

IACS Working Group on the Randolph Glacier Inventory (RGI) and its role in future glacier monitoring and GLIMS

Annual Status Report of the Working Group, September 2022 *Activities of the WG since the last report in August 2021*

1. WG meetings

The steering committee has held **online meetings** at least every two months on average. The **next WG-wide meeting** (including all WG members and contributors) is planned for November 2022.

2. New members

Since August 2021, **4 new contributors joined the WG** based on their activity and involvement in the RGI process. The WG currently has ~20 members and ~30 contributors from more than 15 countries.

3. Preparation and release of new version of the RGI (RGI7)

The WG has primarily focused on preparing an updated version of the current RGI version. This has involved the following steps:

- a. After the call for outlines in 2020, the WG has carefully considered all submissions and developed objective criteria to justify a particular choice of outlines in case there are multiple available outlines for the same region. In a WG-wide call on October 23 2020, all parties were invited to provide feedback on the steering committee's recommendations.
- b. Once the outlines to update from RGI6 were agreed upon, activities focused on developing the RGI generation workflow from the GLIMS database. **This process is now finished.**
- c. A suite of scripts has been developed to download the outlines automatically from GLIMS, processing and selecting them to generate the RGI7 outline files in a product called "RGI7alpha" (see figure). This workflow has been applied to all of the world's glacierized regions, and **RGI7alpha is available in its near final version** (the only region still missing outlines is RGI19).
- d. The next iteration of the product generation ("RGI7beta") entails the computation of hypsometry data and other automated attributes. **This process is well underway.**

RGI7 will represent a considerable improvement over RGI6. 70% of the outlines (representing 35% of the total area) have been remapped for RGI7. The production workflow is now entirely open source, reproducible and documented.

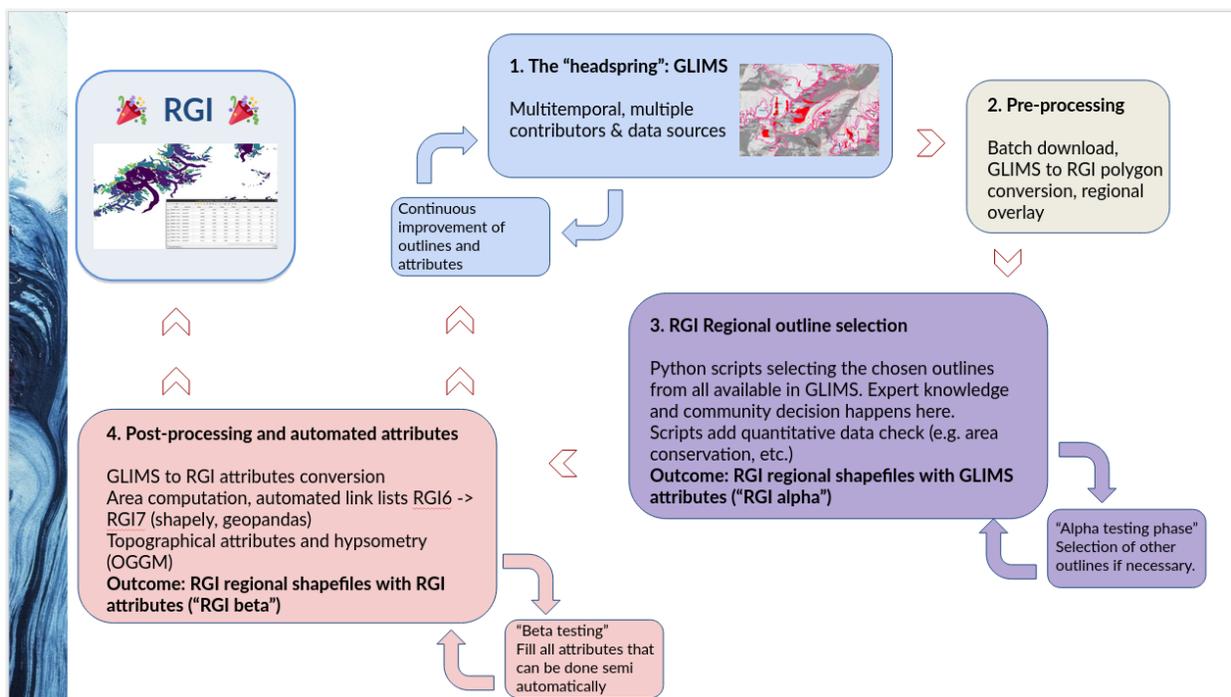


Figure 1. RGI generation workflow.

