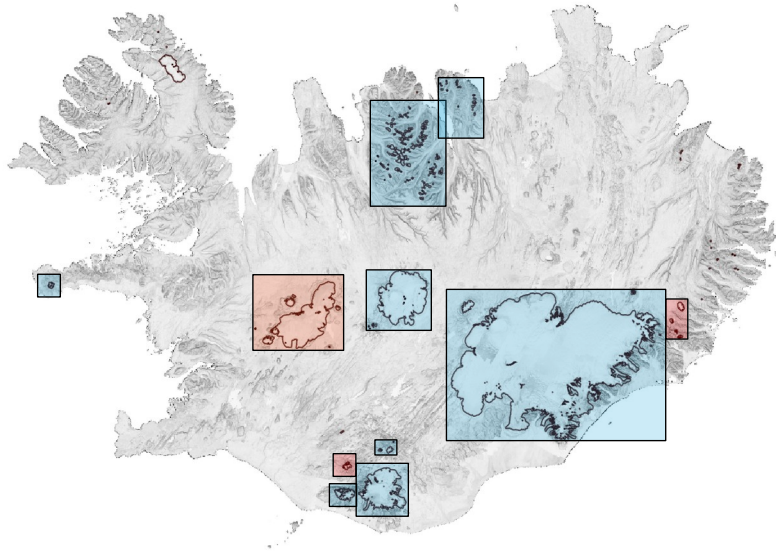# ICELINK – WP3.3 Geodetic Mass Balance in Iceland

Tómas Jóhannesson, Eyjólfur Magnússon, Joaquín M.C. Belart, Þorsteinn Þorsteinsson, Hrafnhildur Hannesdóttir

Glacier DEM database: Pléiades and lidar (Y1 Icelink)

Goal: To create a complete database for visualization and download of the DEMs from lidar (2008-2013) and Pléiades (2013-2025), with a DOI, similar to the dataverse of GEUS (https://www.dataverse.geus.dk/)
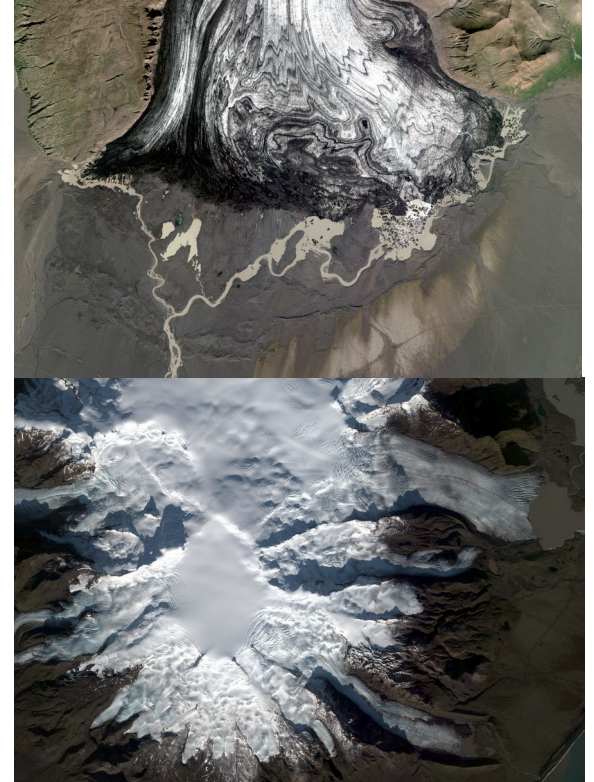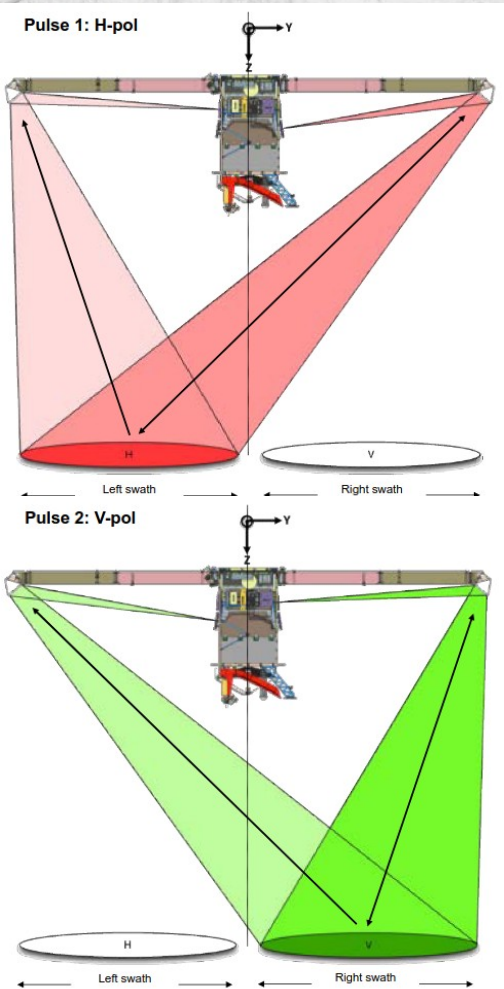

