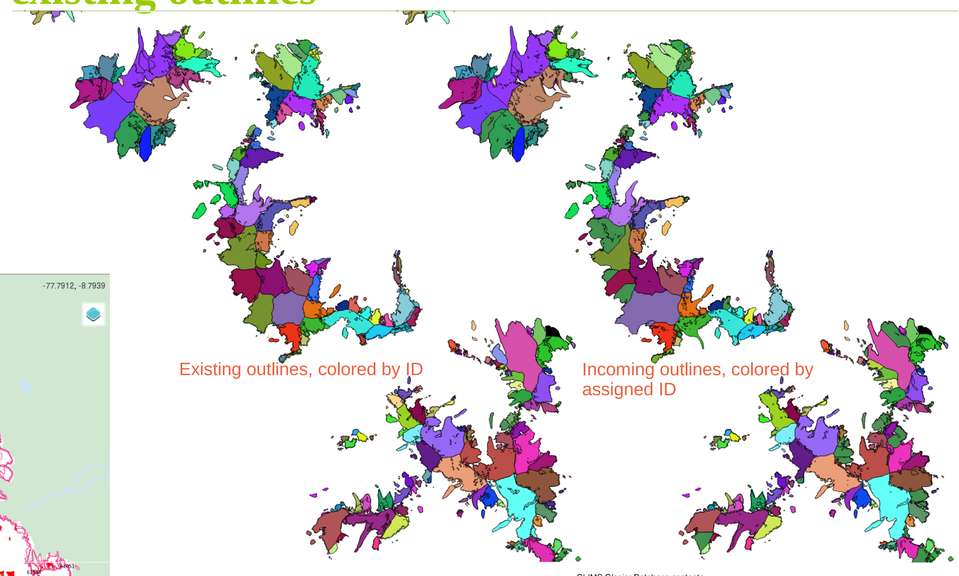
(Grayed-out items are done.)

New online map application

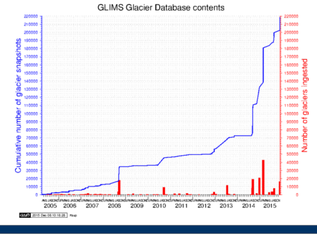
http://www.glims.org/maps/glims



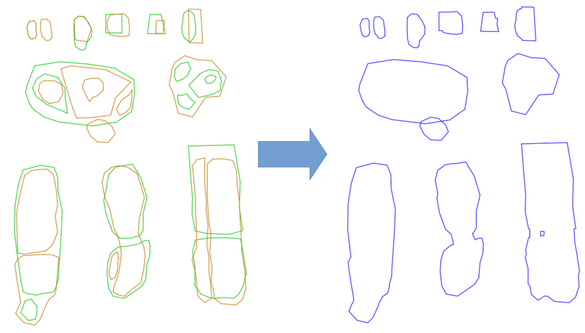
New data ingest: Automatic assignment of GLIMS glacier IDs based on overlaps with existing outlines



GLIMS data ingests



Tracking multi-temporal outlines via groups



Multi-temporal set of polygons (synthetic data set for testing)

Polygons of groups calculated from sets of outlines with sufficient overlap

Groups of outlines that pertain to the same ice body are assigned to a single *group*. A representation (set of outlines) of an ice body at a particular time is identified by a *state ID*. This allows, for example, an ice body to be mapped as a single ice mass with one polygon at time 1, as a collection of glacier fragments at time 2, and again as a single ice mass at time 3. To obtain the current area of a particular ice mass, the area of its latest *state* is calculated.

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