

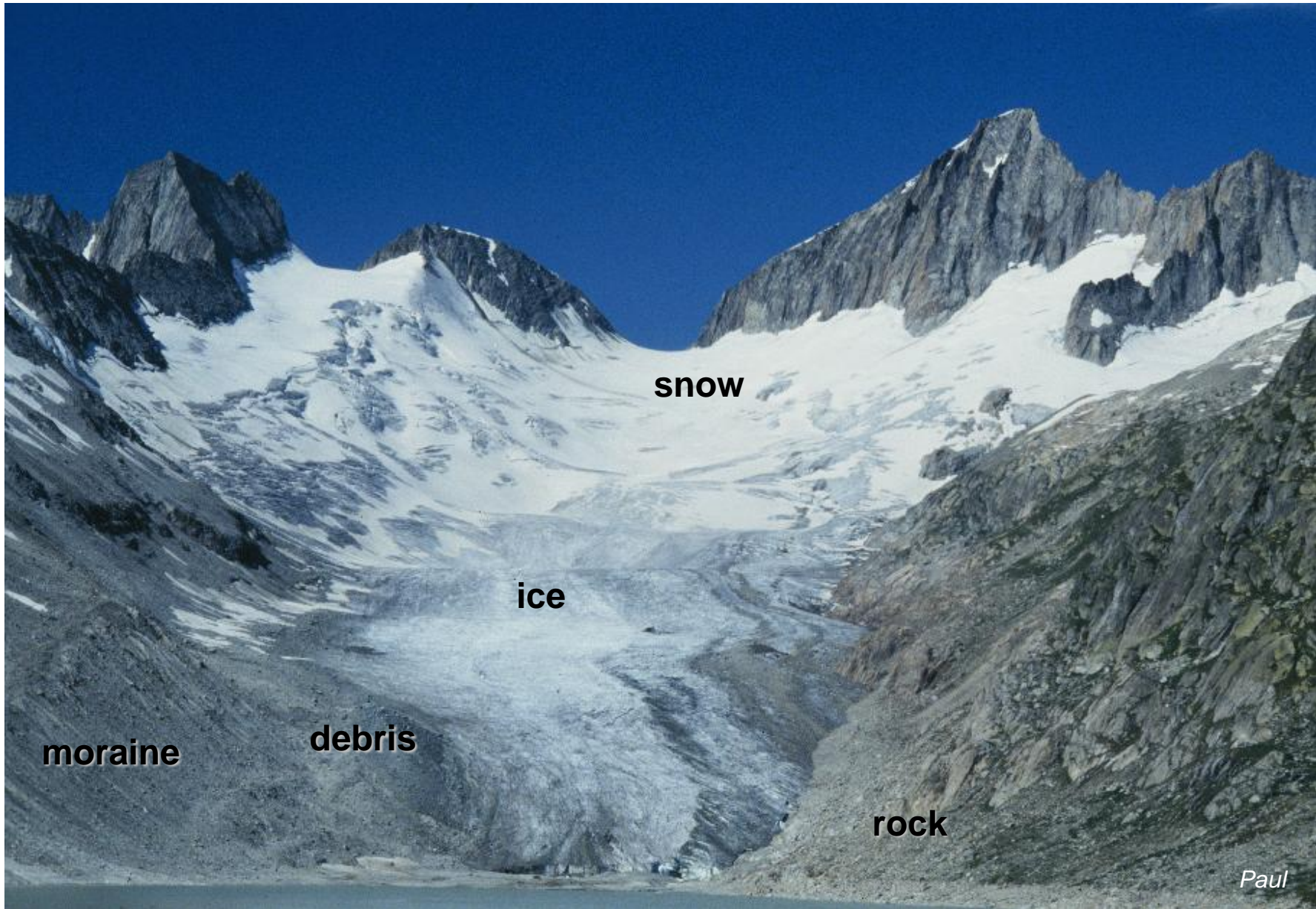
Global Glacier Inventories and GLIMS: Status and Applications

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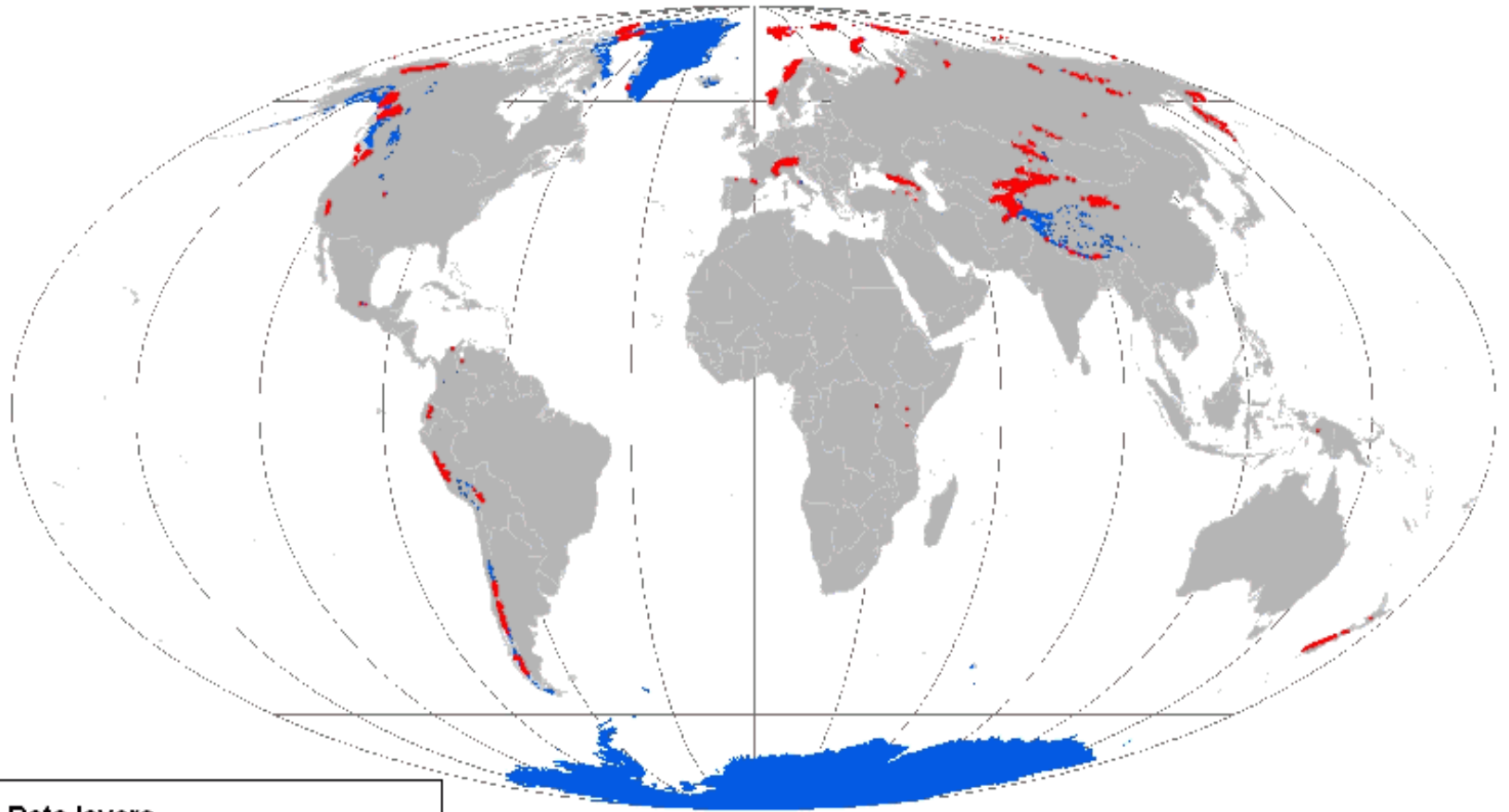
A typical small valley glacier in the Alps



Glacier Inventories

- **World Glacier Inventory (WGI)**
 - compiled in the 1980s from aerial photographs/maps of a 40 year period
 - **point** information with topographic attributes for ca. 72000 glaciers
 - extended with Eurasian inventory and additional data (WGI-XF)
 - entire data set is digitally available and widely used for modeling
- **GLIMS database & new Randolph Glacier Inventory (RGI)**
 - compiled since 2000 from satellite data (ASTER, TM/ETM+) and maps
 - **vector** outlines, in part with topographic attributes
 - open to include complimentary information, 100 000 glaciers in GLIMS
 - RGI: Merged GLIMS, WGI/WGI-XF, DCW data + new project datasets
- **Gridded data sets**
 - 1 by 1 deg **GGHydro** by G. Cogley, only area covered, globally complete
 - 1 by 1 km from the digital chart of the world (**DCW**), original vector data

