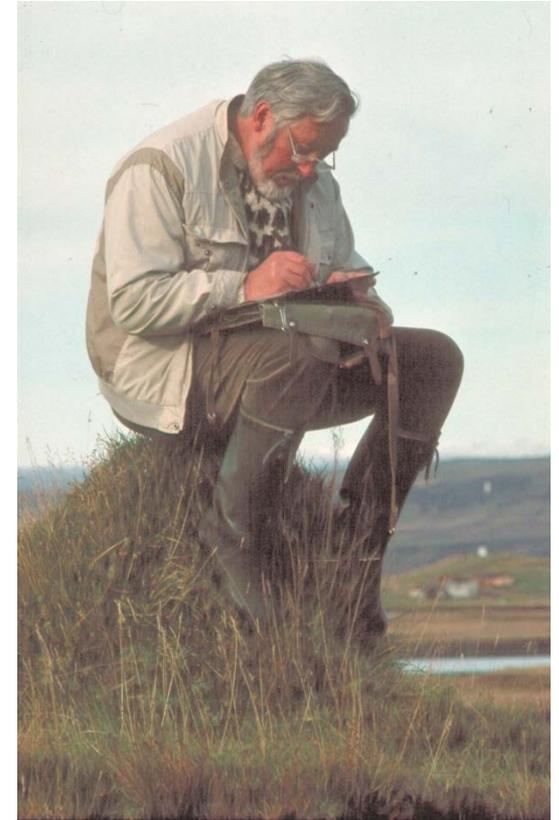


Digital Vegetation Map of the Central Highlands of Iceland

Guðmundur Guðjónsson
Sigurður K. Guðjohnsen
Rannveig Thoroddsen



Summary

- Vegetation mapping in Iceland
- Facts about the Digital Map
- Vegetation map of the Central Highlands
- Examples of the plant communities and their distribution in the Central Highlands
- Examples of statistical results
- Presentation of the data
- Status of vegetation mapping and development of methods
- Conclusions



Vegetation mapping in Iceland



Purpose

- Originally: To calculate the sheep carrying capacity of the Central Highlands vegetation.



Vegetation classification

- Based mainly on growth forms and dominants and characteristic vascular plants species in the upper layers of the vegetation.
- Less emphasis on mosses and lichens







Vegetation classification

- The vegetation is classified into 100 different plant communities and 14 different land types (e.g. glaciers, lakes, rivers, gravel flats, etc.).
- Vegetation cover is divided into four classes.





Facts about the digital map



Milestone

Digital vegetation map of the Central Highlands of Iceland was completed in 2014.

A milestone in vegetation mapping of Iceland, which started 1955.





Methods of digitization

The map is based on revision of earlier published and unpublished maps with the aid of new orthophotos/aerial photographs and satellite images.





Methods of digitization

- Vegetation data, both published and original field data, were redrawn and updated with newest orthophotos and SPOT 5 satellite images.
- Vegetation boundaries were adjusted and classification changed where it was obvious from the underlying imagery.
- Updates were also made with assistance of photographs and Digital Terrain Model (DTM)
- No special fieldwork was made for further corrections but updates will be made as opportunities arise



Accuracy of the digital vegetation map

- The new map is in a scale of 1:25.000
- It covers 42.700 km² or 41% of the country.
- The smallest polygons are less than 100 m²
- All together the number of mapped polygons are 117.000





Access to data

The data for the digital vegetation map of the Central Highlands of Iceland is a public domain and available online for the public and private sector.

