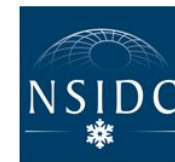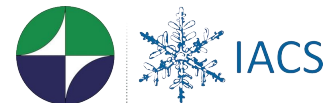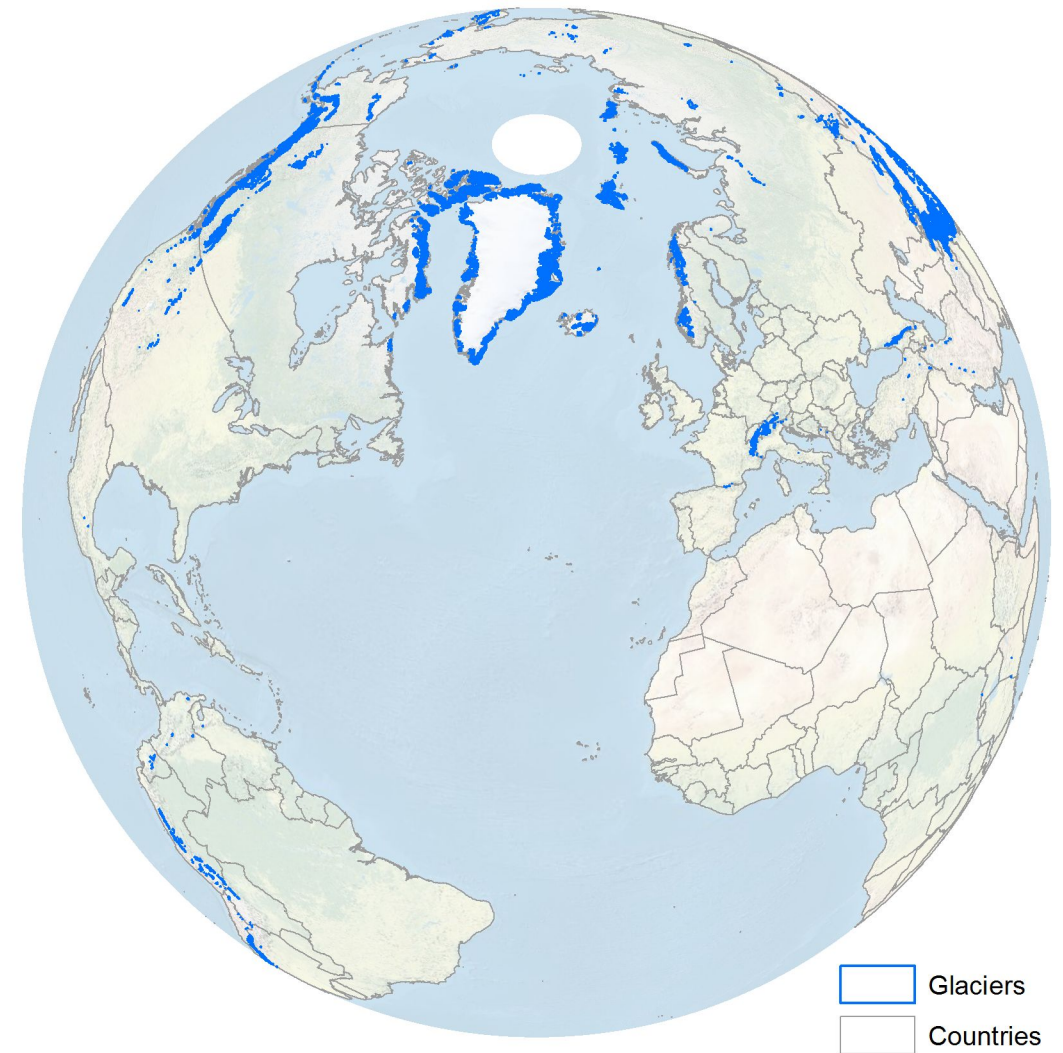# A new working group on the Randolph Glacier Inventory (RGI) and its role in future glacier monitoring

Fabien Maussion, Regine Hock, Frank Paul, Philipp Rastner, Bruce Raup, Michal Zemp

#ShareEGU2020

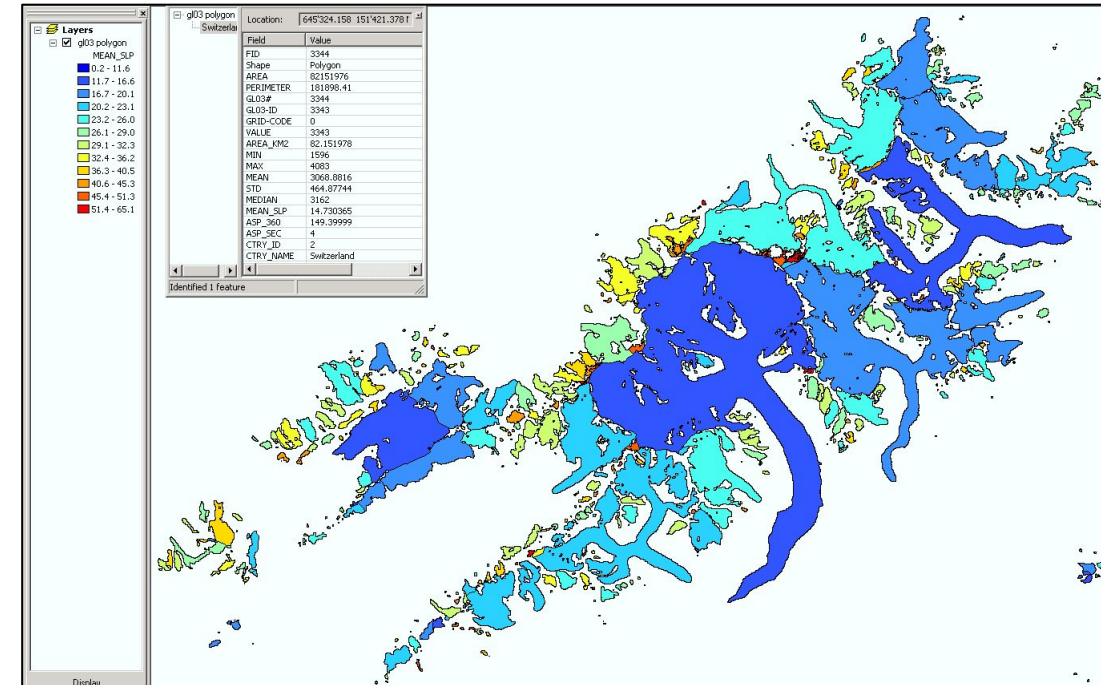Contact:

fabien.maussion@uibk.ac.at

☐ Glaciers

☐ Countries

## A glacier inventory is a key baseline dataset for numerous applications, e.g.

calculation of glacier changes, constraining elevation change and velocity products

contribution to run-off / regional hydrology / sea level rise

modelling of ice thickness, past and future extent / volume, climate change impacts