WGI and DCW

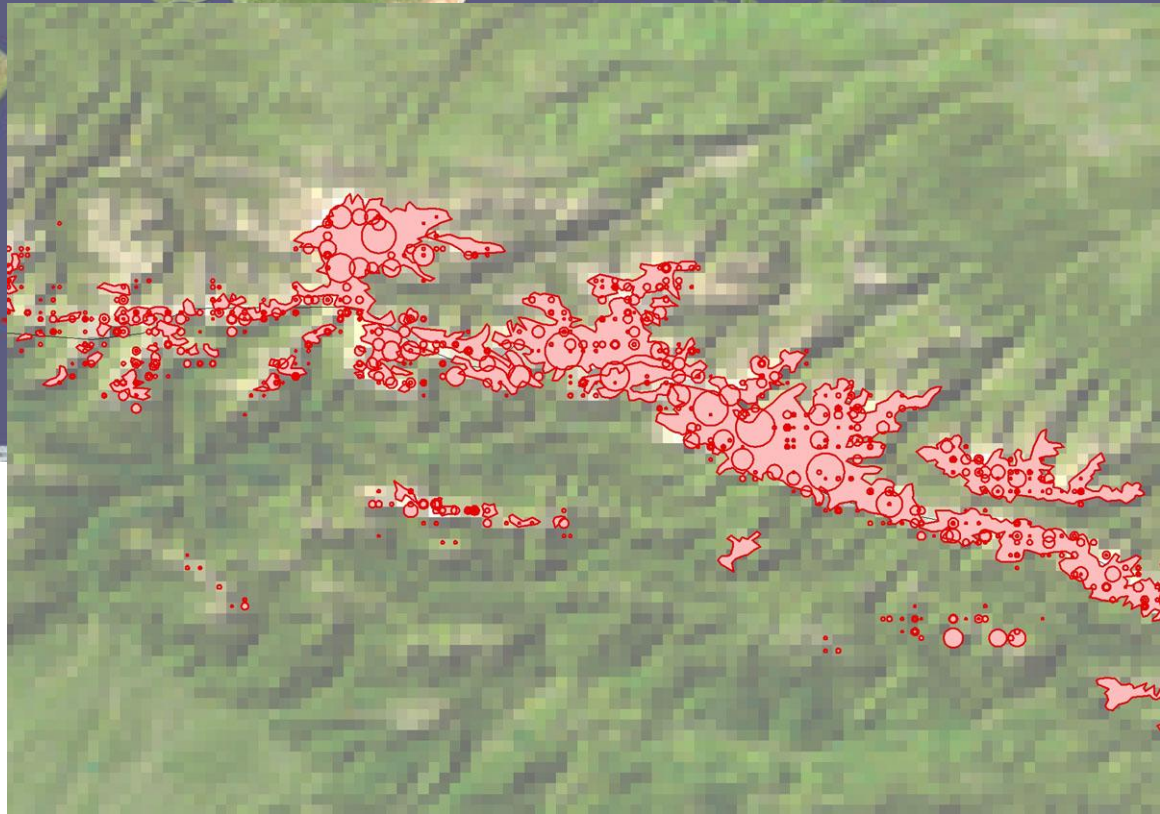
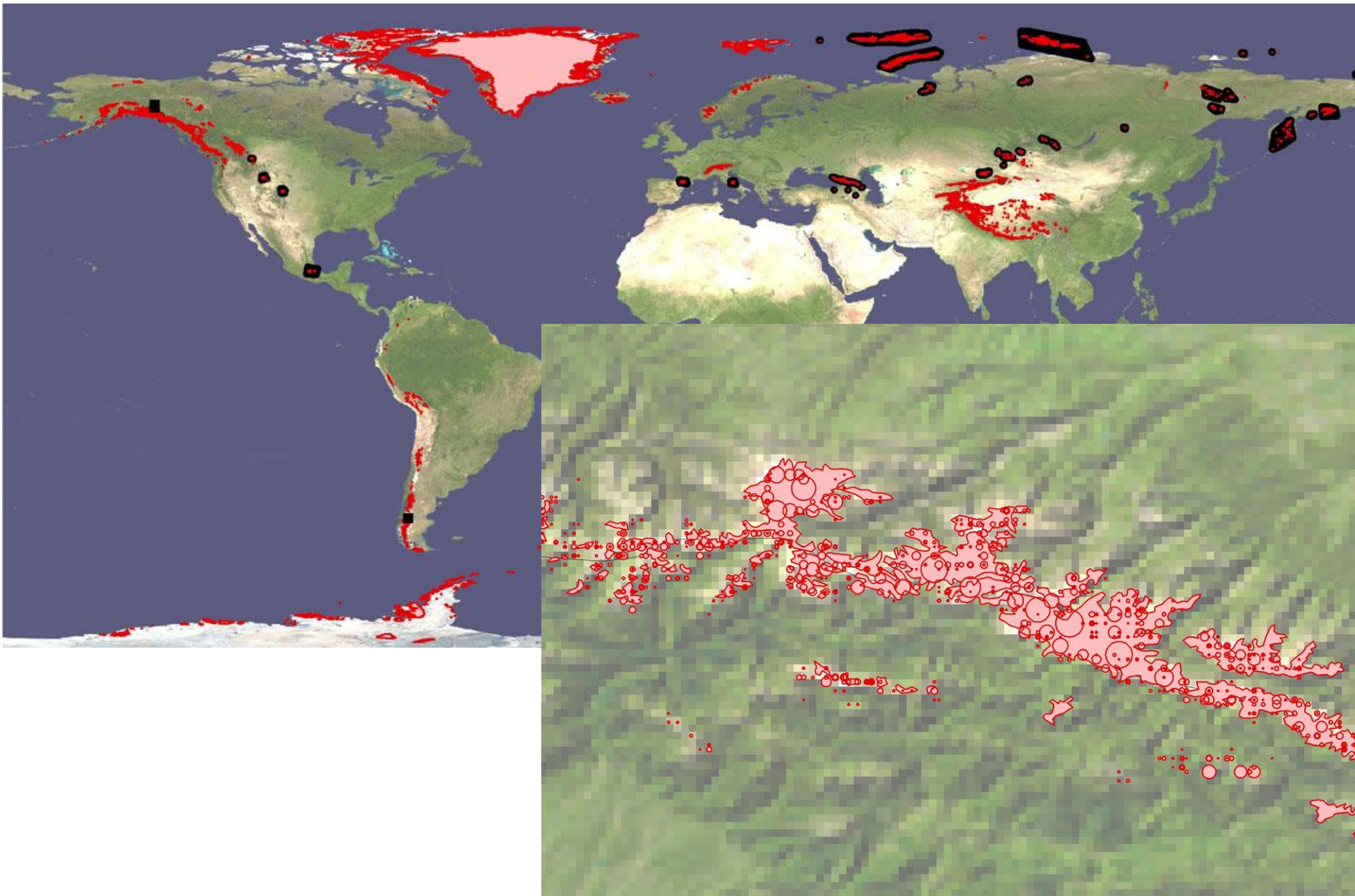


Data layers

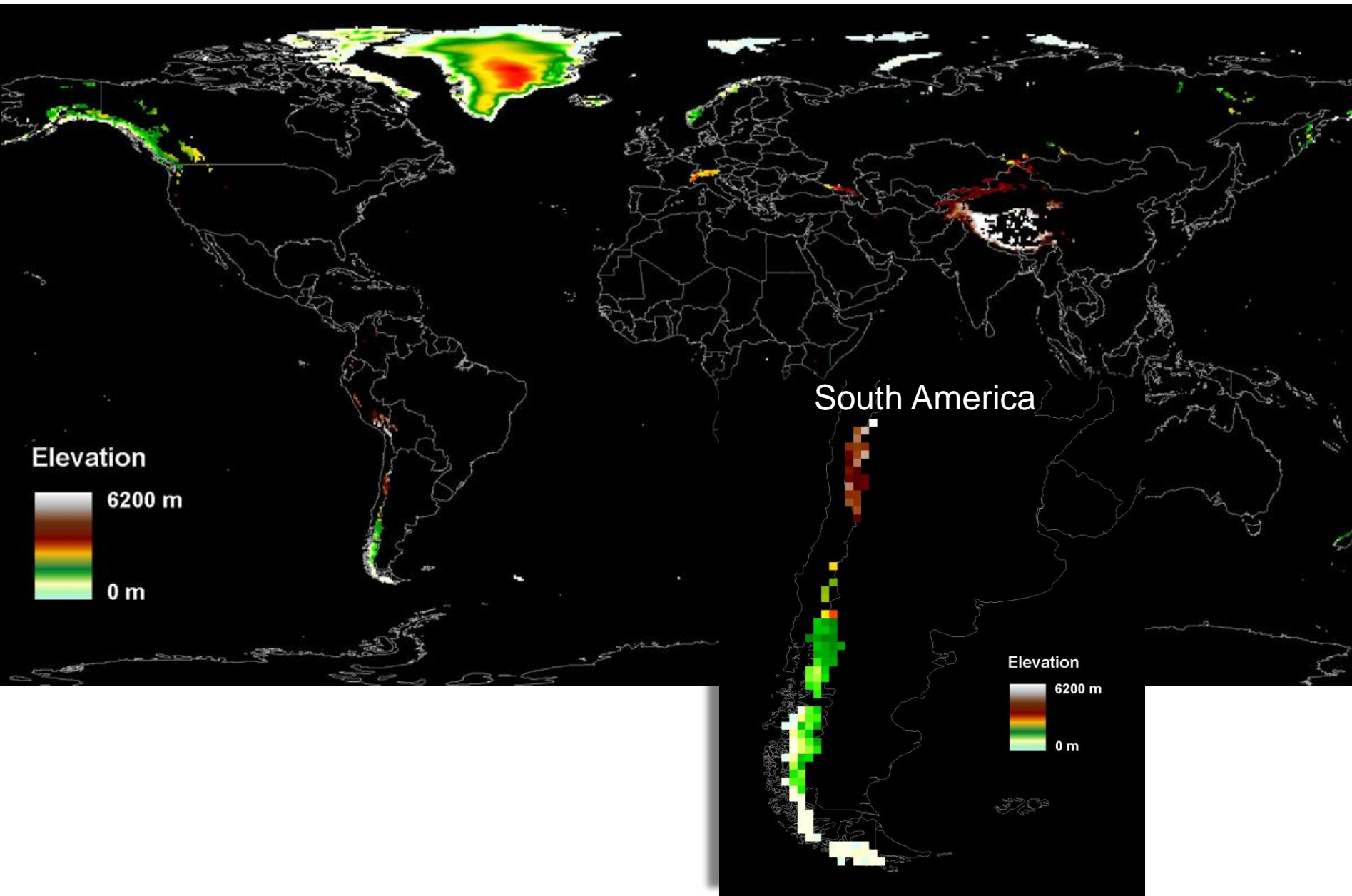
- glaciers and ice caps (WGI)
- glaciers, ice caps and ice sheets (DCW)