http://atlas.lmi.is/NI_Data/

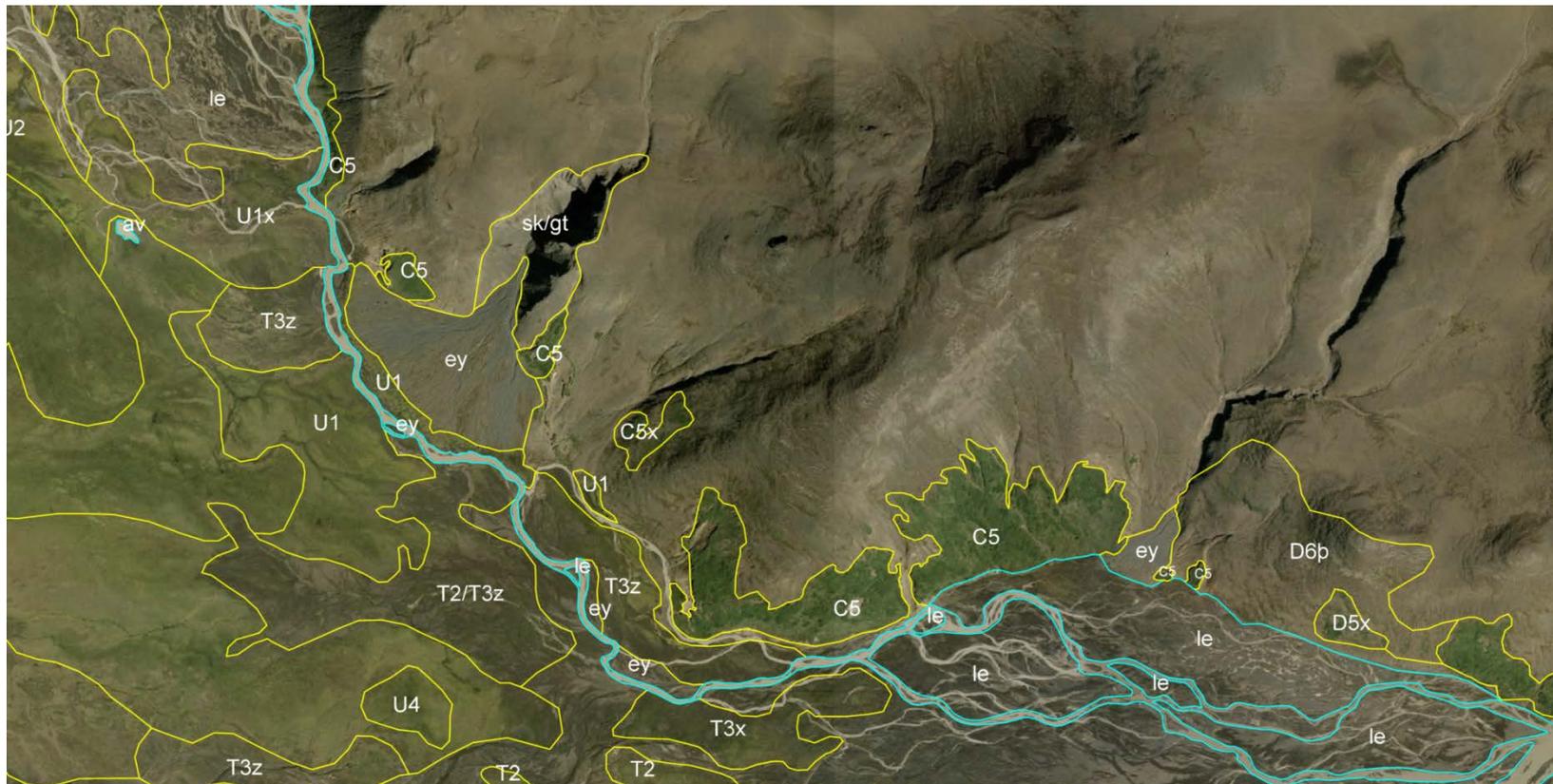




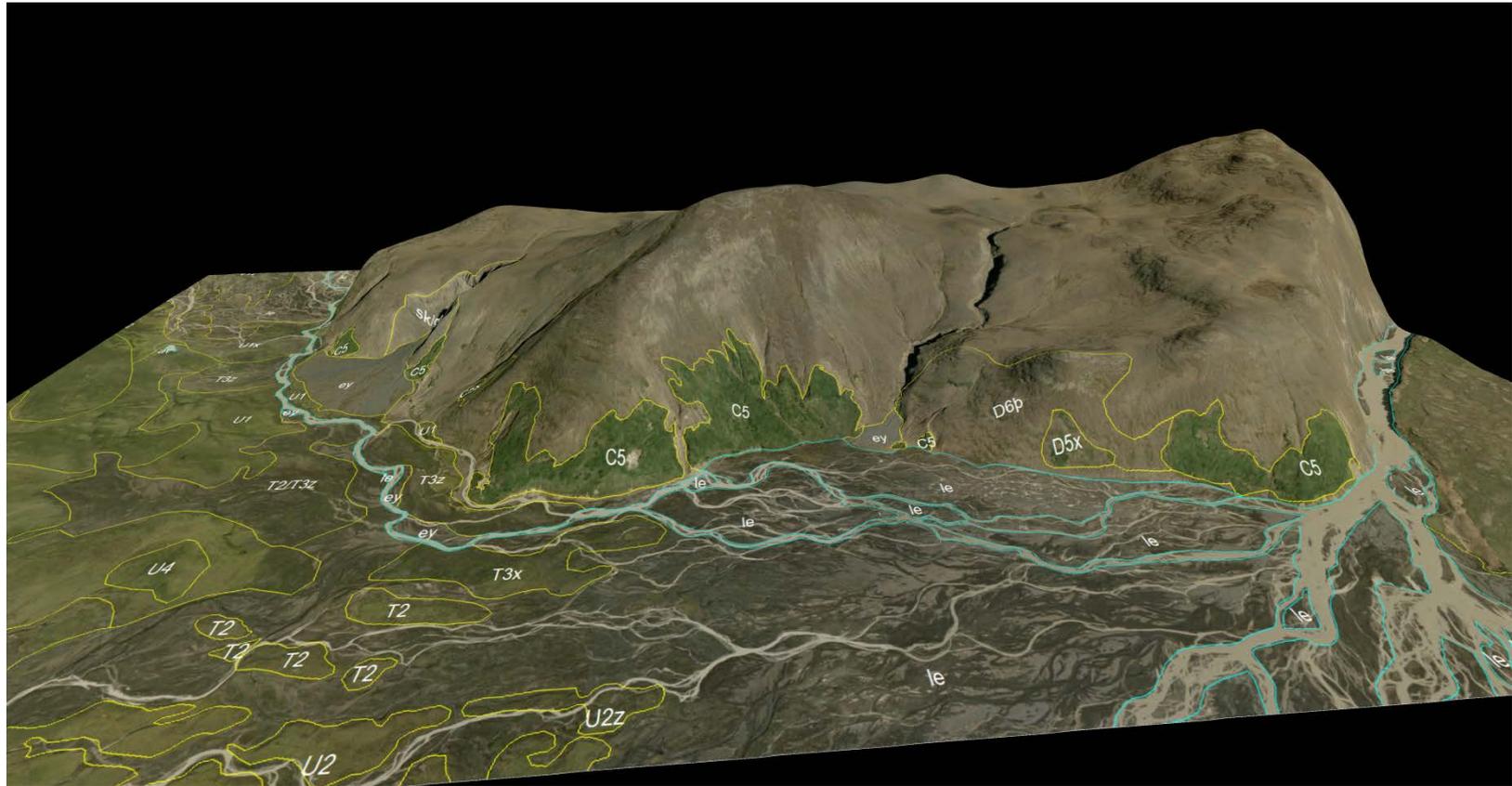