Outlines and data of the Swiss Glacier Inventory (mean slope colour coded)
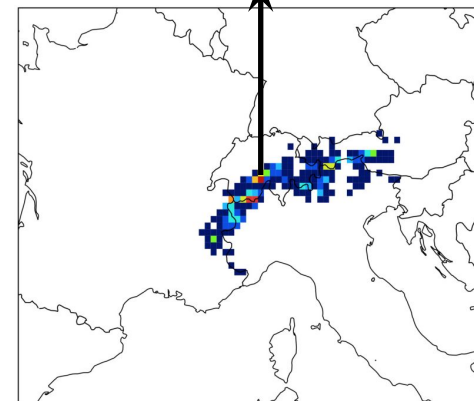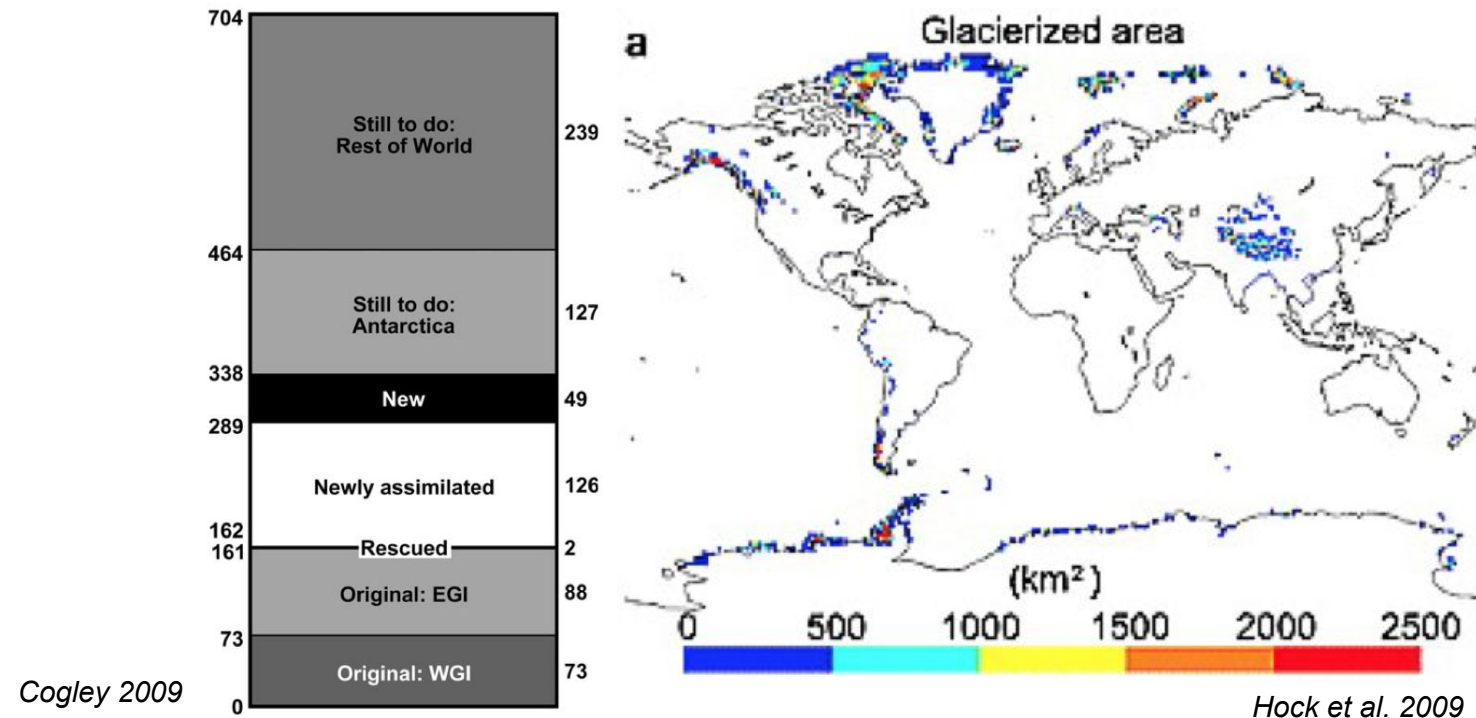
Percentage of glacier cover in RCM REMO

2.1 The World Glacier Inventory (WGI)

First global glacier inventory

- compiled for the Int. Hydrological Decade (1965-1974)

- published in 1989 as the World Glacier Inventory (WGI)

- columnar point dataset

WGMS 1989

Cogley 2009

Hock et al. 2009
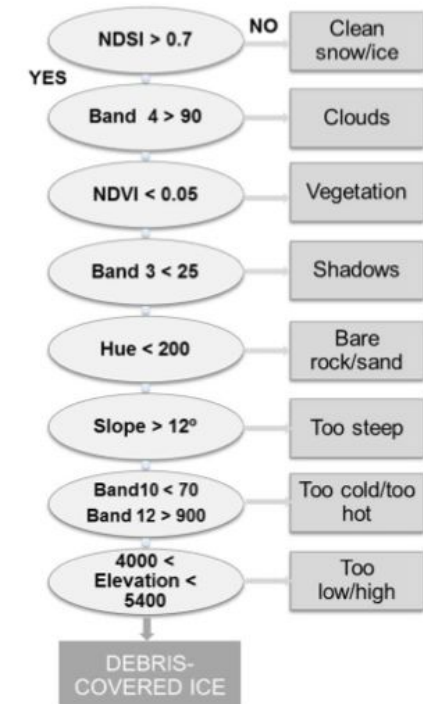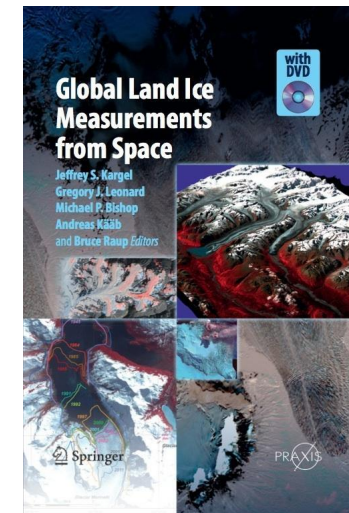
2.2 The GLIMS glacier database