World Glacier Inventory

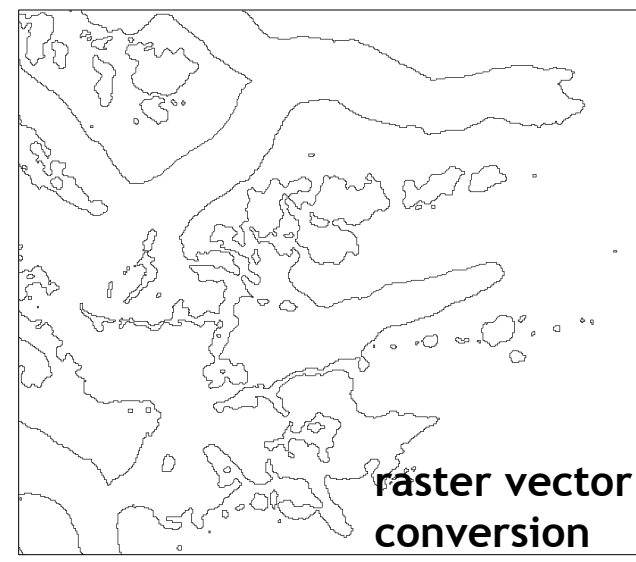
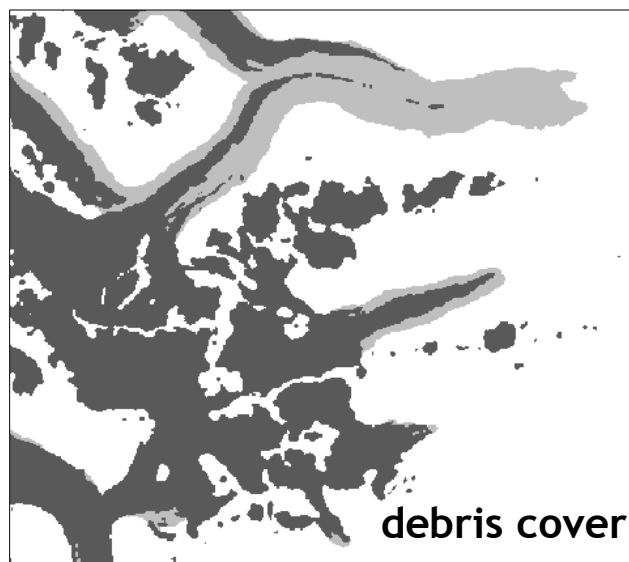
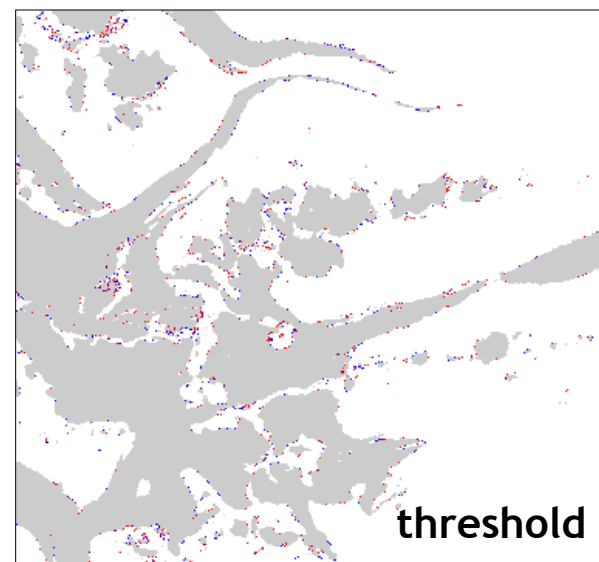
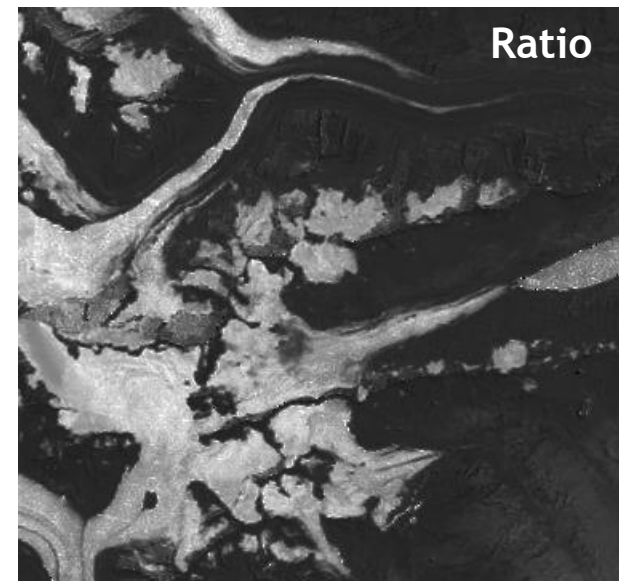
Poor regions in the DCW



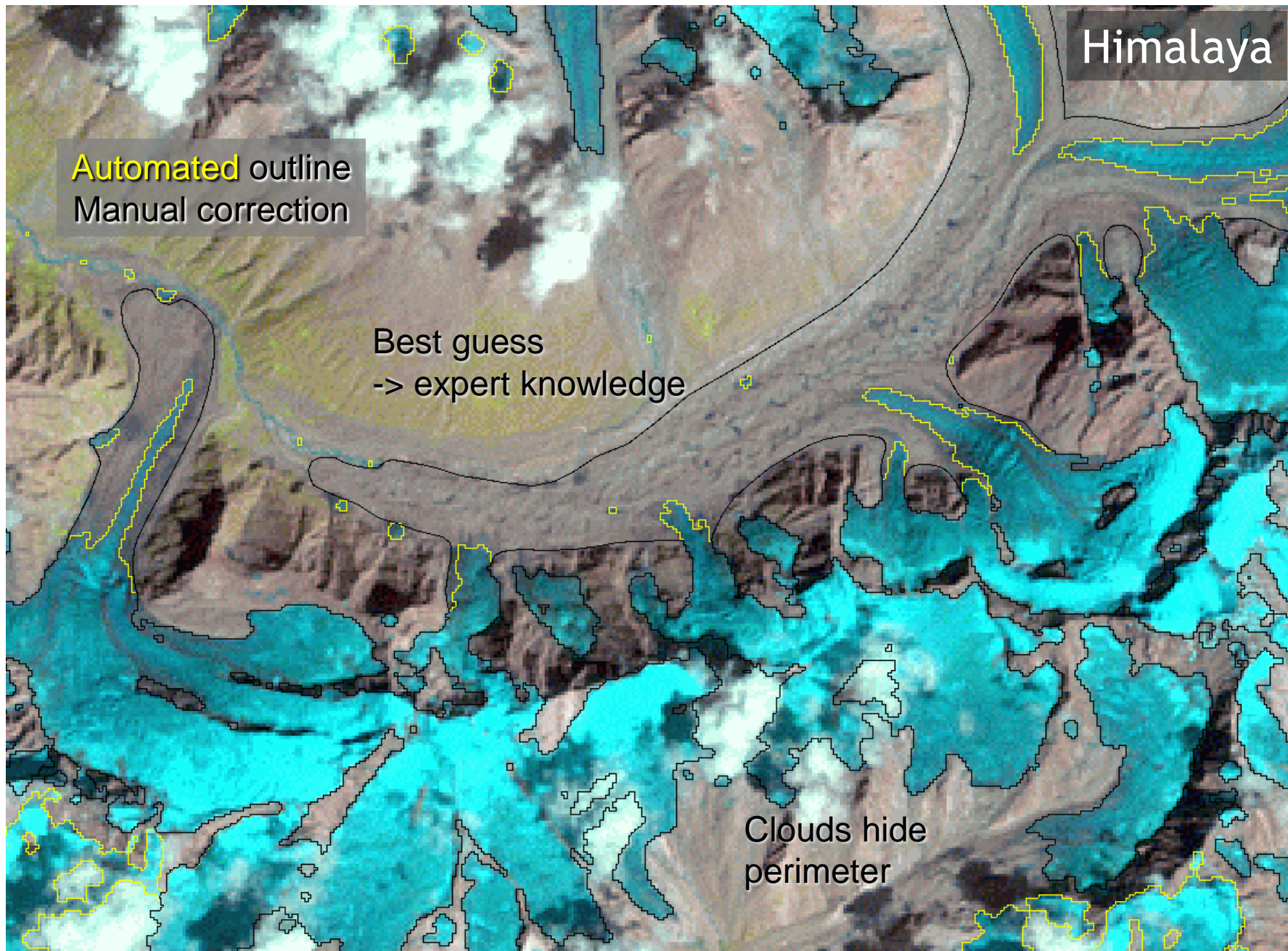
DCW combined with elevations from SRTM



Glacier mapping with Landsat



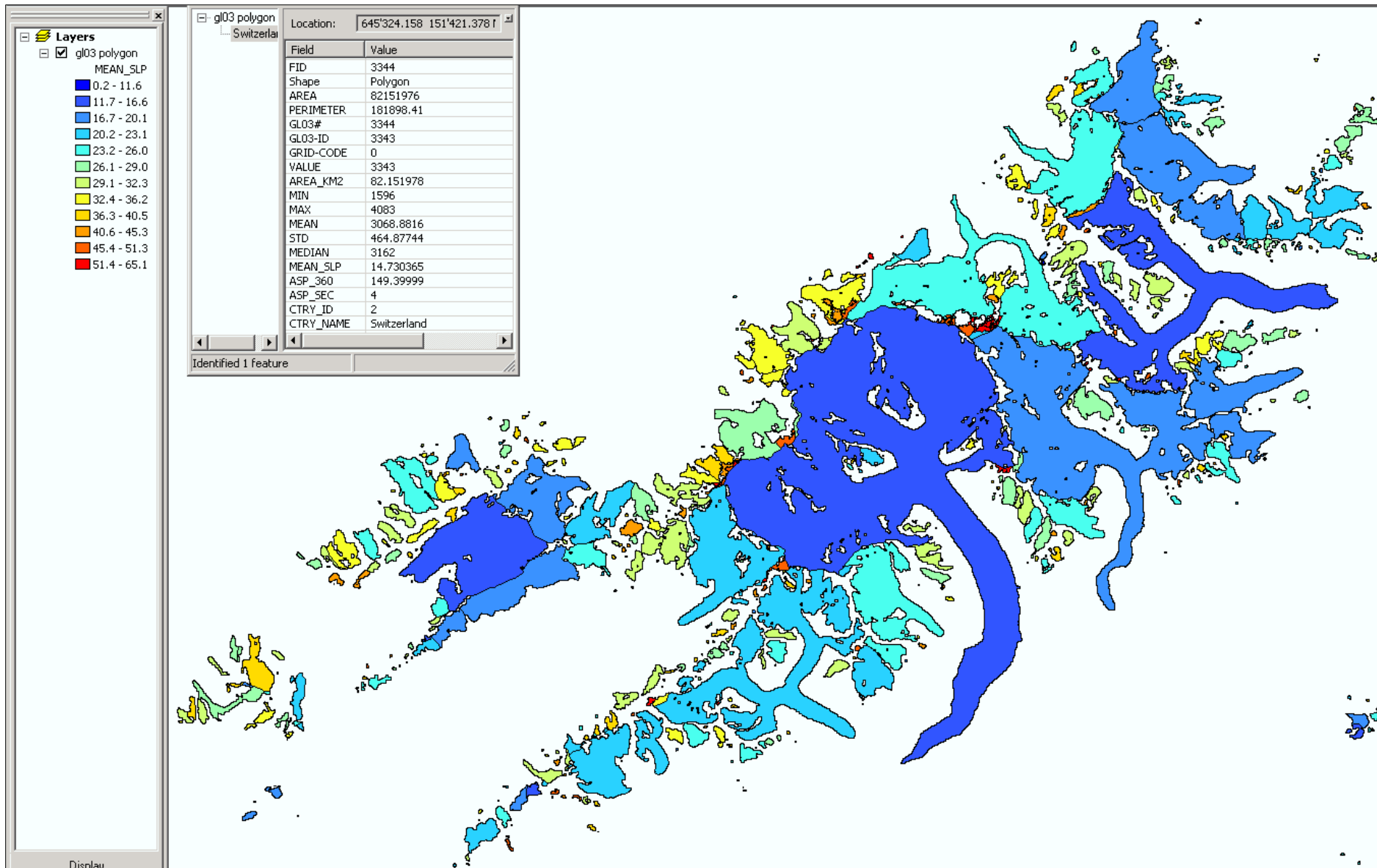
Debris-cover/Clouds: Where is the outline?