Vegetation map of the Central Highlands



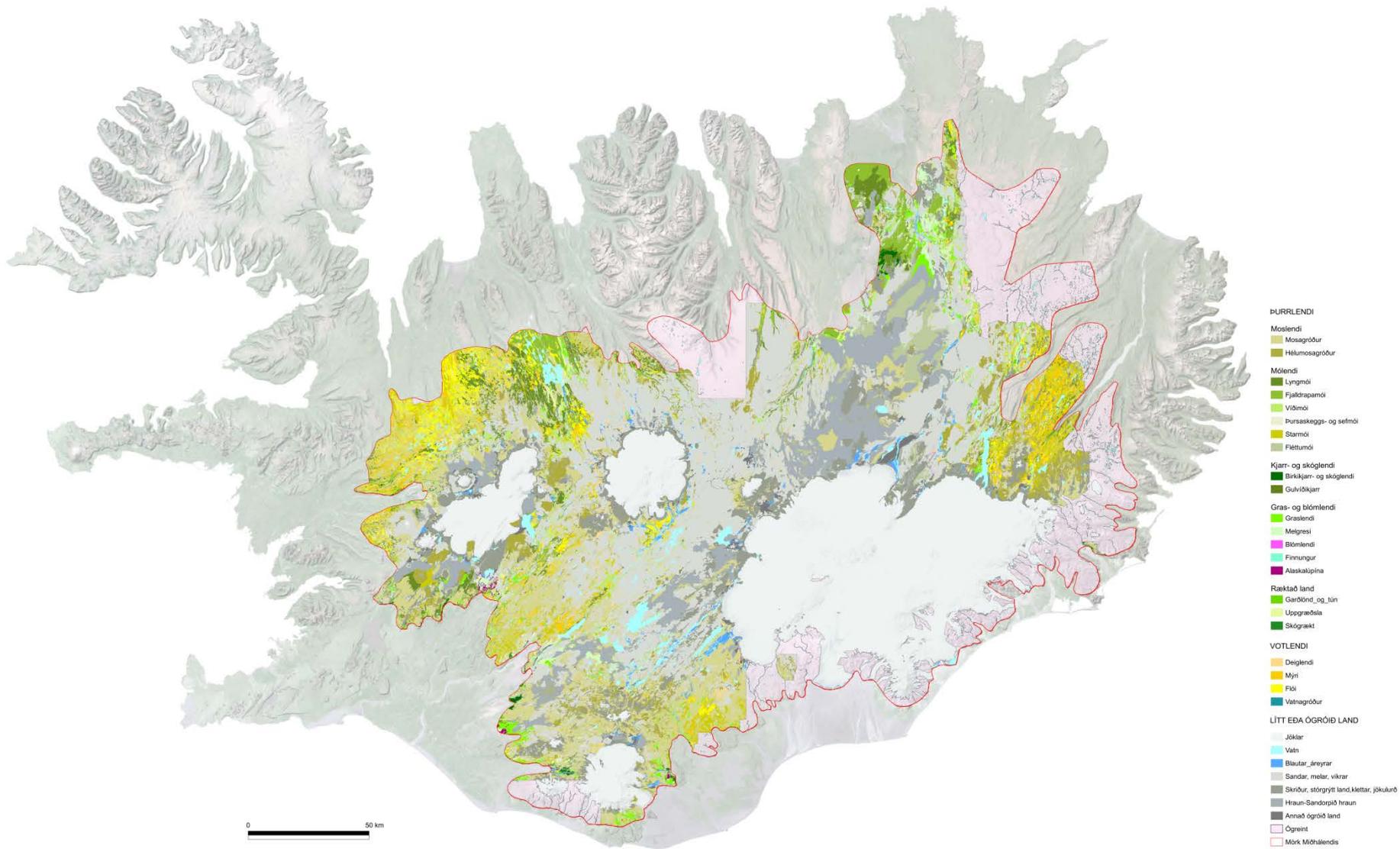
Hrefnubúðir near lake Hvítárvatn



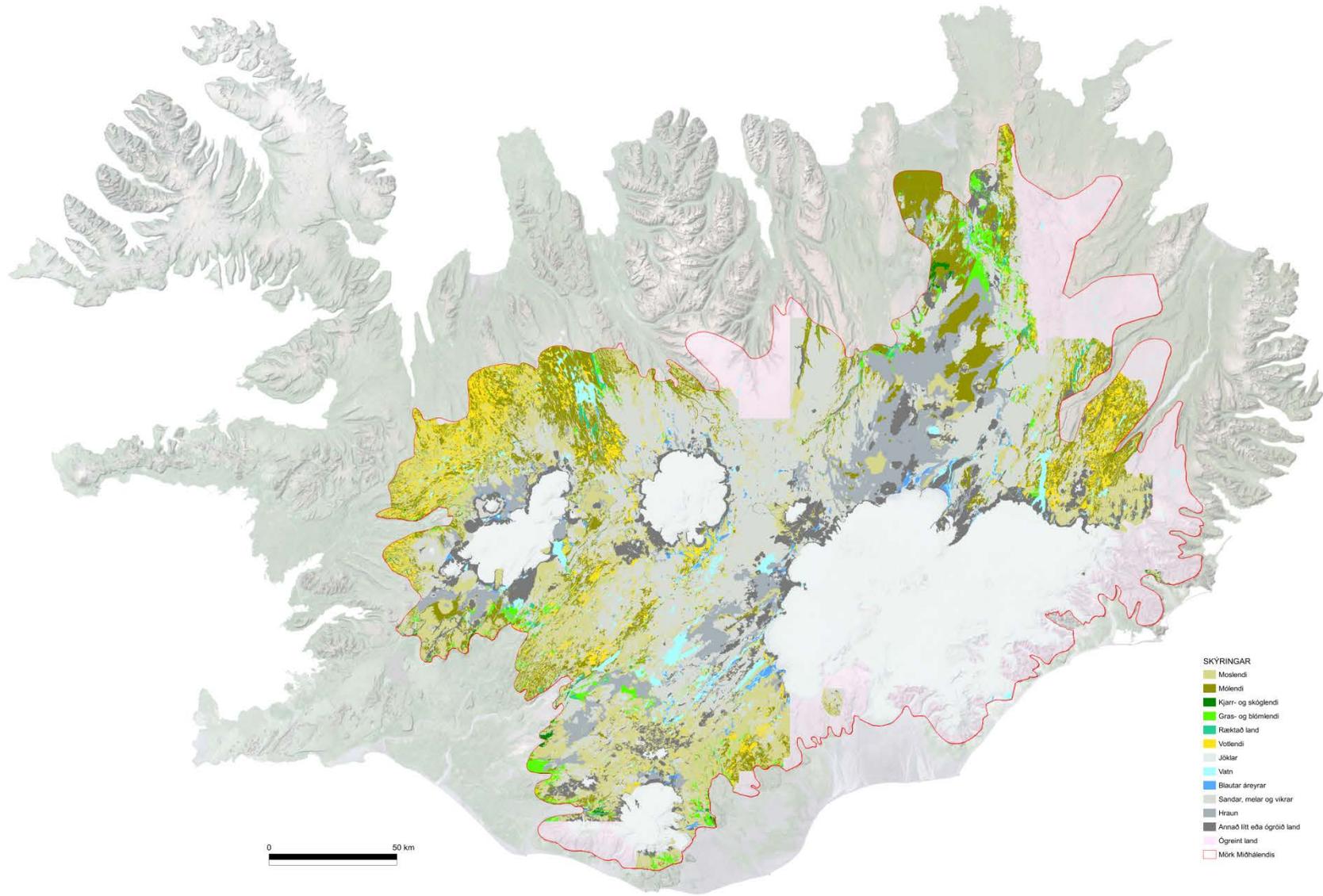