Generation of Data Acquisition Requests for the ASTER Satellite Instrument for Monitoring a Globally Distributed Target: Glaciers

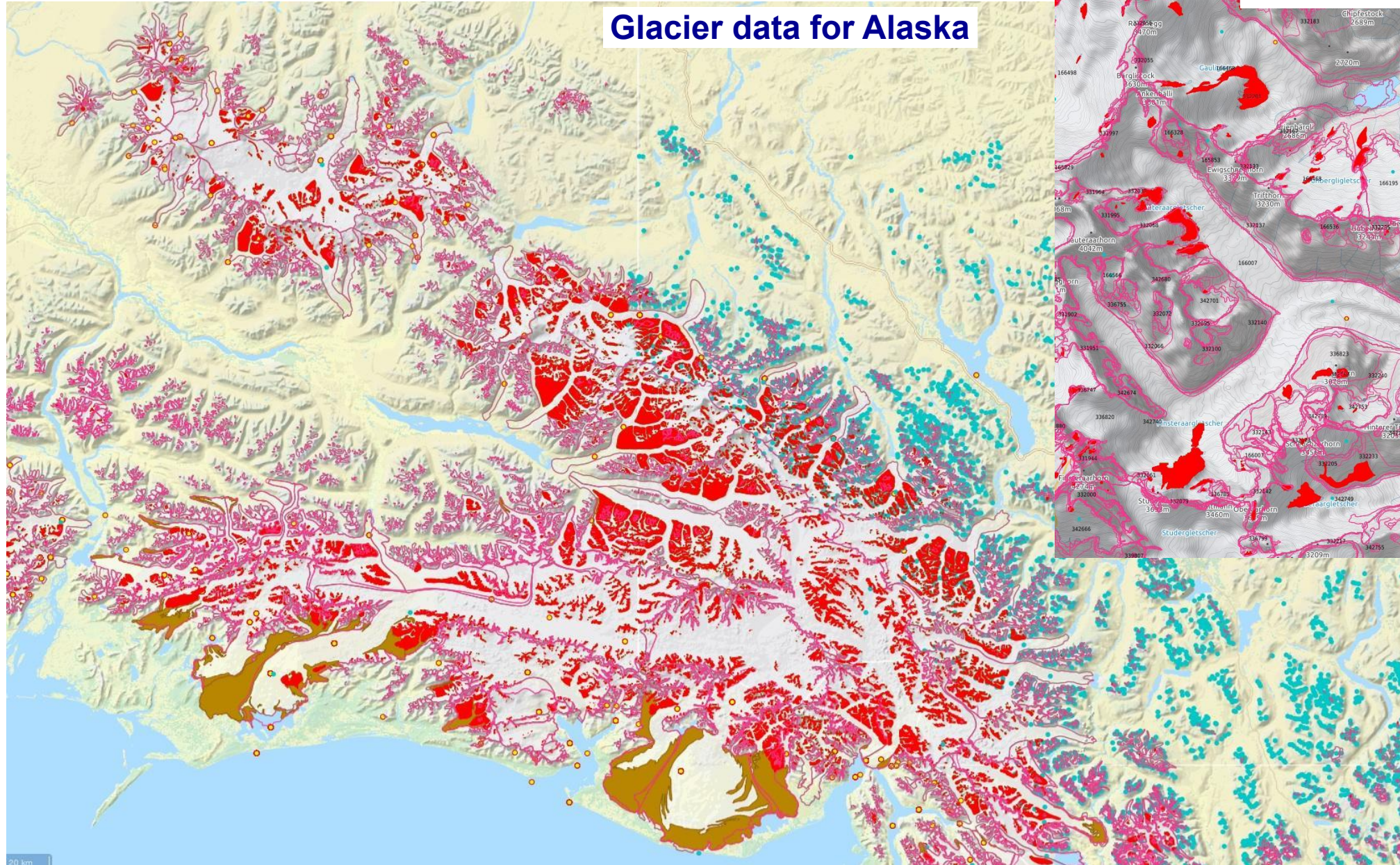Bruce H. Raup, Hugh H. Kieffer, Trent M. Hare, and Jeffrey S. Kargel

- The GLIMS database stores vector outlines of glaciers + attributes

  - built around 2000 and fed by the free availability of ASTER data
  - relied on contributions from scientists around the world

- With the free availability of the SRTM DEM and orthorectified Landsat data in 2008, glacier inventory production accelerated (see GLIMS book)