Glaciers mapped 2021-2023:

Hofsjökull, Vatnajökull, Langjöukll, Mýrdalsjökull, Eyjafjallajökull, Eiríksjökull, Þórisjökull, Hrútfell, Snæfellsjökull, Torfajökull, Tröllaskagi, Flateyjarskagi, Snæfellsjökull
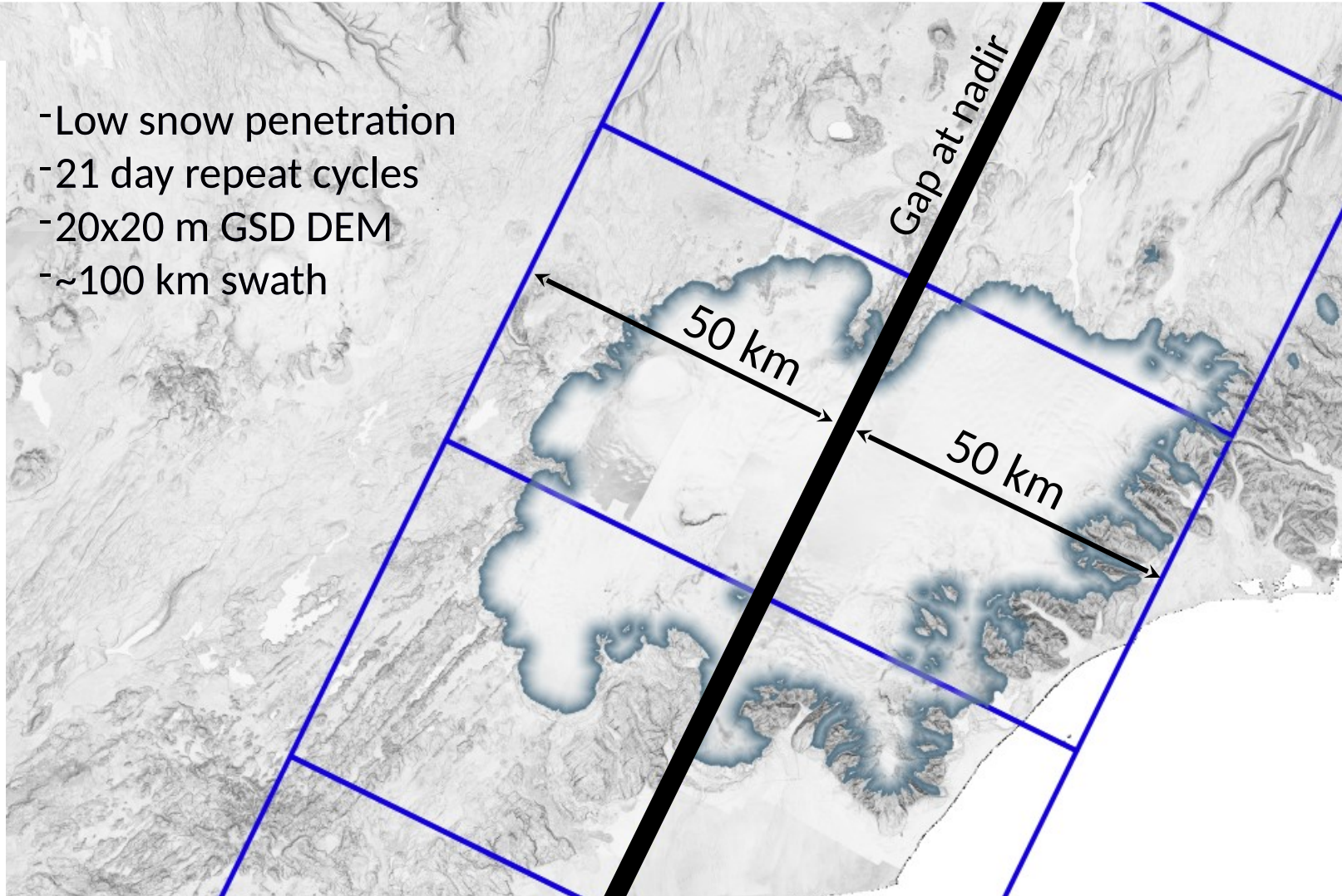
Finish tasking & re-survey (summer 2025):
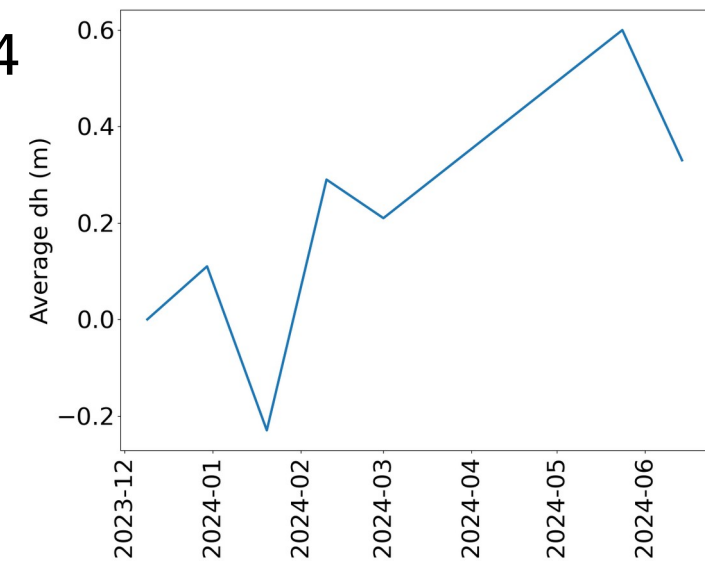
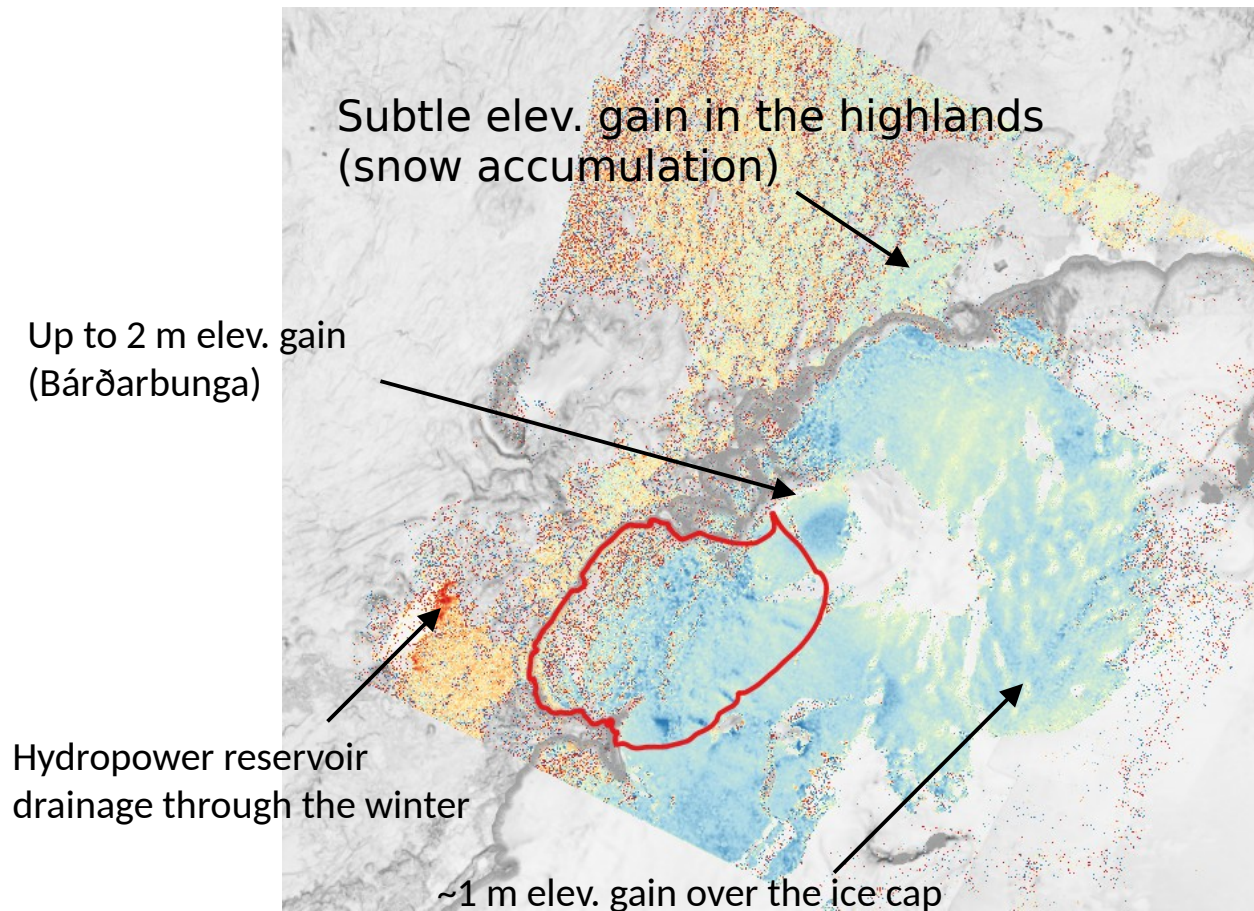Langjökull, Tindfjallajökull, Þrándarjökull, Hofsjökull Eystri