Hrefnubúðir near lake Hvítárvatn



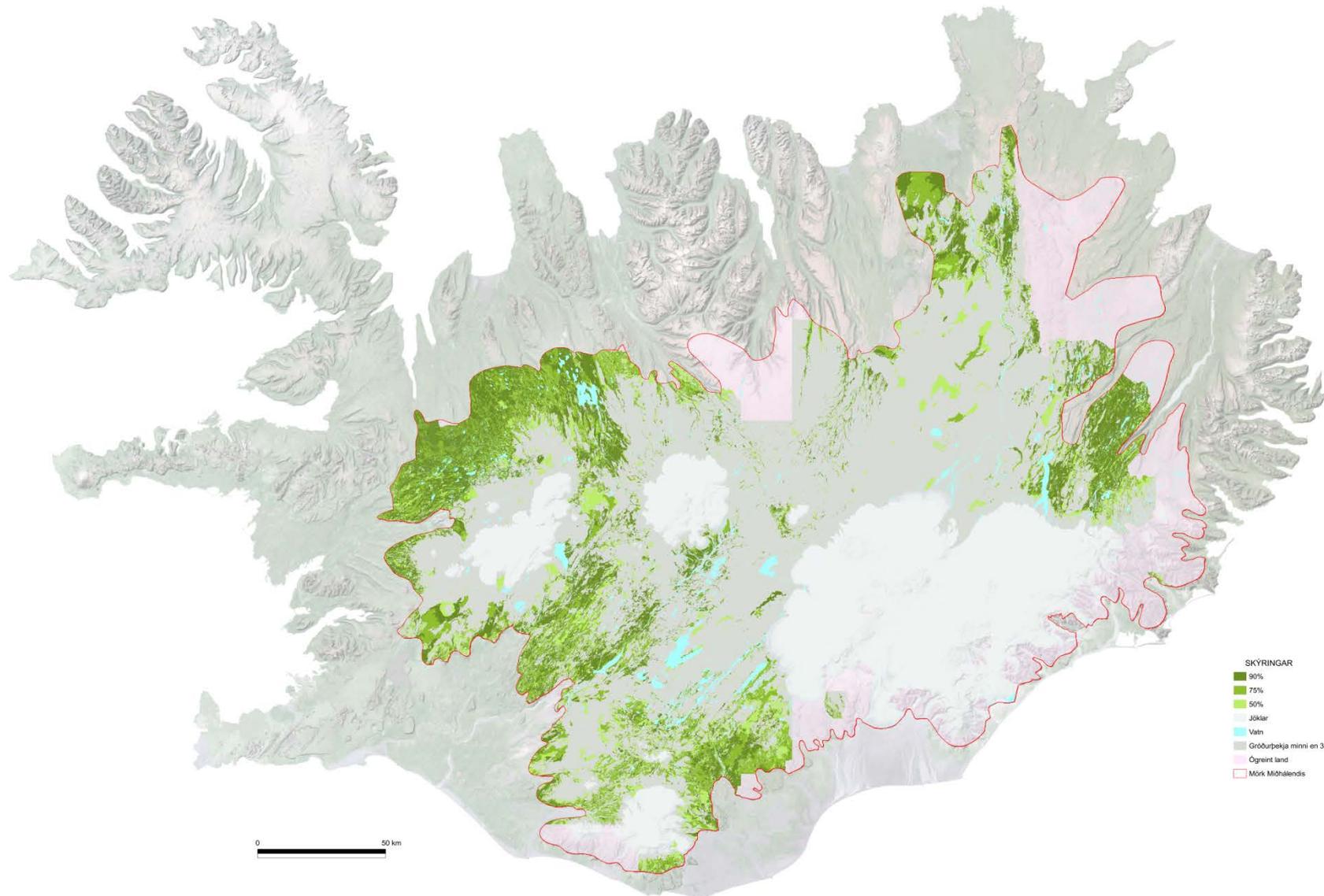
Vegetation types in the Central Highlands