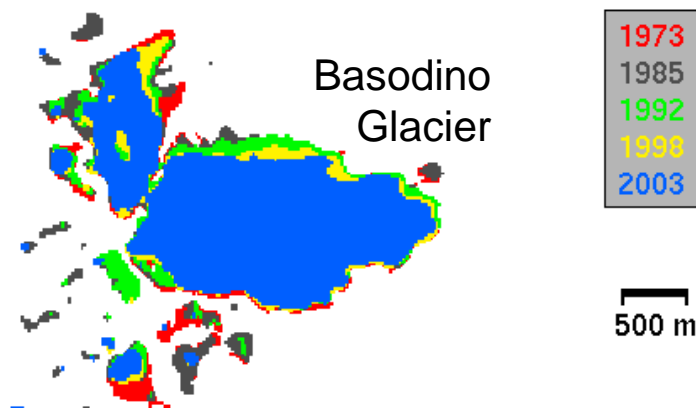
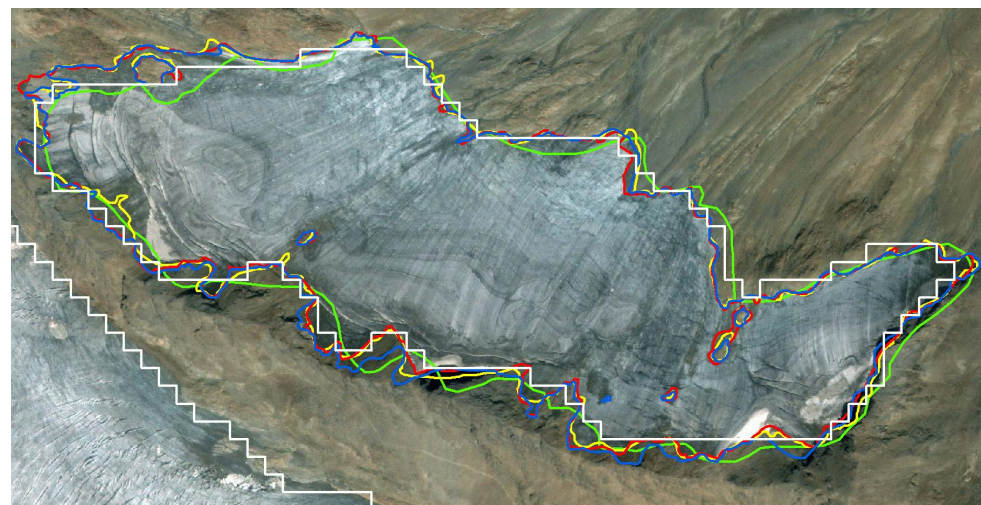
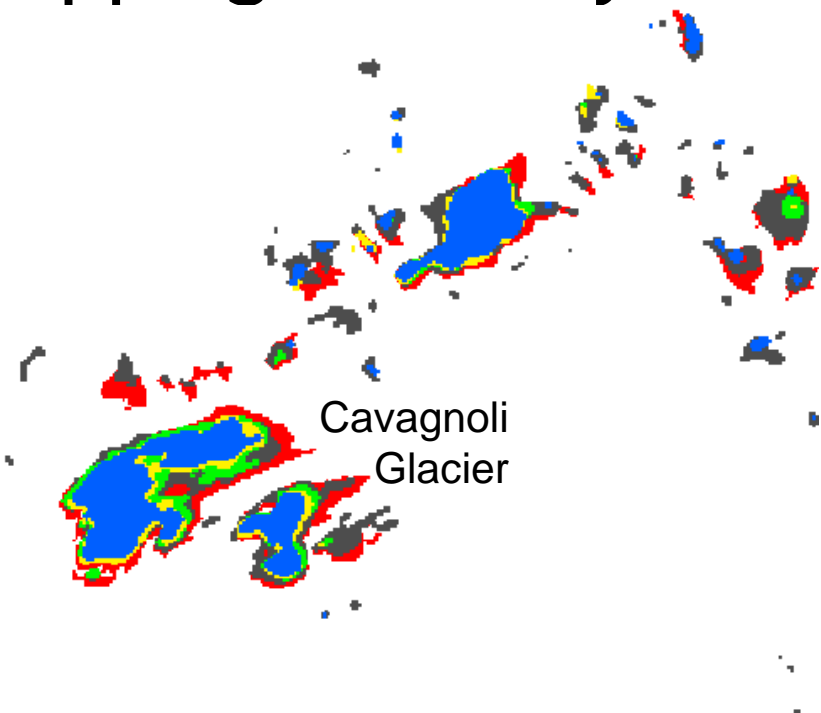
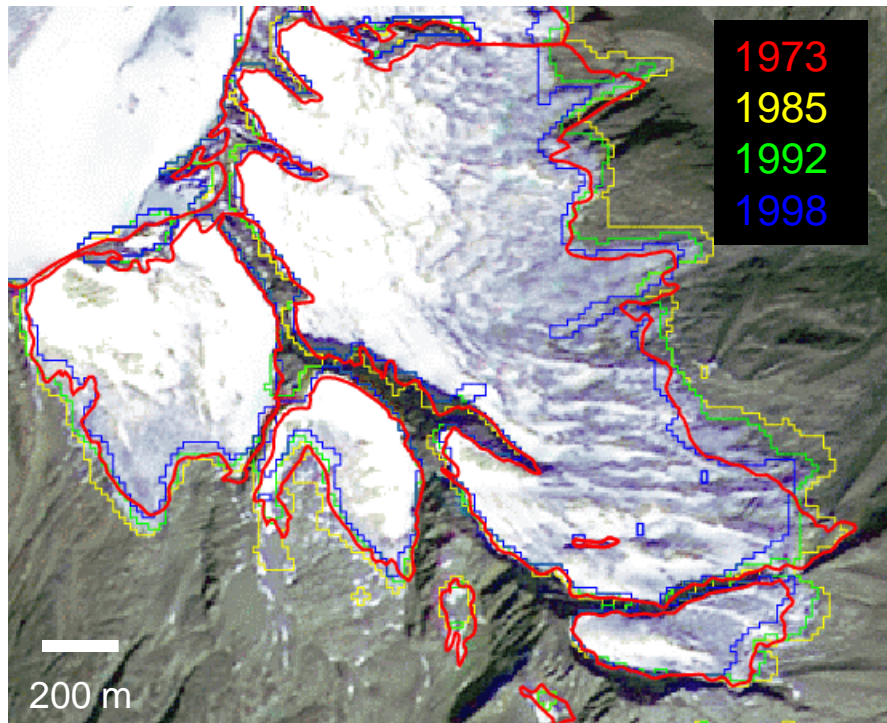
Glacier entities: Where is the drainage divide?



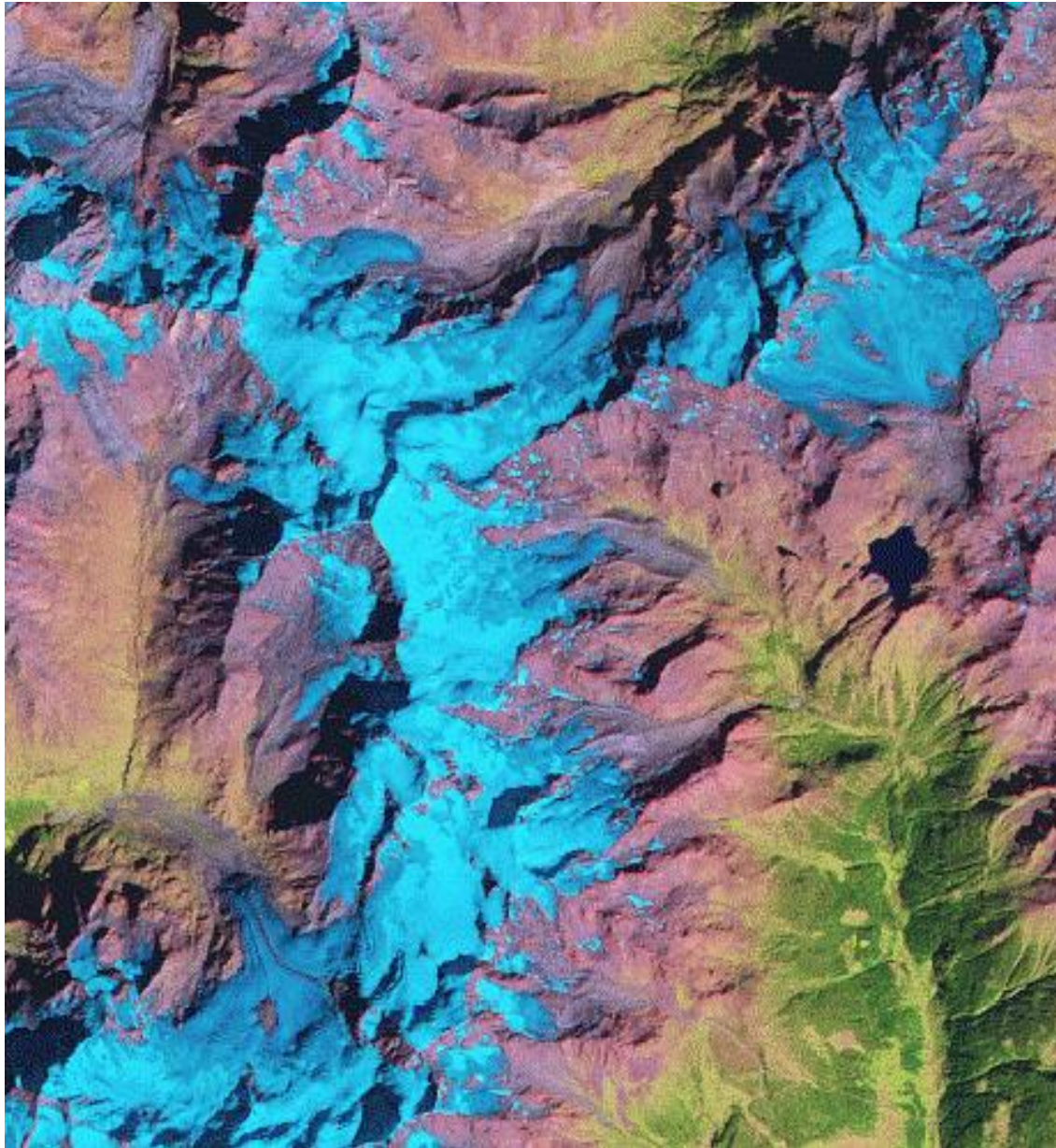
Glacier inventory with topographic attributes