Surface Water and Ocean Topography (SWOT)

- Low snow penetration
- 21 day repeat cycles
- 20x20 m GSD DEM
- ~100 km swath

Gap at nadir

50 km

50 km

Glacier mapping using SWOT: Winter 2023-2024

Subtle elev. gain in the highlands (snow accumulation)

Up to 2 m elev. gain (Bárðarbunga)

Hydropower reservoir drainage through the winter

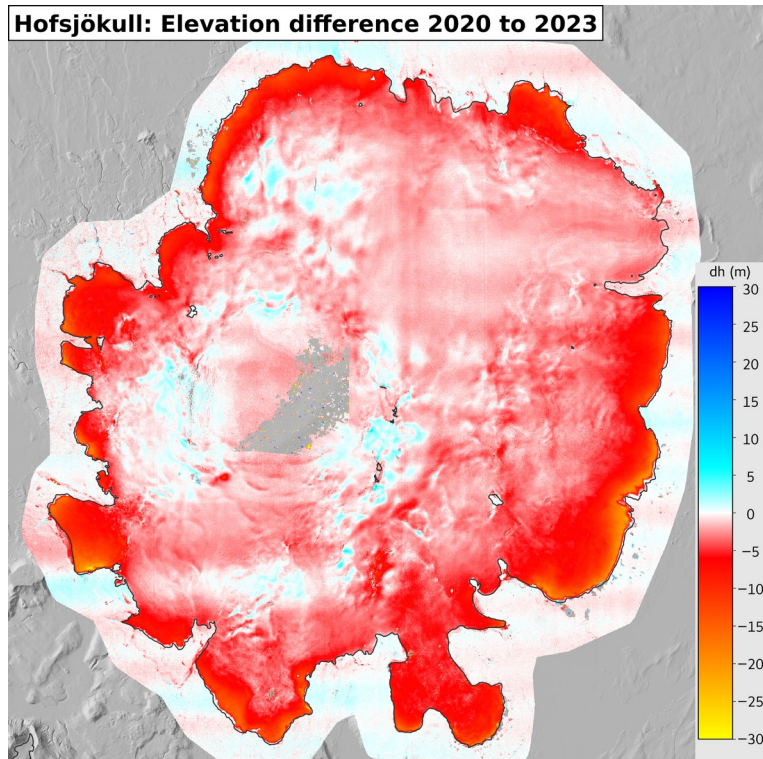~1 m elev. gain over the ice cap

dh (m)