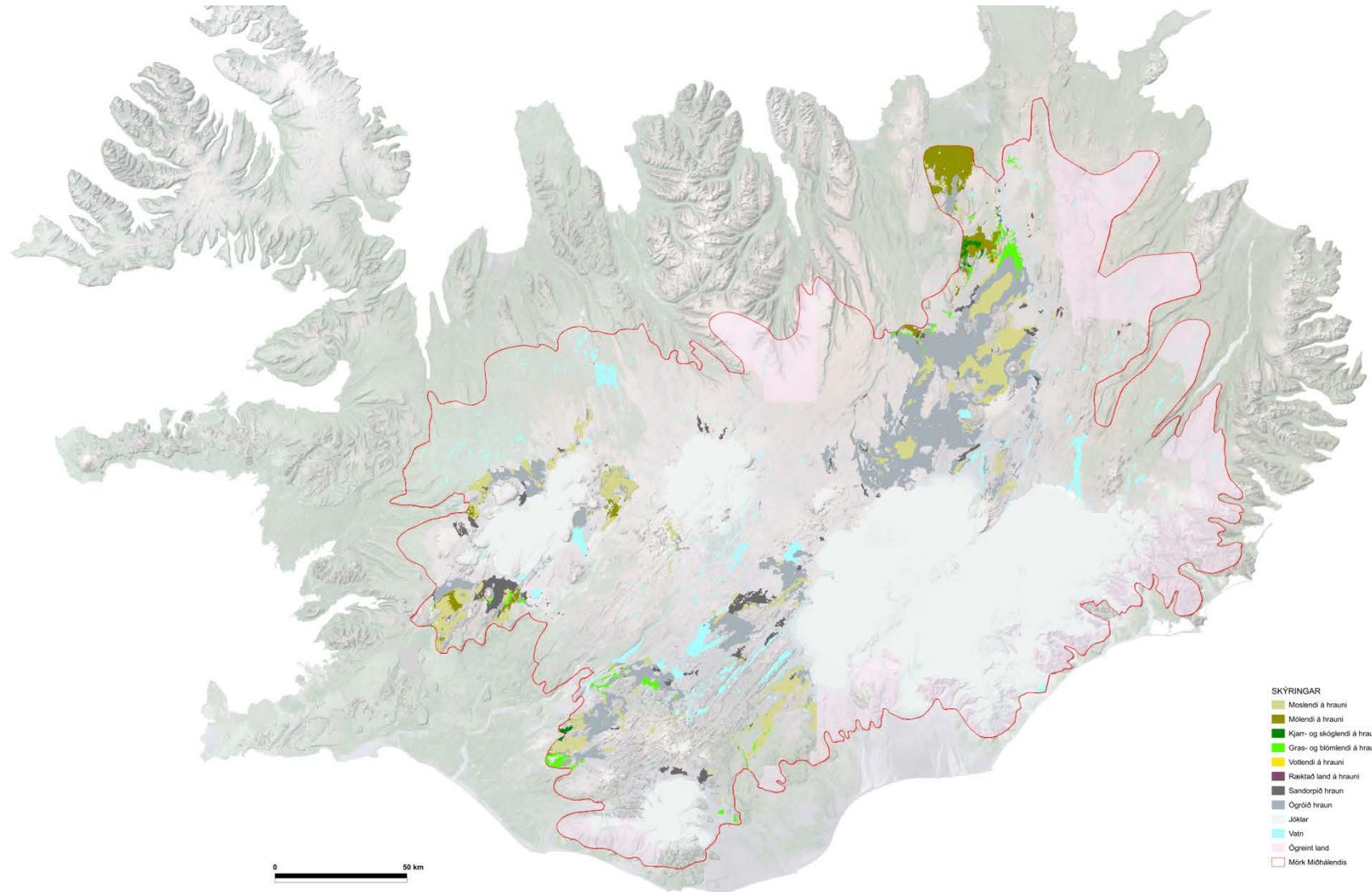
Vegetation complexes in the Central Highlands