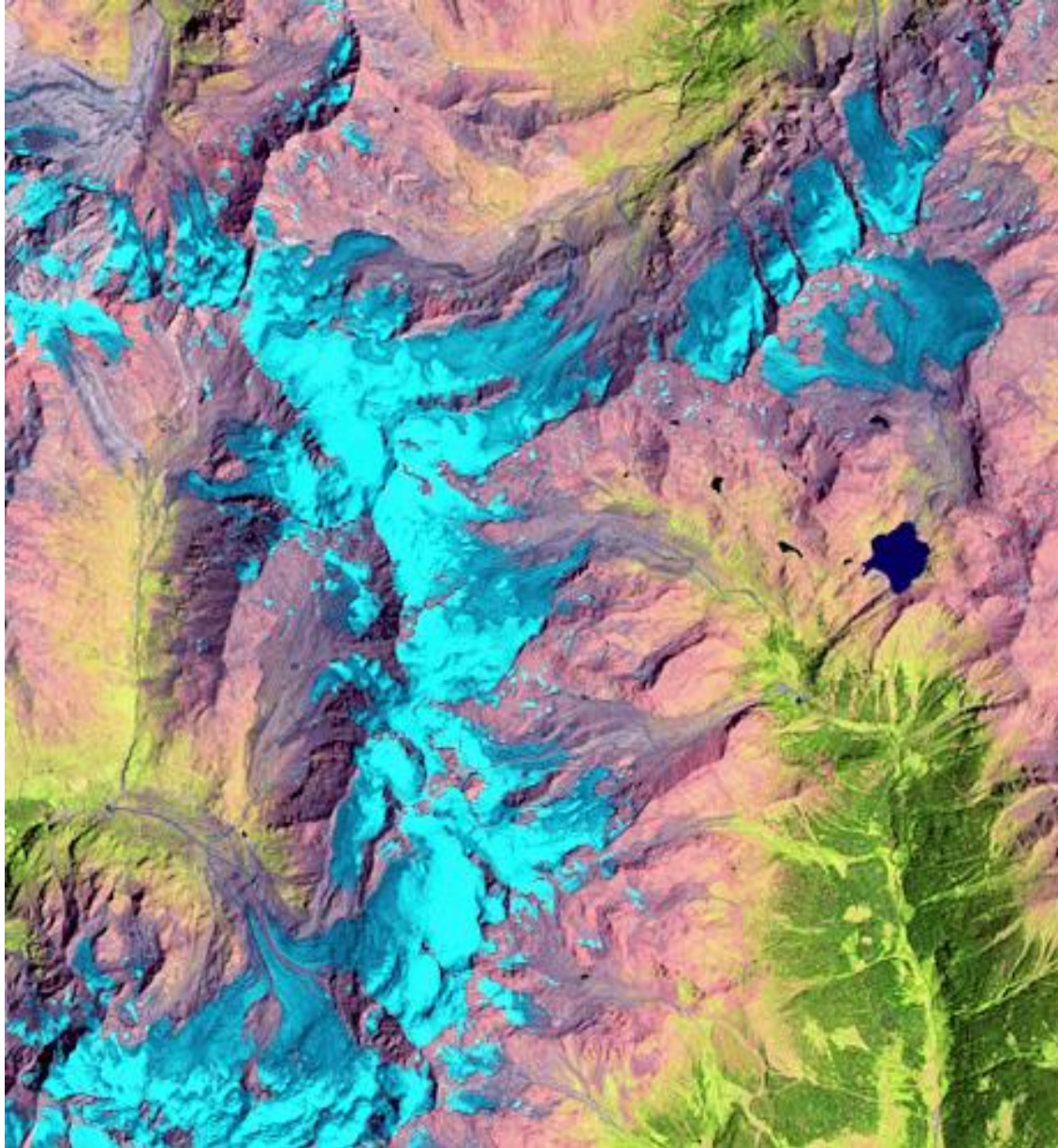
Temporal change and Mapping accuracy



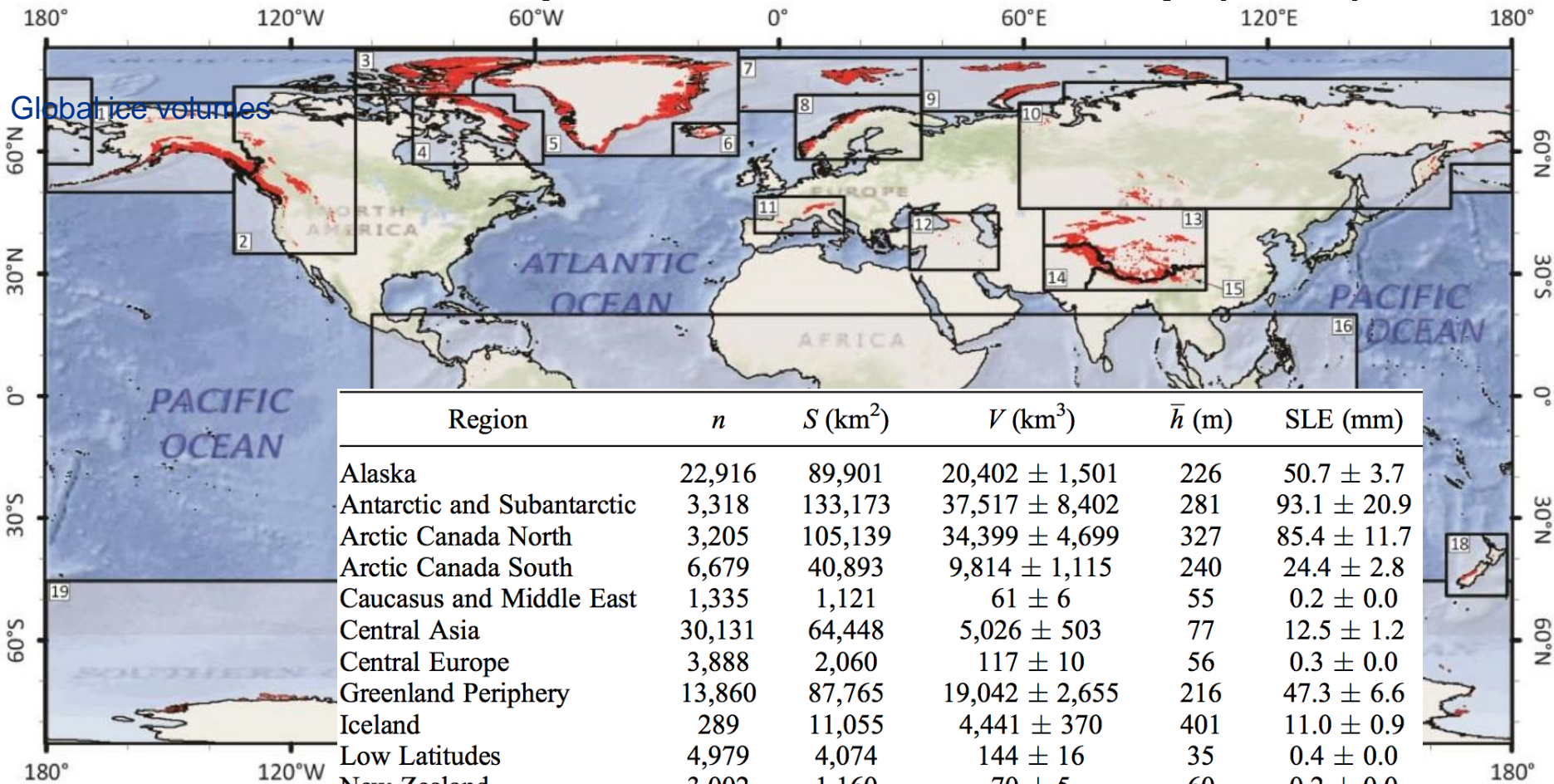
Flicker images: Ortler 1985



Flicker images: Ortler 2003



The Randolph Glacier Inventory (RGI)

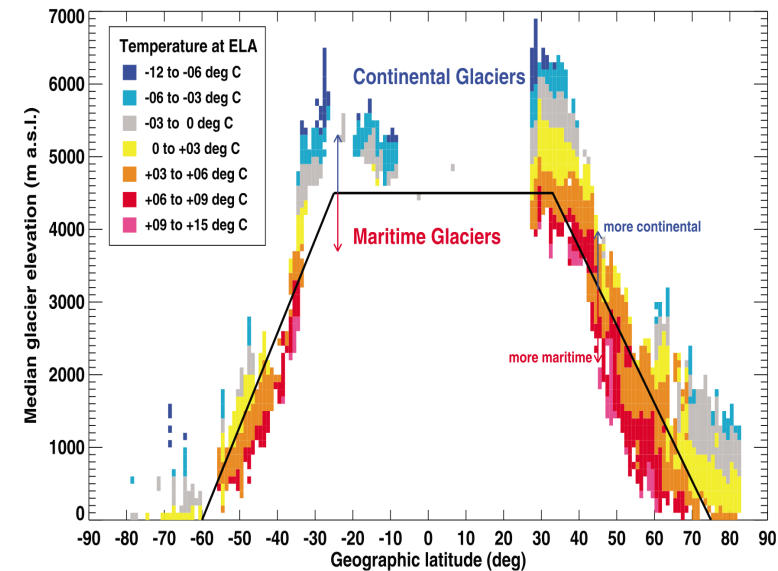
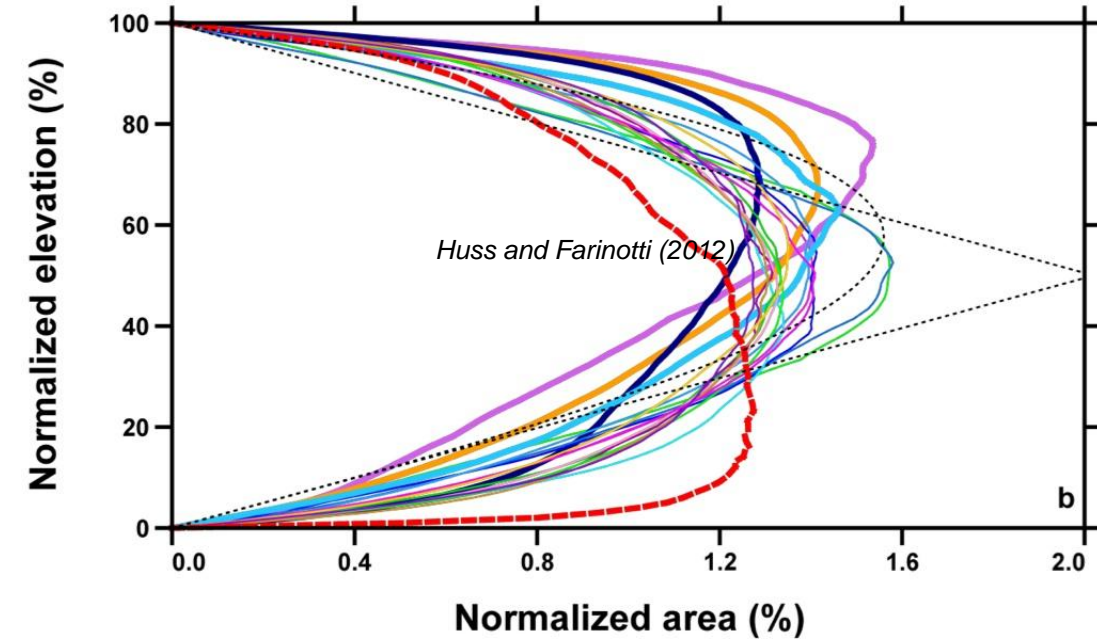
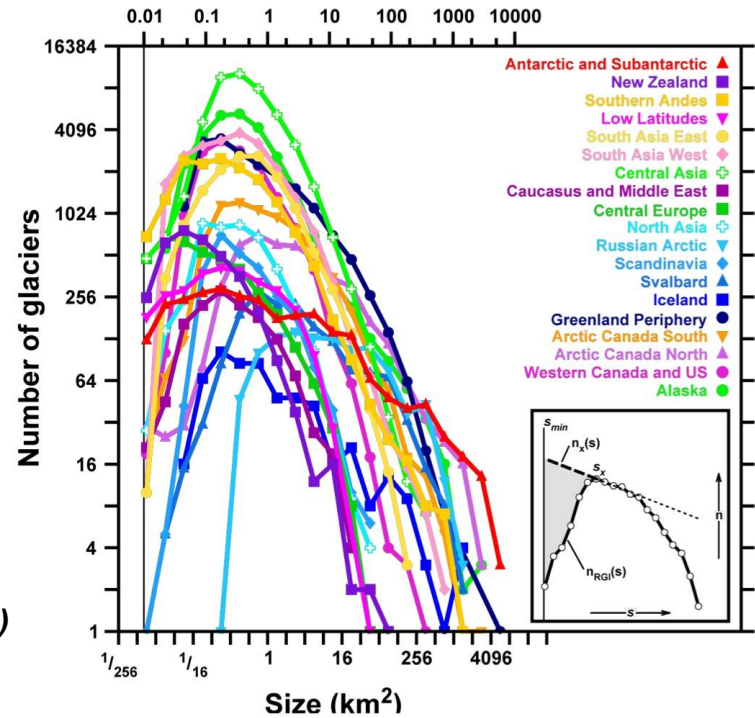
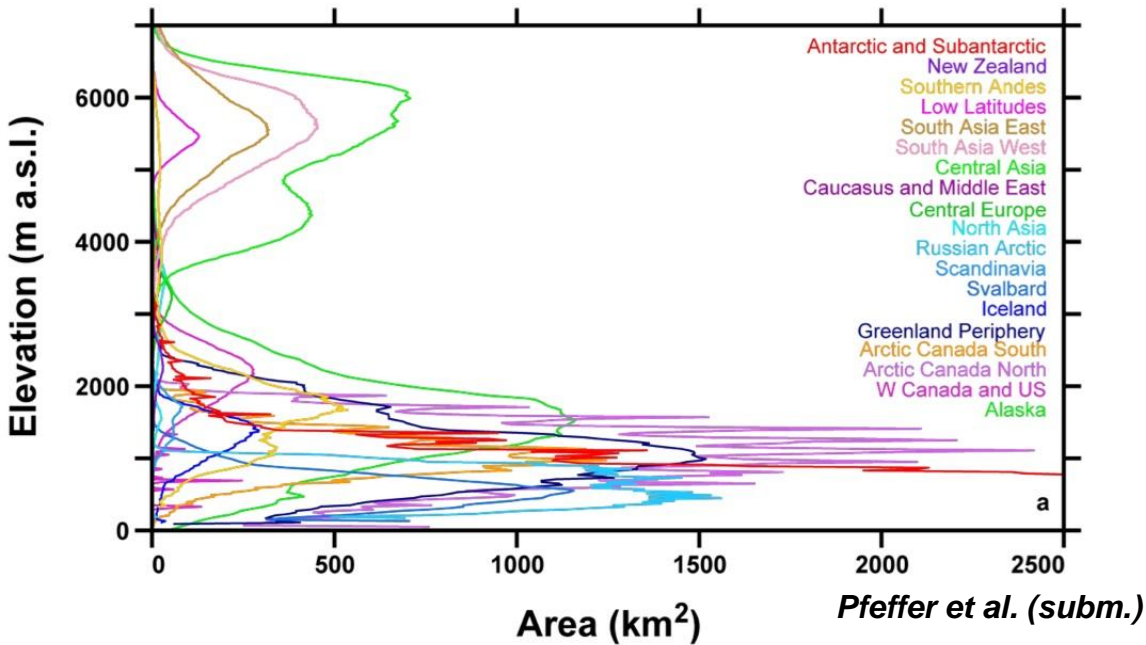