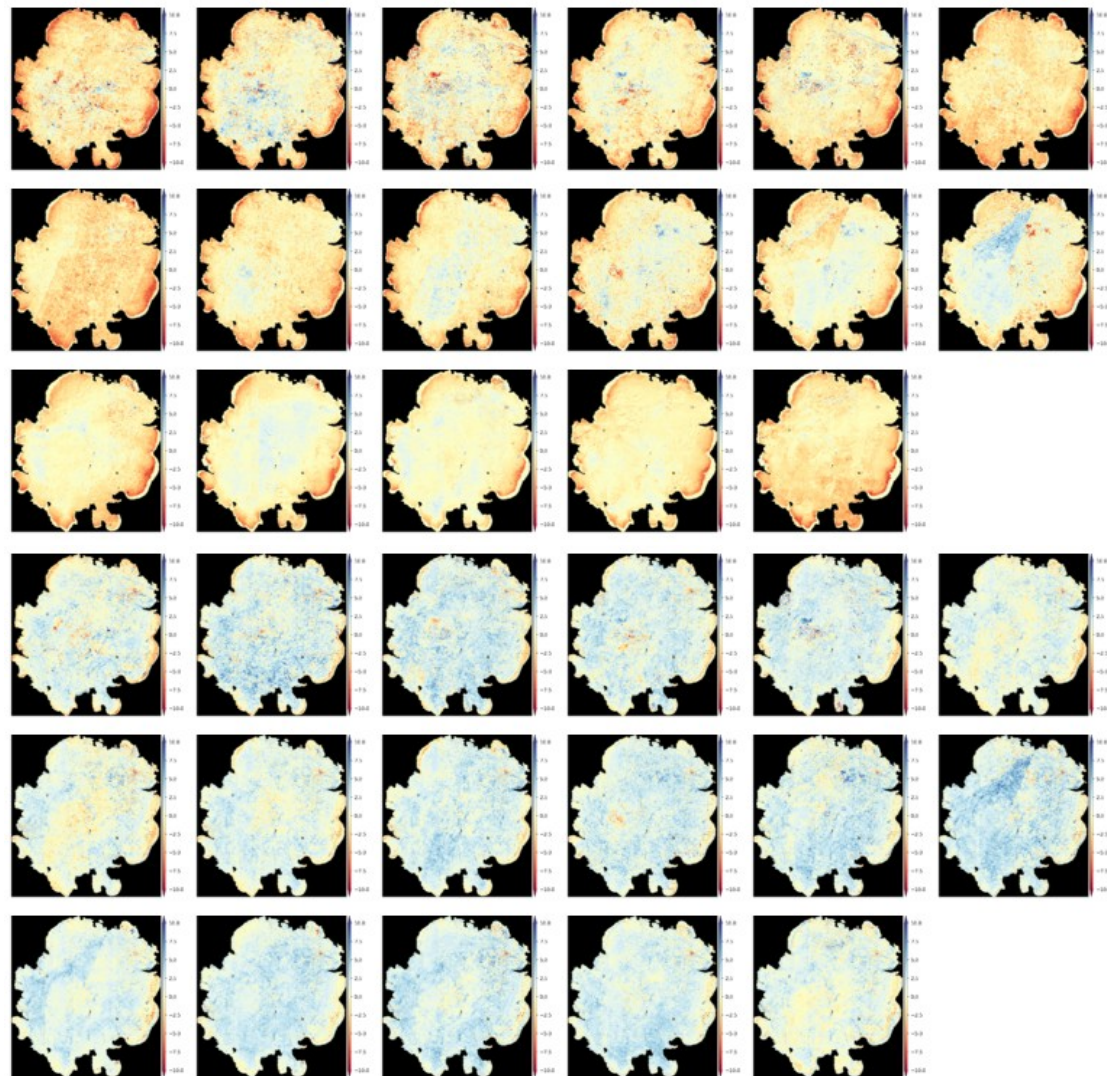# Geodetic mass balance analysis: Gausian Process (GP) Regression

Hofsjökull: Elevation difference 2020 to 2023

dh (m)

Example of "traditional" DEM-differencing: Pléiades 2020 to 2023

1 Oct – 1 Oct

1 Oct – 1 Jun

GP-derived monthly elevation changes using ArcticDEM, lidar and Pléiades