- Intense methodological development to improve glacier mapping (debris, ice divides) followed
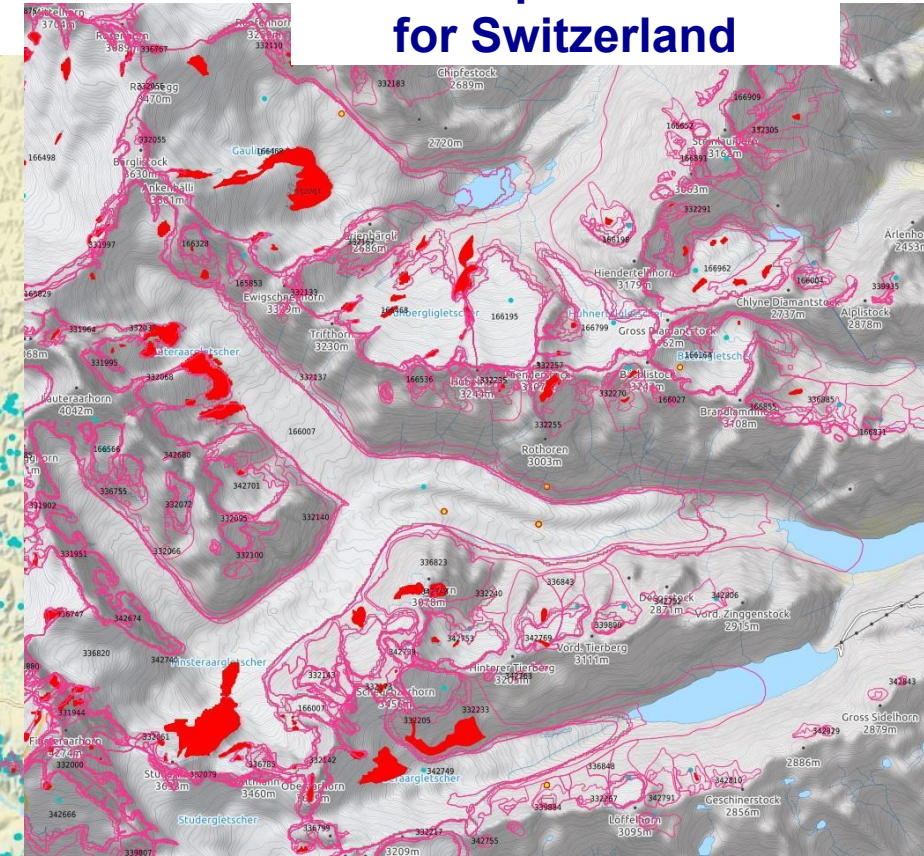
Racoviteanu & Williams 2012

2. Evolution of the RGI: The GLIMS database

Multi-temporal outlines for Switzerland

Glacier data for Alaska

Glacier outlines
Rock outcrops
Debris cover
WGI Data

2.3 The Randolph Glacier Inventory (RGI)
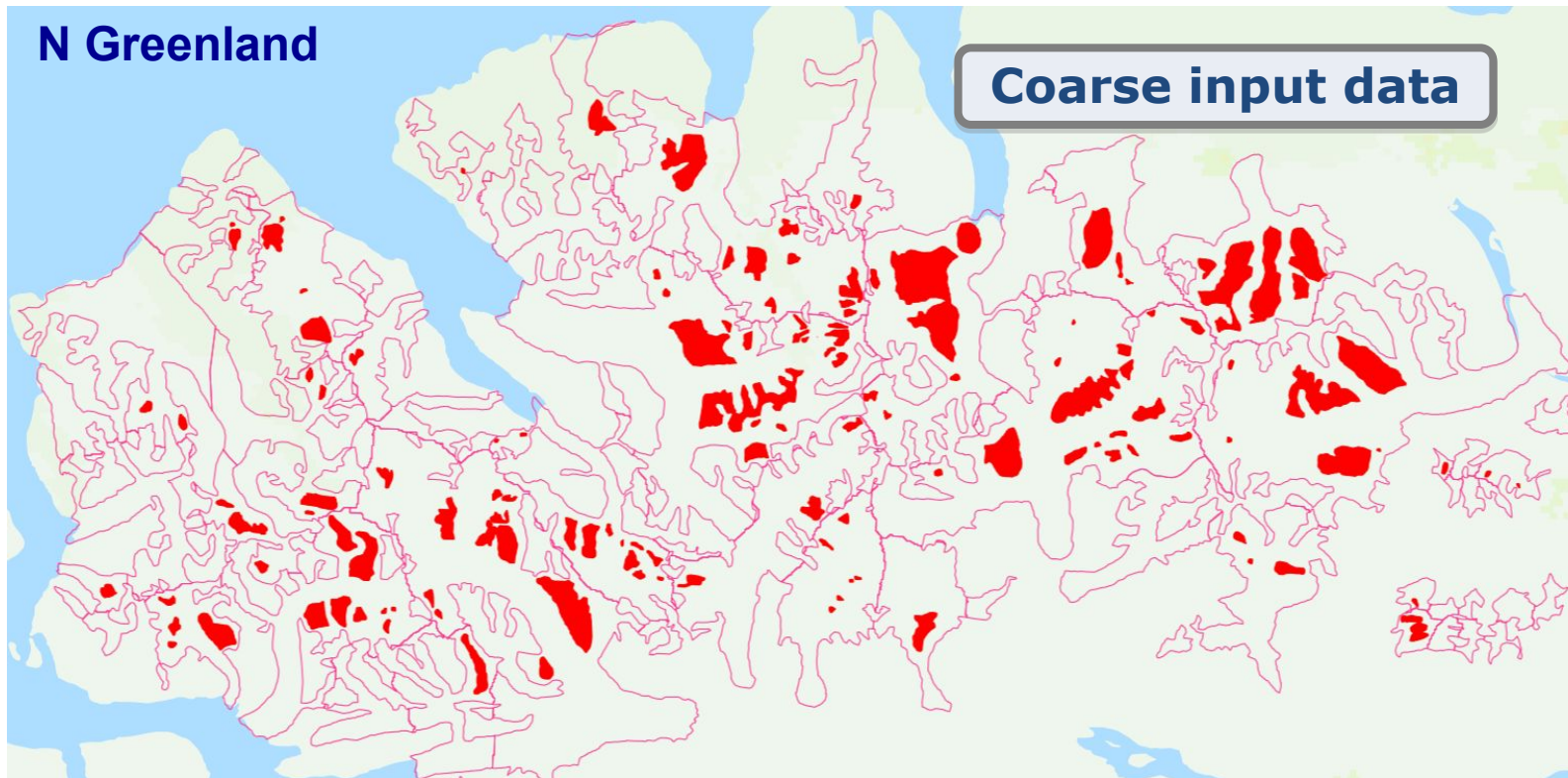
- RGI motivated by IPCC AR5 sea-level projections

- Based on GLIMS outlines & a special community effort for the missing outlines

- Fast compilation was more important than high quality => some regional issues

- Quality has been constantly improved since then (RGI3.2 for AR5, now RGI6.0)