Region	n	S (km ²)	V (km ³)	\bar{h} (m)	SLE (mm)
Alaska	22,916	89,901	20,402 ± 1,501	226	50.7 ± 3.7
Antarctic and Subantarctic	3,318	133,173	37,517 ± 8,402	281	93.1 ± 20.9
Arctic Canada North	3,205	105,139	34,399 ± 4,699	327	85.4 ± 11.7
Arctic Canada South	6,679	40,893	9,814 ± 1,115	240	24.4 ± 2.8
Caucasus and Middle East	1,335	1,121	61 ± 6	55	0.2 ± 0.0
Central Asia	30,131	64,448	5,026 ± 503	77	12.5 ± 1.2
Central Europe	3,888	2,060	117 ± 10	56	0.3 ± 0.0
Greenland Periphery	13,860	87,765	19,042 ± 2,655	216	47.3 ± 6.6
Iceland	289	11,055	4,441 ± 370	401	11.0 ± 0.9
Low Latitudes	4,979	4,074	144 ± 16	35	0.4 ± 0.0
New Zealand	3,002	1,160	70 ± 5	60	0.2 ± 0.0
North Asia	3,455	2,816	140 ± 15	49	0.3 ± 0.0
Russian Arctic	353	51,665	16,839 ± 2,205	325	41.8 ± 5.5
Scandinavia	1,795	2,846	256 ± 19	90	0.6 ± 0.0
South Asia East	13,615	21,699	1,312 ± 119	60	3.3 ± 0.3
South Asia West	22,563	33,961	3,241 ± 287	95	8.0 ± 0.7
Southern Andes	19,089	32,521	6,674 ± 507	205	16.6 ± 1.3
Svalbard	2,058	33,932	9,685 ± 922	285	24.0 ± 2.3
Western Canada and USA	14,516	14,615	1,025 ± 84	70	2.5 ± 0.2
Total	171,046	734,856	170,214 ± 20,688	231	422.6 ± 57.1

Pfeffer et al. (subm.)

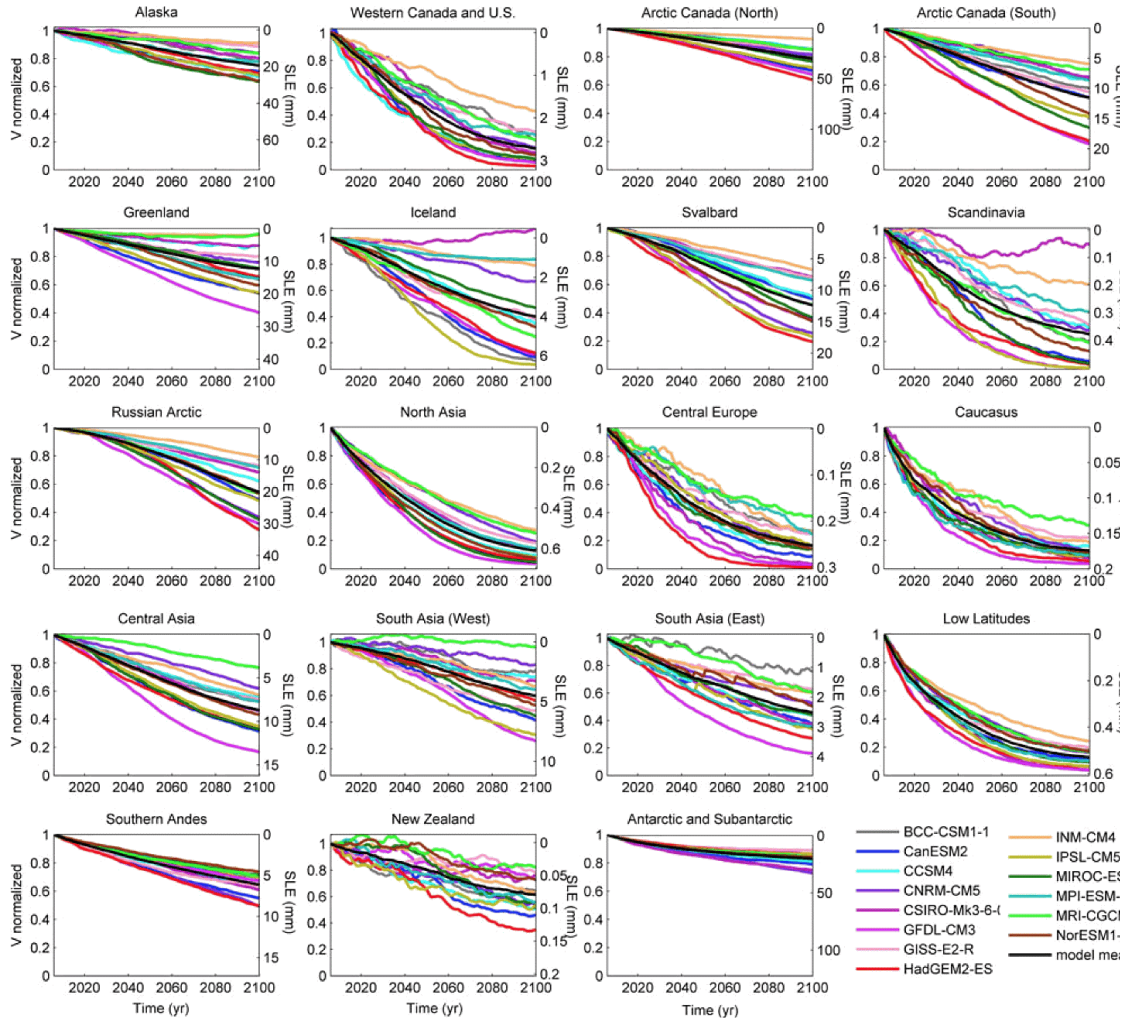
Huss and Farinotti (2012)

