

Concept note for Interdisciplinary Master thesis, Geogr. Institute, Univ Zurich

Analysis of historical glacier photographs (~last 40 years) from Greenland:
reconstruction of glacier changes and long-term context

Background:

The Museum Cerny in Bern – a unique worldwide collection of arctic art (<https://mcca.ch/>) – contains a legacy of photographs from Greenland, which have not yet been scientifically analysed, especially for glacier research and reconstruction. The photos were taken by Urs Stoller, who worked as a helicopter pilot in Greenland for decades, from 1974 to 2010 in the entire coastal area of Greenland. This also includes 16 GEUS summer expeditions, which enabled him to document many less accessible areas.

The entire photo collection comprises around 3000 images, including around 100 glacier photos, some of which can be viewed at: <https://db.museumcerny.ch/index.php?form-inuit-search=stoller&form-inuit-group=objects>



Elephant Glacier



Southwest Coast



Northwest Coast

Content for the Master's thesis:

- Geolocalisation of glacier photos (digitisation of photos) and georeferencing
- Analysing the photos using remote sensing methods (e.g. monoplottting tool)
- Embedding the determined glacier extents (surfaces?) in the temporal context: comparison with freely available DEMs over the last decades
- Discussion/outlook, possible additional deepening: embedding in longer-term (i.e., Holocene) context or comparison with glacier variability over Greenland (spatial differences? comparison with other data?)

Supervision:

- Dr Samuel Nussbaumer
- Dr Jacqueline Bannwart

with faculty representation (options):

- Prof Livia Piermattei → Analysis of historical photos
- or Prof Michael Zemp → Glacier monitoring, current glacier mass balance
- or Prof Andreas Vieli → Glacier changes in Greenland, glacier dynamics

Literature:

Huber, J.; McNabb, R. & Zemp, M.

Elevation changes of west-central Greenland glaciers from 1985 to 2012 from remote sensing
Frontiers in Earth Science, **2020**, 8, 35

Kjær, K. H.; Bjørk, A. A.; Kjeldsen, K. K.; Hansen, E. S.; Andresen, C. S.; Siggaard-Andersen, M.-L.; Khan, S. A.; Søndergaard, A. S.; Colgan, W.; Schomacker, A.; Woodroffe, S.; Funder, S.; Rouillard, A.; Jensen, J. F. & Larsen, N. K.

Glacier response to the Little Ice Age during the Neoglacial cooling in Greenland
Earth-Science Reviews, **2022**, 227, 103984

von Albedyll, L.; Machguth, H.; Nussbaumer, S. U. & Zemp, M.

Elevation changes of the Holm Land Ice Cap, northeast Greenland, from 1978 to 2012–2015, derived from high-resolution digital elevation models
Arctic, Antarctic, and Alpine Research, **2018**, 50, e1523638