- New datasets are continuously created and forwarded to GLIMS

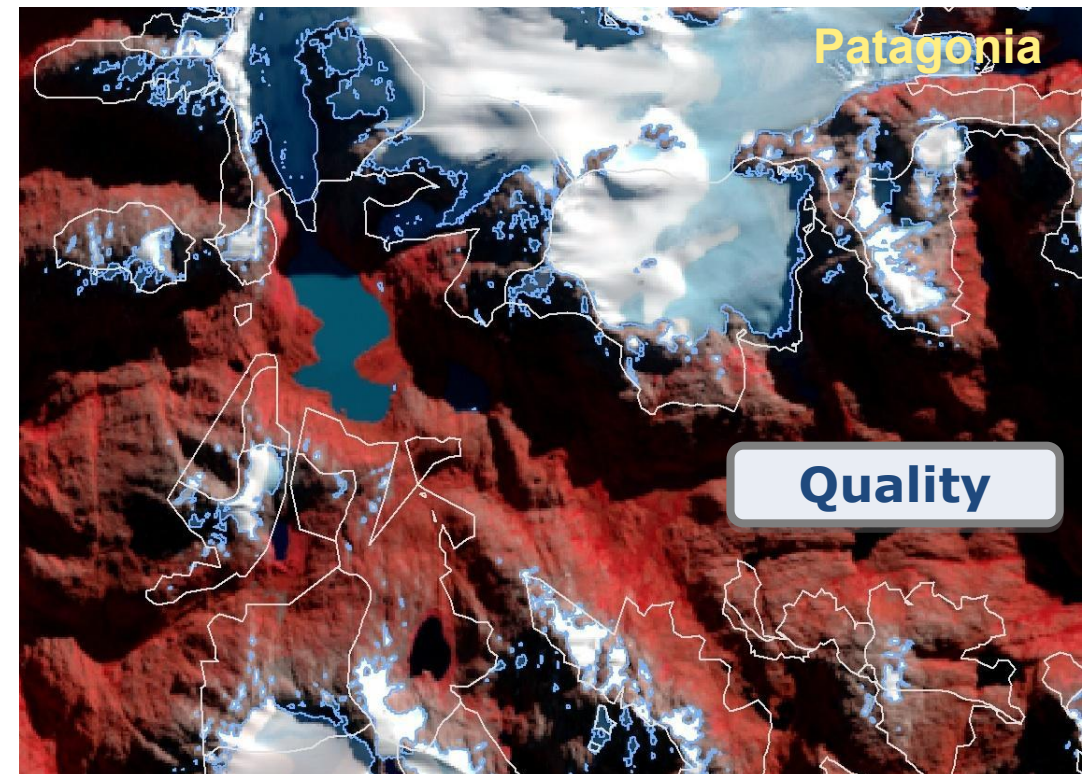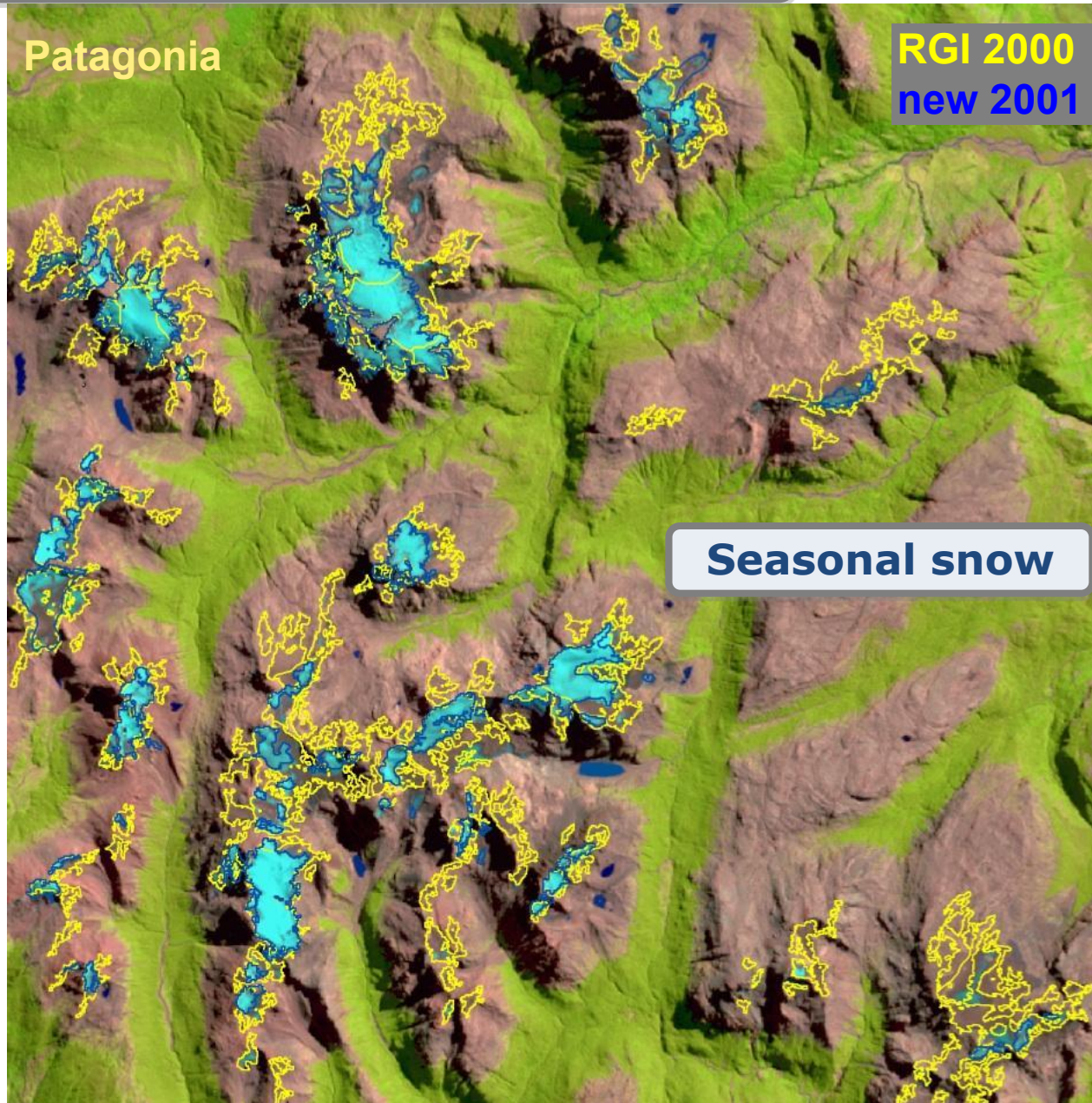*Pfeffer et al. 2014*
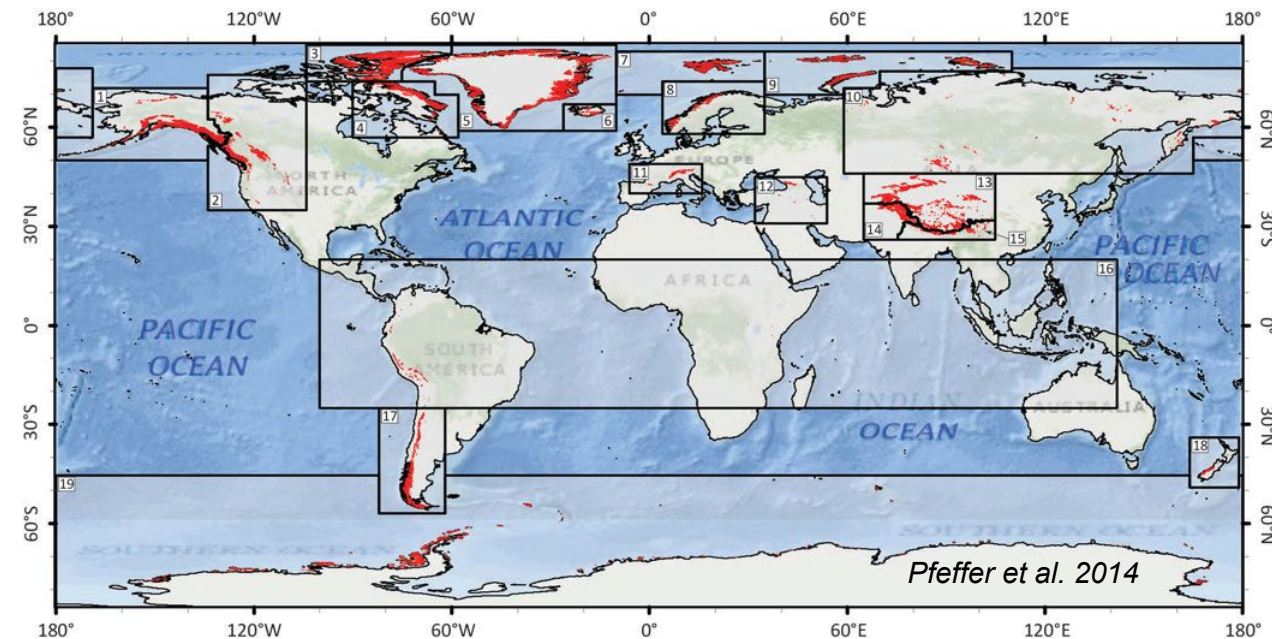
3. Known issues in the RGI