Characteristics of the RGI



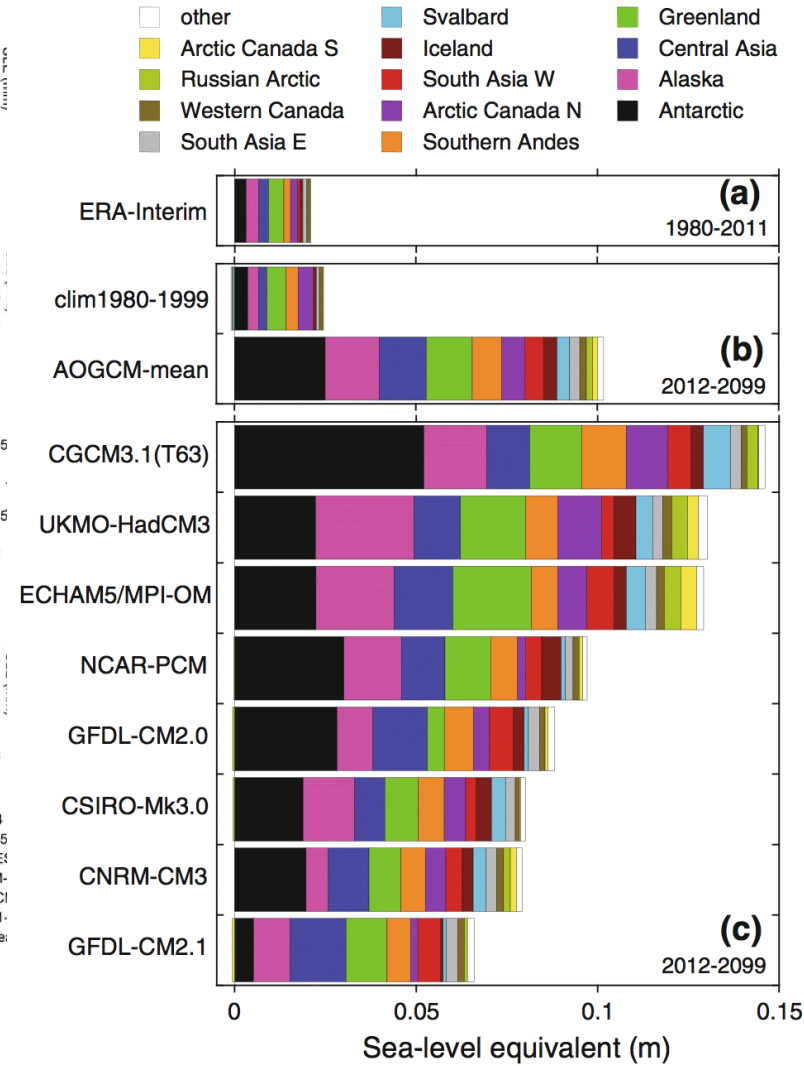
Applications of the RGI

Transient evolution of global glacier volumes



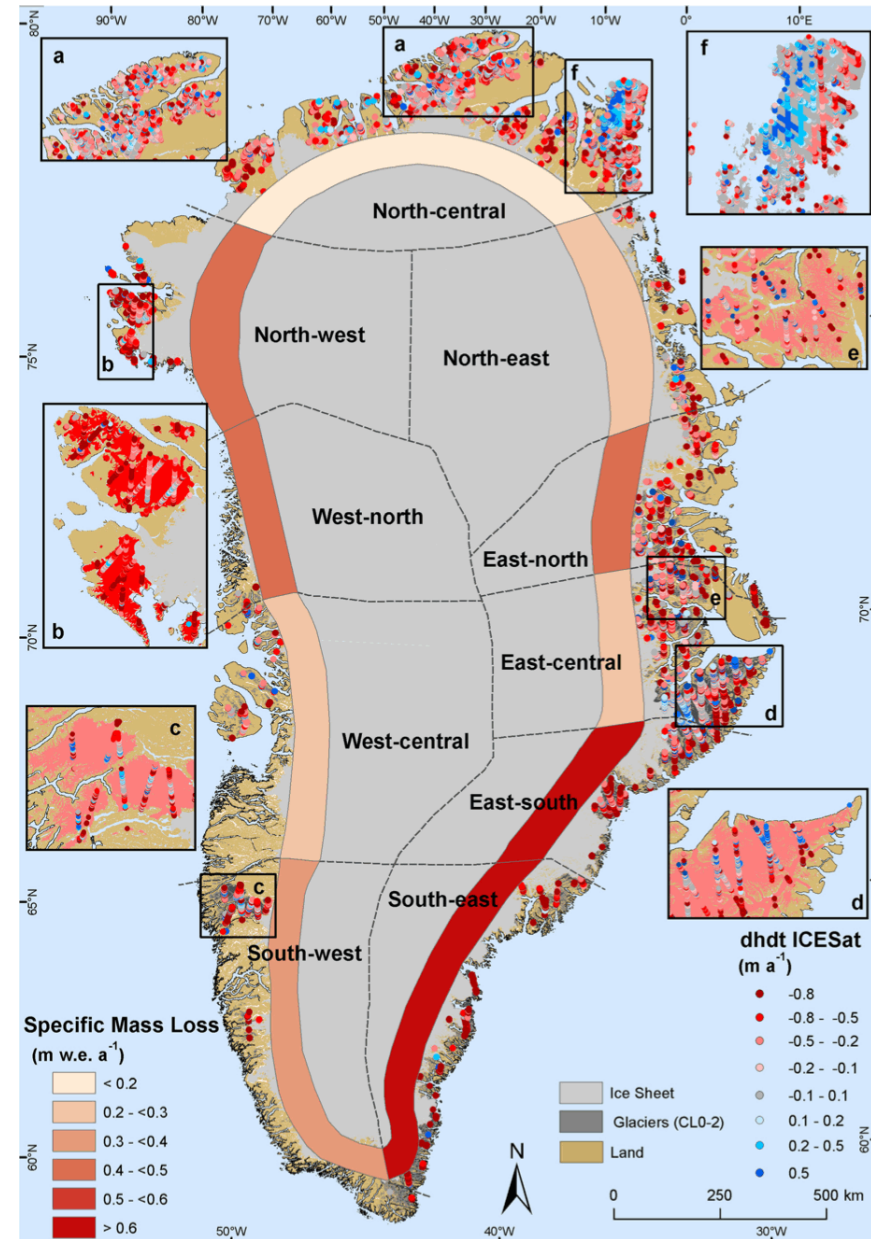
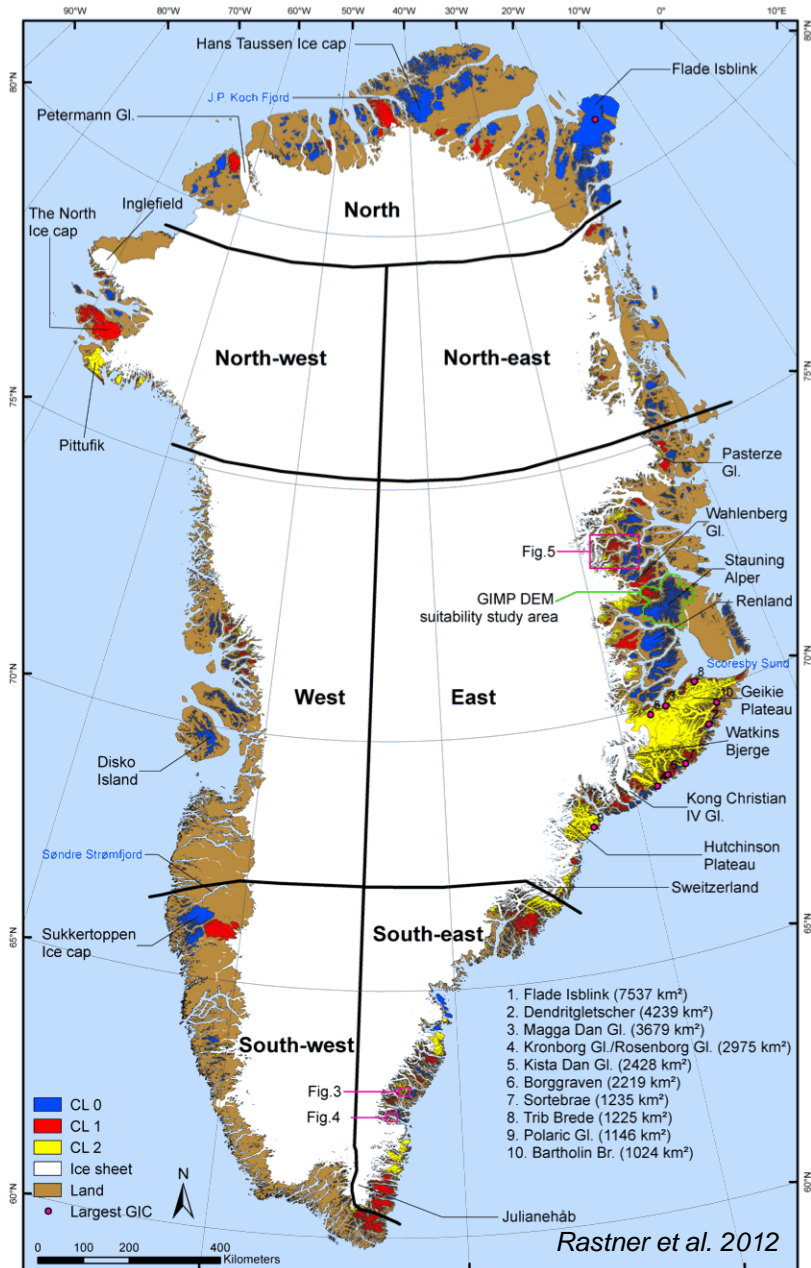
Radic et al. (2013)

Future sea-level rise contribution

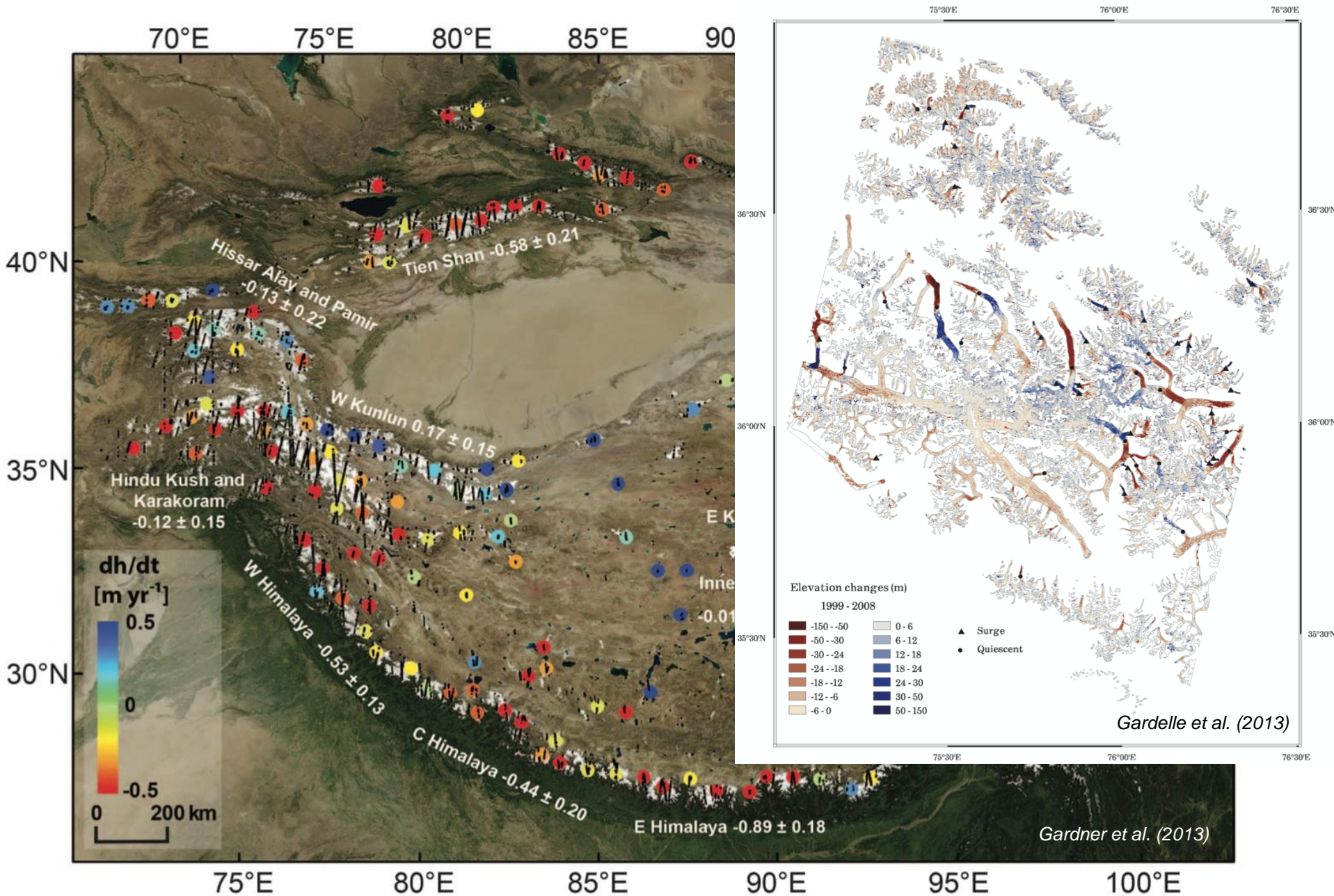


Giesen and Oerlemans (2013)