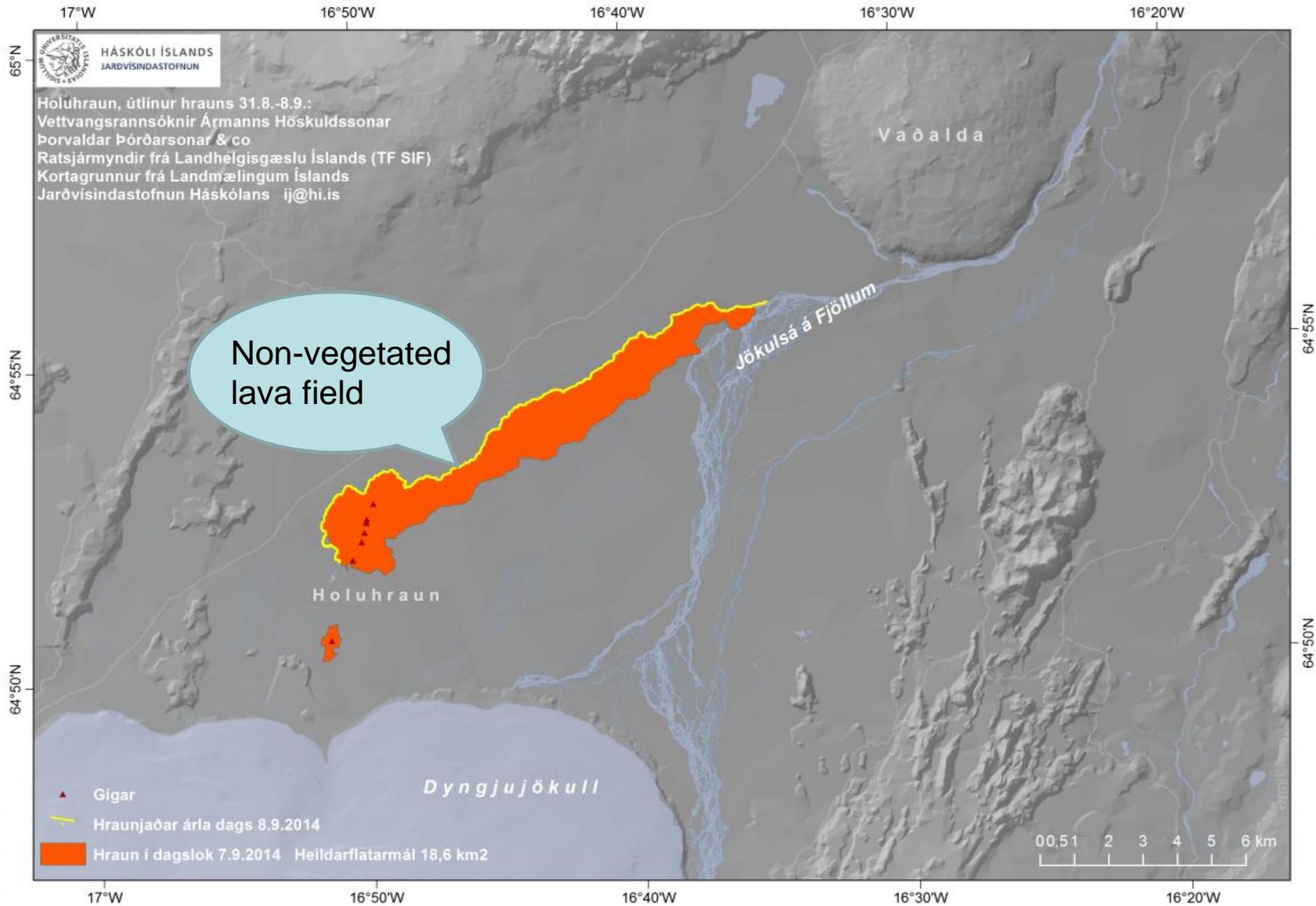


Vegetation cover in the Central Highlands



Vegetation complexes on lava fields and non-vegetated lava fields in the Central Highlands







Examples of the plant communities and their distribution in the Central Highlands