- **large temporal spread**: regional: 10, global: 30 years

- **outlines quality issues**: see examples

- **ad-hoc data generation process**: not traceable, not reproducible
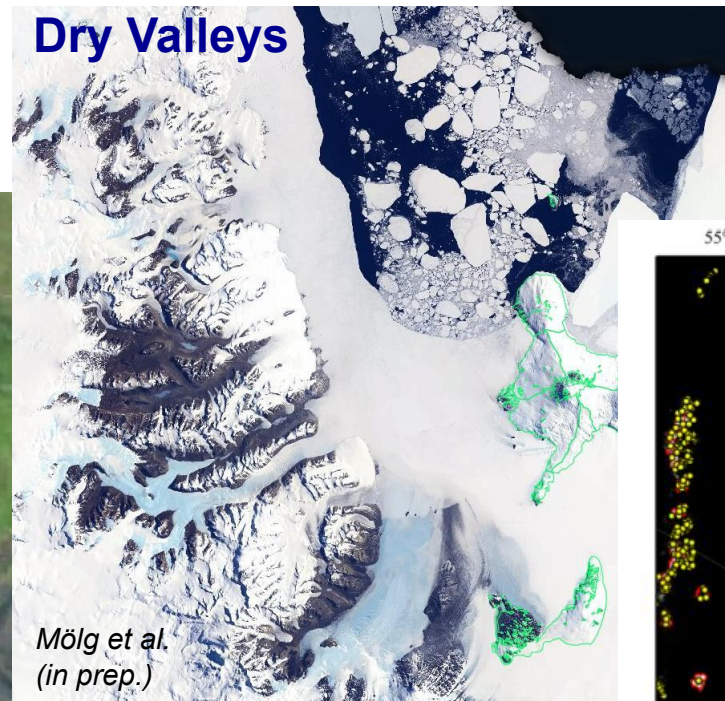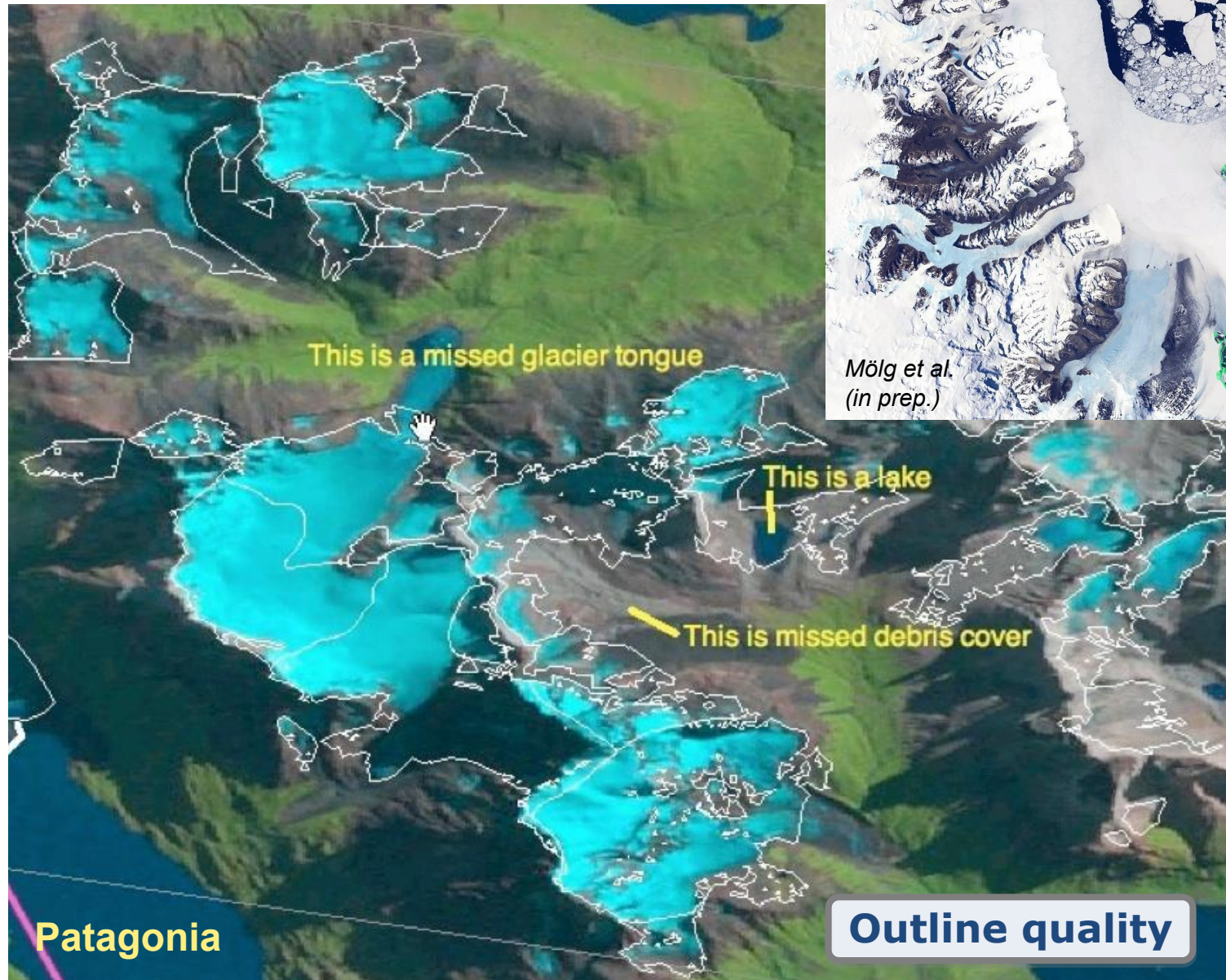
N Greenland