Delays

Overall, the preparation of the RGI has been considerably more time and labor-intensive than originally anticipated, in particular due to rigorous quality control of updated outlines and the development and documentation of the production workflow. Some delays appear to result from insufficient resources allocated to GLIMS to ingest and quality control outline submissions, which is a task that has then been deferred to the RGI working group (see also Section 5).

Unrelated to GLIMS, many regions also required complete remapping or considerable reprocessing (for example in RGI region 17, where the Chilean and Argentinian inventories did not match at the country border). Furthermore, the RGI7beta generation process has uncovered several flaws in the geolocation of the available outlines in RGI region 19, “Subantarctic and Antarctic Islands”. At the time of writing, these outlines are being redrawn by the community.

RGI7 is about 1 year late compared to the original schedule targeted in our previous report. The currently targeted release date for RGI7beta is the end of October 2022. This will be followed by an internationally open review process. We expect the final RGI7 to be released by early 2023.

4. Online documentation of the WG activities

The IACS homepage is the main outreach page of the WG. We updated the homepage continuously to keep it up to date:

<https://cryosphericsscience.org/activities/working-groups/rgi-working-group>

In addition, all WG meeting notes, scripts, and discussions are fully documented online, in several thematic repositories:

- <https://github.com/GLIMS-RGI/rigidocs> : all WG meeting notes, reports, archives of sent emails, etc.
- https://github.com/GLIMS-RGI/rgi7_scripts : code and documentation for the generation

of the RGI out of the GLIMS database. This contains the main bulk of the work of the last two years.

- https://github.com/GLIMS-RGI/rgi7_scripts/wiki : description of the various RGI7 datasets and production workflow.
- <https://github.com/GLIMS-RGI/rgitools>: code and documentation of the tools used to generate the attributes of the RGI7 outline files.

5. Integration into GLIMS

For the first time since the creation of the RGI, all outlines to be considered in the new version of the RGI are extracted from GLIMS. The new RGI will be hosted and released on the GLIMS homepage. Furthermore, we continue our efforts to coordinate the RGI efforts with GLIMS:

- As reported last year, Fabien Maussion is now a full member of the [GLIMS core team](#) with the task to better coordinate GLIMS and RGI activities.
- Regine Hock, Fabien Maussion and Bruce Raup have been in communication with the NSIDC director to secure improved further long term support from NSIDC to both GLIMS and RGI activities to remedy the issues currently faced in finalizing RGI7 (see Section 3).

6. Conferences

The status of the RGI was presented by Fabien Maussion at the EGU on May 23rd, 2022. A short presentation was also given at a 1-day event in June 2022 by the RAGMAC Working Group.

7. Funding

Most of the mapping work has been done voluntarily or within funded projects (e.g. `Glaciers_cci+` project). The RGI7 product generation is mostly done at the University of Innsbruck with the following “ad hoc” funding (total 24,300€):

- 5,000€ (2021) from IACS
- 3,200€ (2021) from IACS
- 6,100€ (2022) from WGMS
- 10,000€ (2022) from UNESCO

These funds have been used to hire part-time researchers and students at the university over the past two years and have been essential to the project. The substantial time spent on the development of RGI 7 by members of the steering committee and contributors is supported by the employing institutes/universities and not covered by the funds above.

8. Future work

The next steps include finalizing the generation and release of RGI7 and updating the technical note that documents in detail the updates made to the previous version of the RGI. Since the data production workflow of RGI7 is entirely novel, we will also strive to submit a manuscript to a peer-reviewed journal in 2023.

Acknowledgements

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