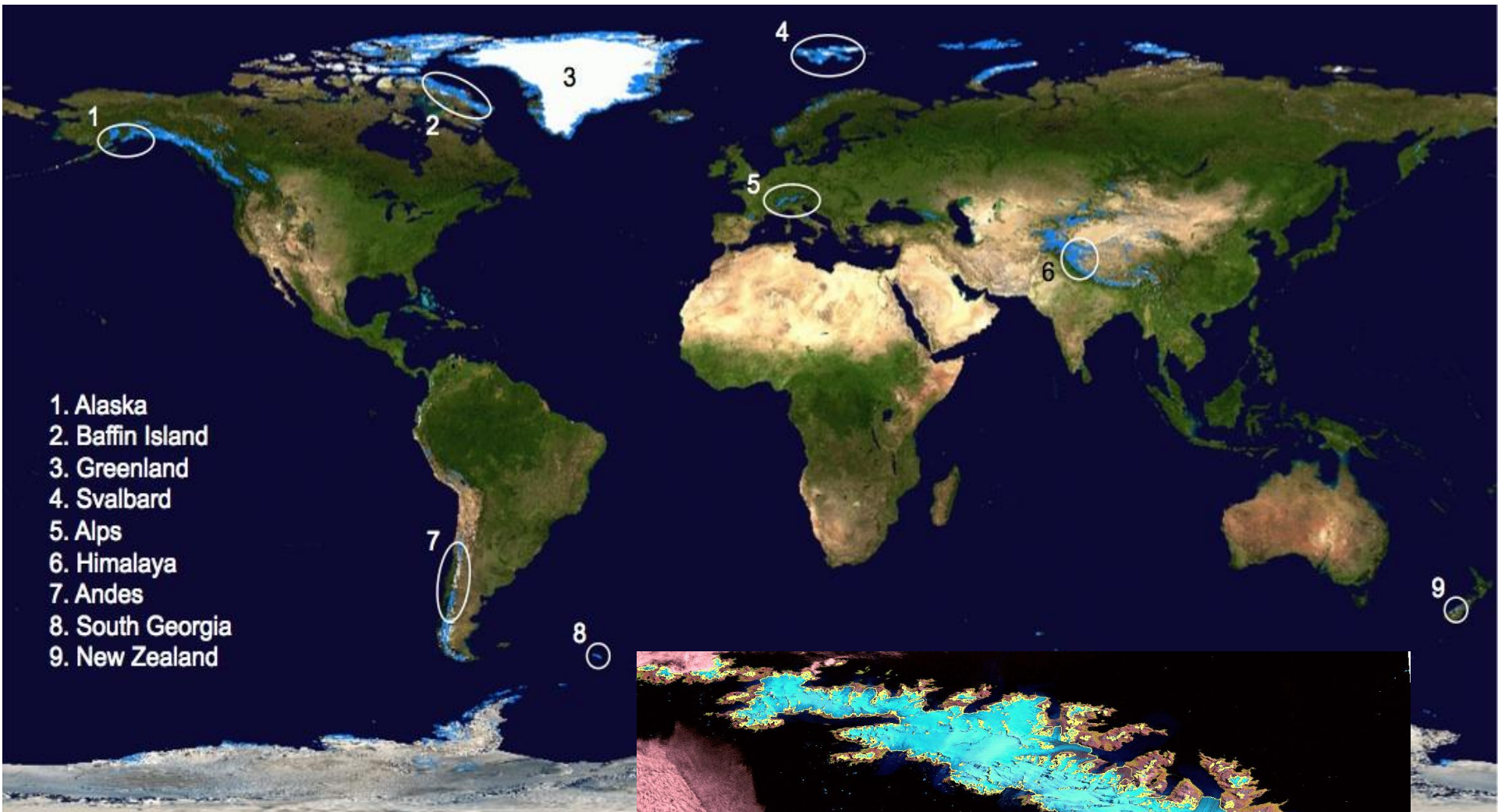
The Greenland inventory and mass changes



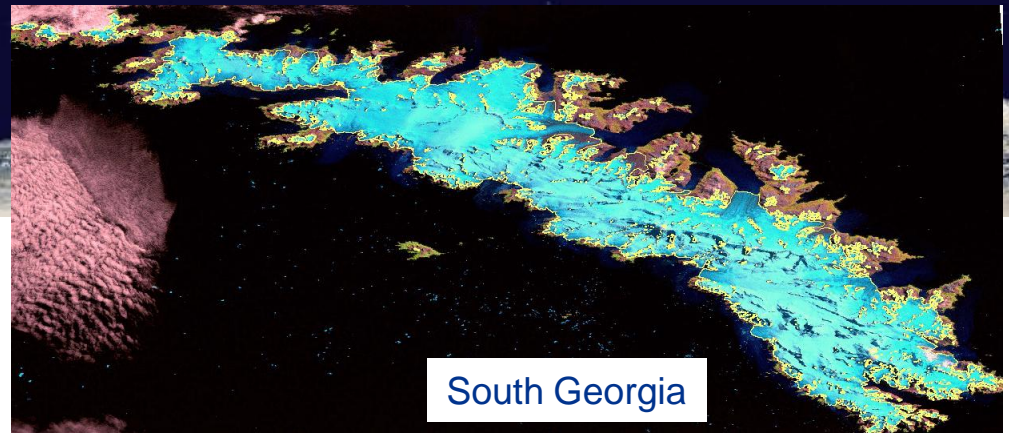
Changes in High Mountain Asia



Contributions of Glaciers_cci to the RGI

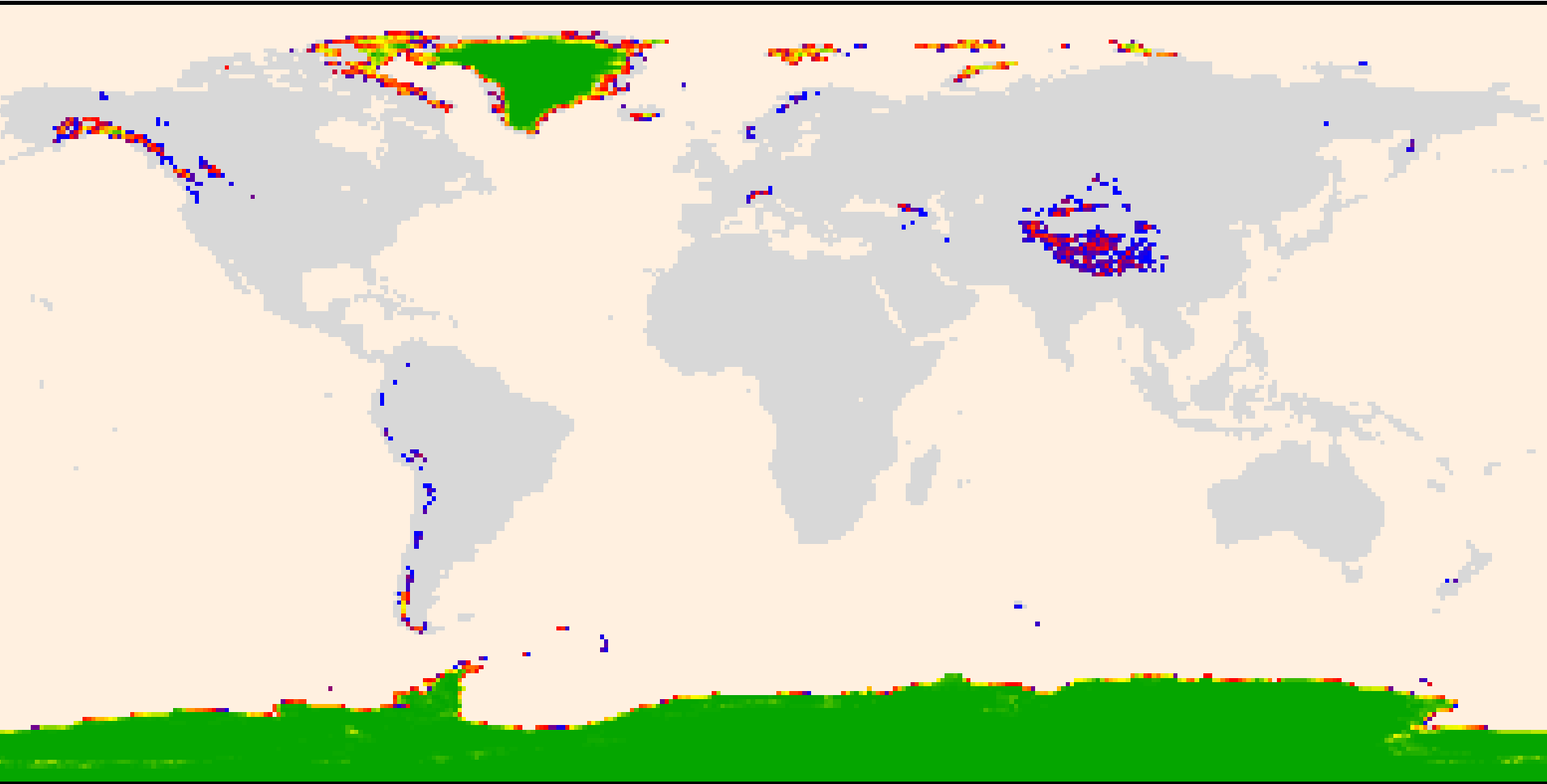


1. Alaska
2. Baffin Island
3. Greenland
4. Svalbard
5. Alps
6. Himalaya
7. Andes
8. South Georgia
9. New Zealand



South Georgia

GGHydro 1 x 1 deg grid by G. Cogley



GLAC