Level fens



V1 *Carex lyngbyei*



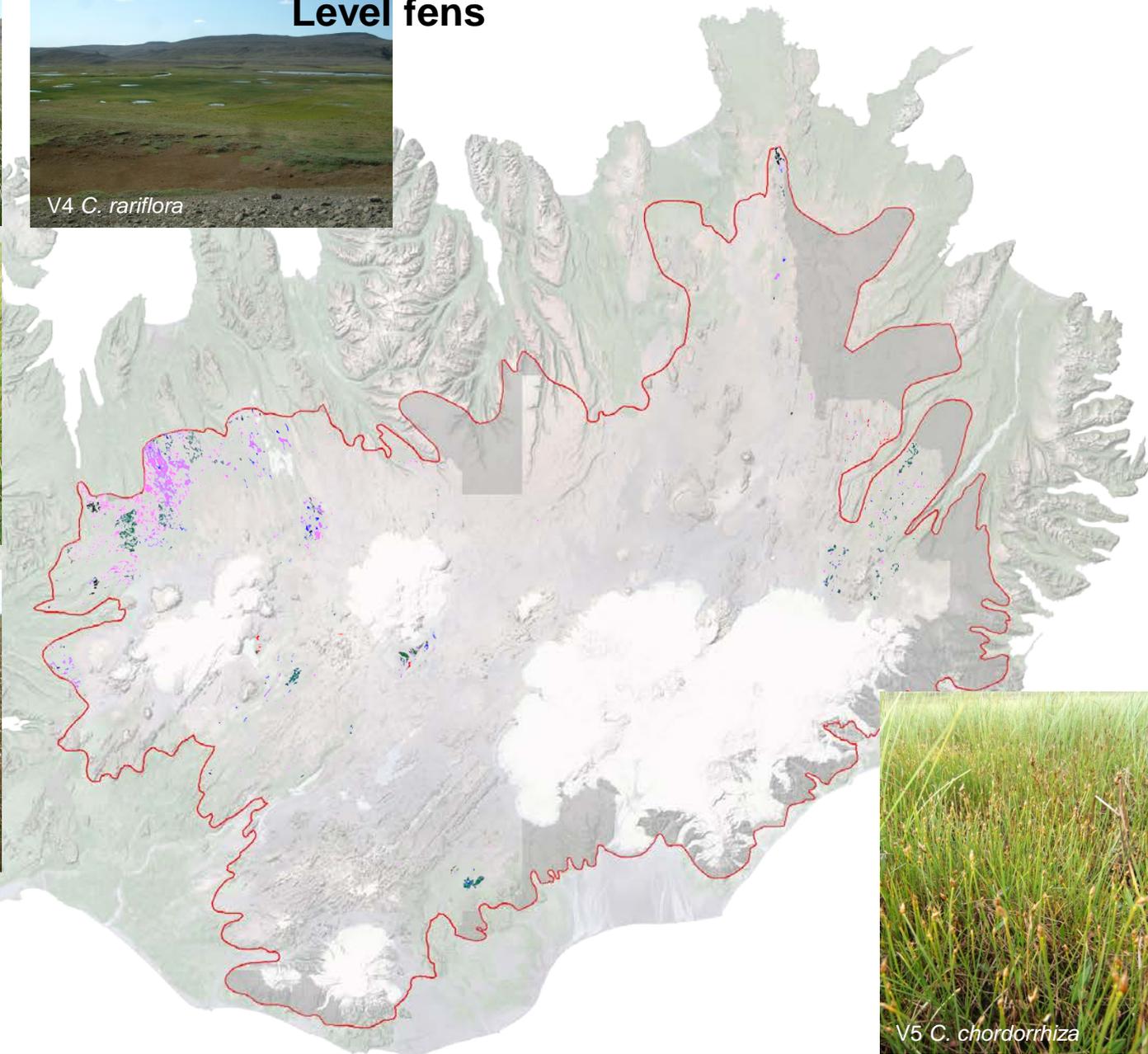
V4 *C. rariflora*



V2 *C. rostrata*



V3 *Eriophorum angustifolium*



V5 *C. chordorrhiza*



Sloping fens

U1 *Carex bigelowii* - *C. rariflora*

U5 *C. bigelowii*

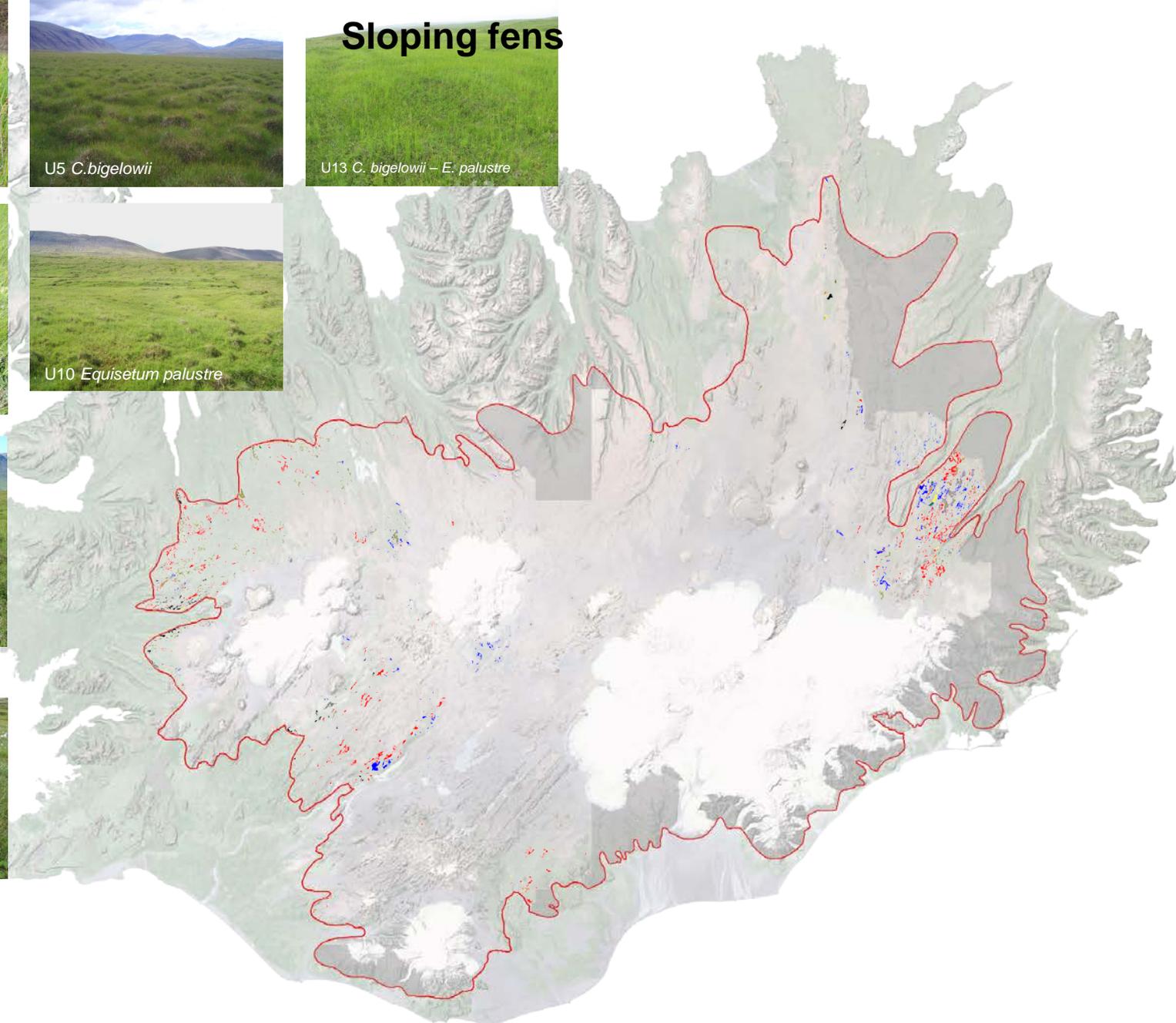
U13 *C. bigelowii* - *E. palustre*

U2 *C. bigelowii* - *Salix* spp.