Coarse input data

Andes

snow

3. Known issues in the RGI

Patagonia

RGI 2000
new 2001

Seasonal snow

Caucasus

Nominal glaciers

Patagonia

Quality

3. Known issues in the RGI

Dry Valleys

Mölg et al. (in prep.)

Missing regions

Antarctic Peninsula

Larsen C

RGI
GLIMS
WGI

Huber et al. 2017

This is a missed glacier tongue

This is a lake

This is missed debris cover

Patagonia

Outline quality

RGI60-11.00897: Hintereisferner

Flow Divides

RGI60-05.10315
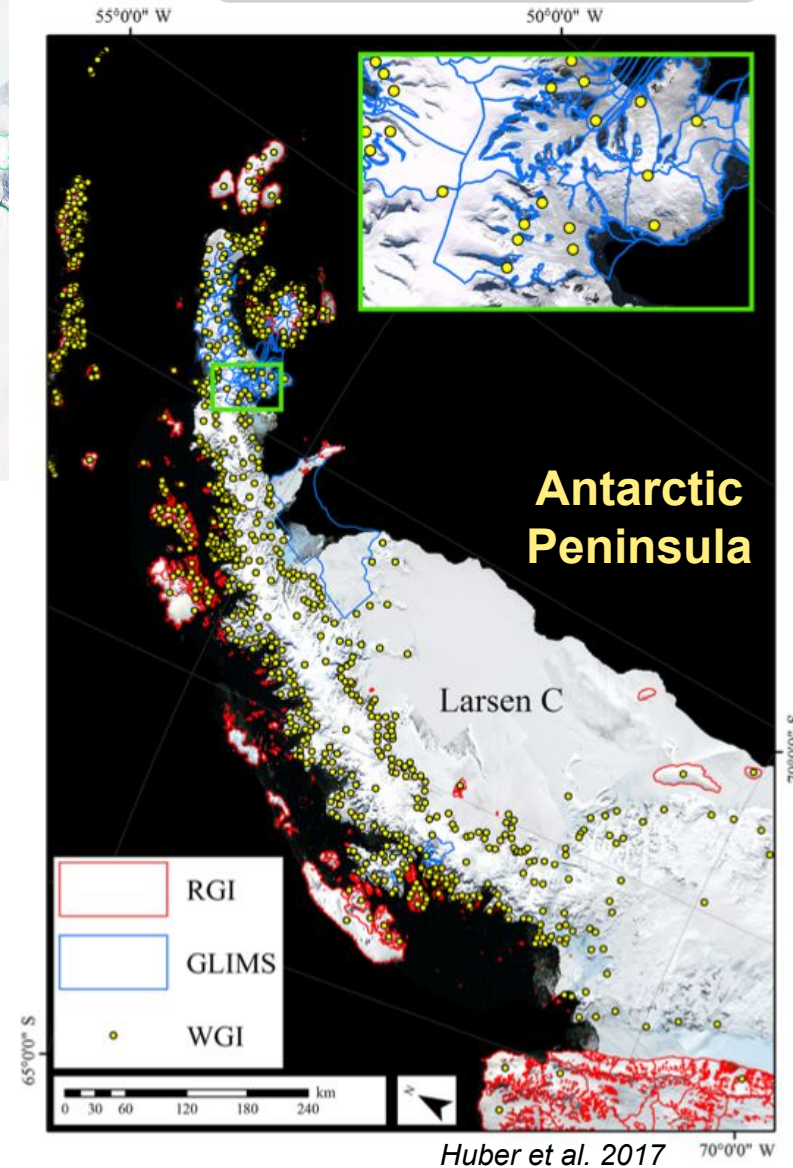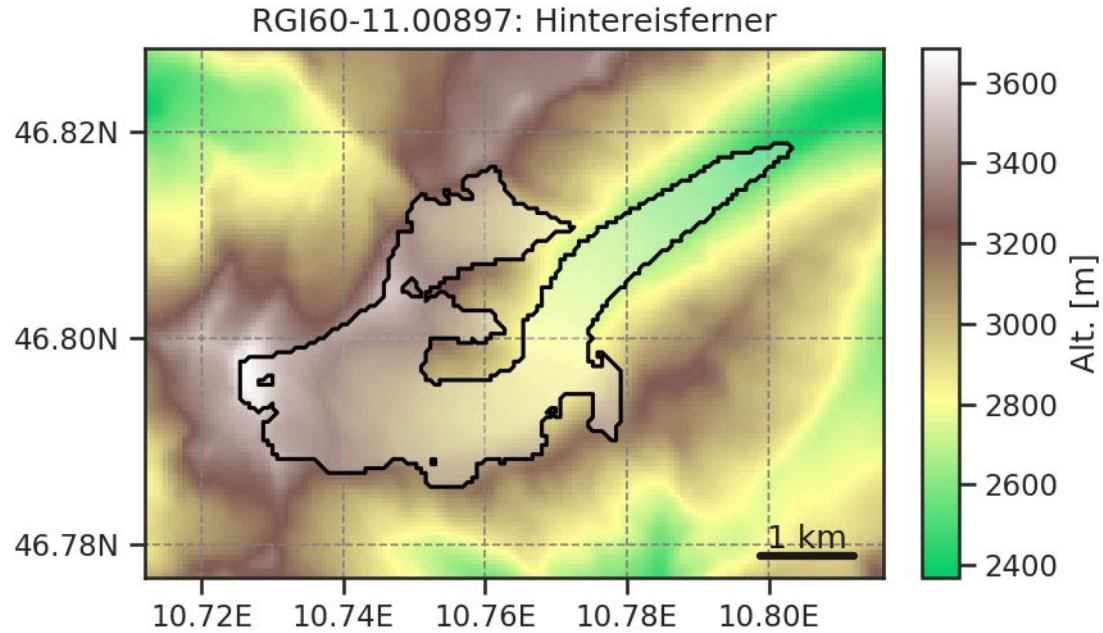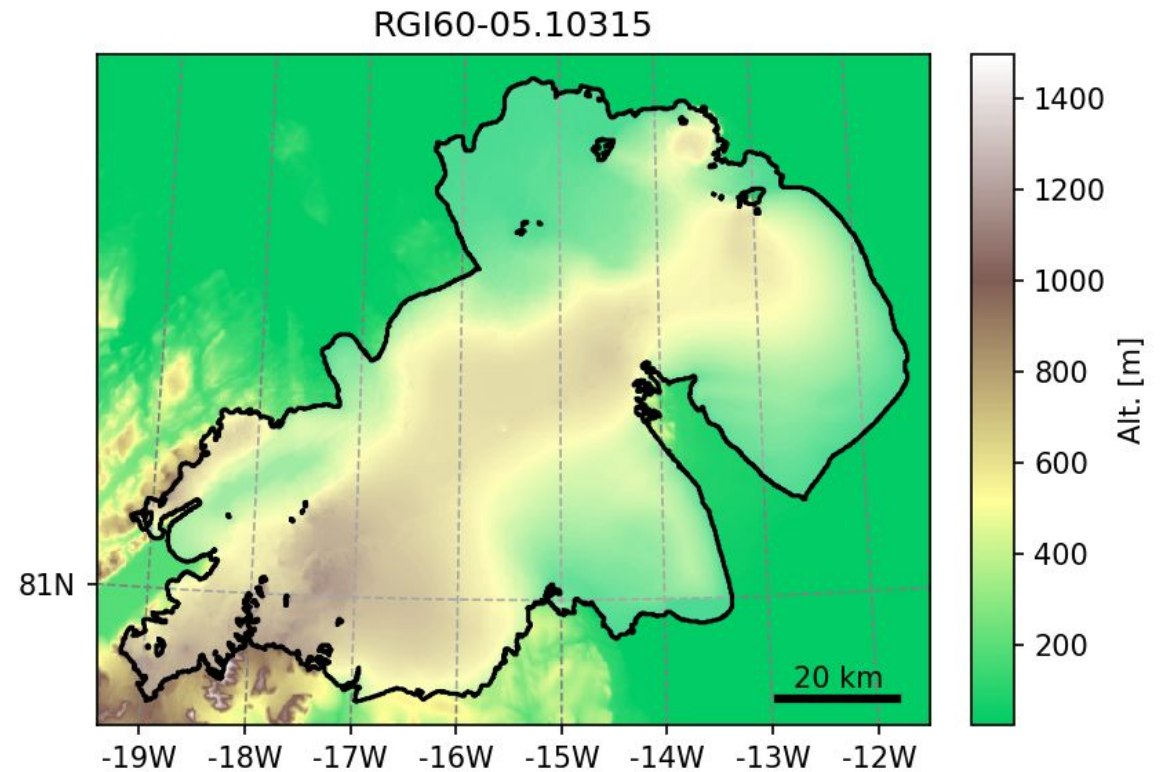
GLIMS as a central tool, complemented by open-source scripts and minimal (but necessary) manual intervention and decision

- **"RGI on demand" button at GLIMS**

- **Suite of open-source tools**

- **Open release workflow**

- **Community involvement!**

- **New RGI Working Group at IACS:**
  https://cryosphericsciences.org/activities/working-groups/rgi-working-group/

- **Call for participation: "kick off" RGI meeting, 05.05.2020 18H30 CEST**

5. Perspective for RGI 8 and beyond: snapshots

1850
- based on LIA maximum extents
- maps, trimlines and geomorphologic evidences
- done: Alps, Patagonia, some other regions

1970s
- based on extents created for WGI?
- maybe use MSS (& Hexagon) for updates?

mid 1980s
- Landsat TM 30 m
- national (aerial) inventories

2000
- Landsat TM / ETM+, ASTER
- good SRTM match
- to be checked for current RGI

2007-11
- many national inventories (Alps, CGI2, Andes, 50% Svalbard, 60% Alaska)
- ALOS DEM (AW3D30)

2013-18
- Landsat OLI, Sentinel 2
- ArcticDEM, TanDEM-X

RGI is great!

We need your support to make it
even better: join the Working
Group to contribute!

Thank you!

Glaciers
Countries

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Philipp Rastner, Bruce Raup, Michal Zemp**