U10 *Equisetum palustre*

U3 *C. bigelowii* - *Betula nana*

U4 *C. bigelowii* - *E. angustifolium*



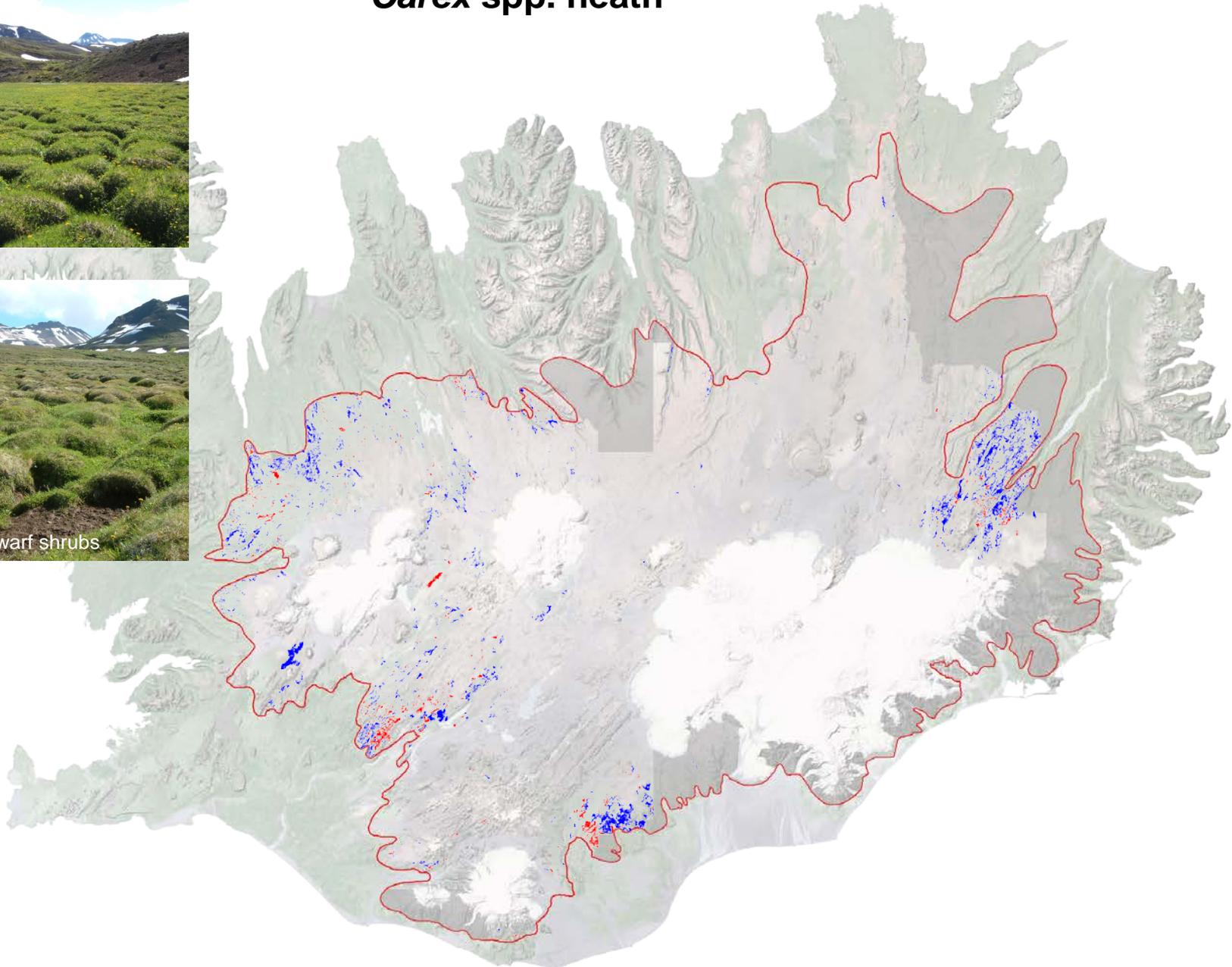
Carex spp. heath



G1 *Carex bigelowii*



G2 *C. bigelowii* – dwarf shrubs





C1 *B.nana* - *V. uliginosum* - *E. nigrum*



Betula nana heath

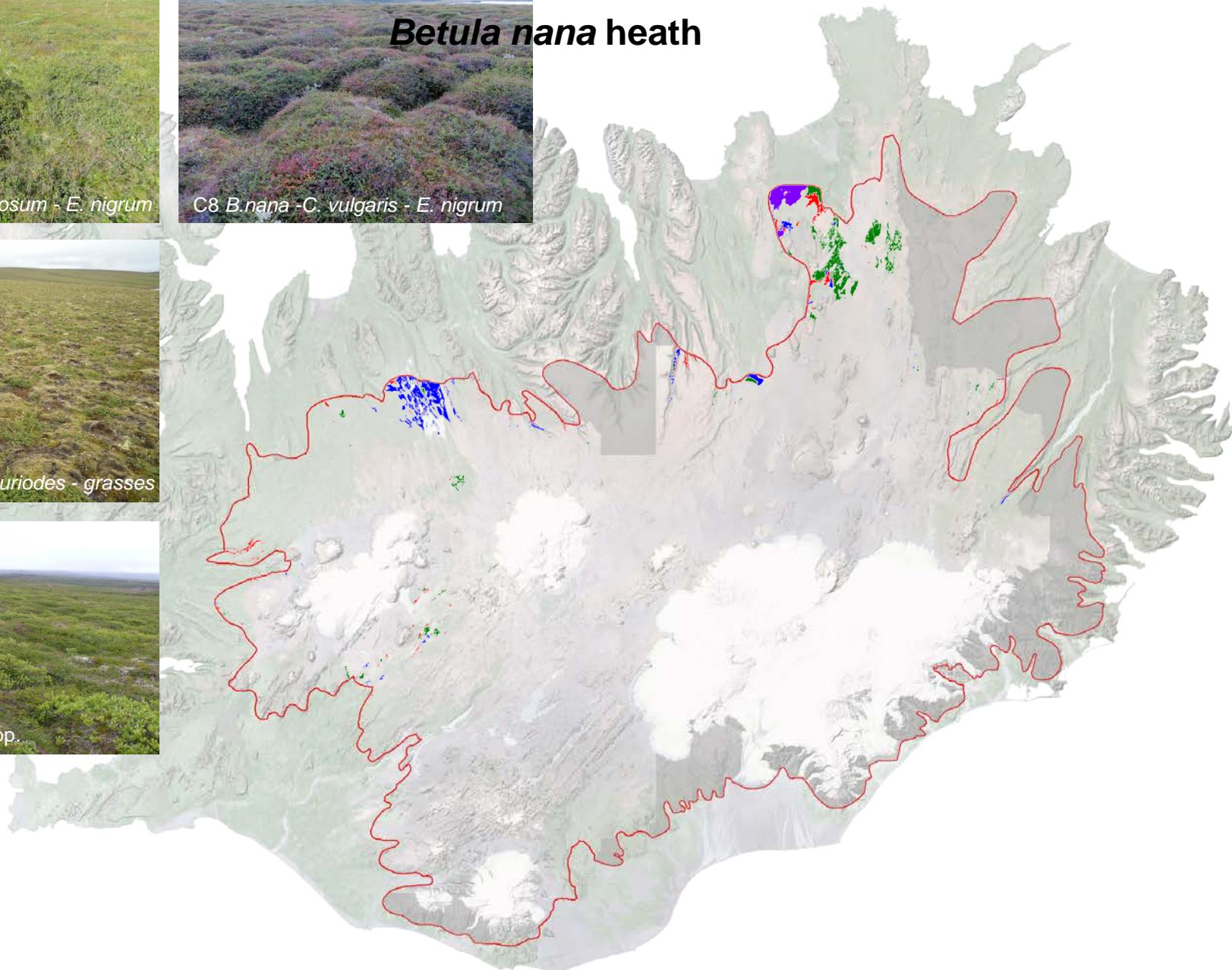
C8 *B.nana* - *C. vulgaris* - *E. nigrum*

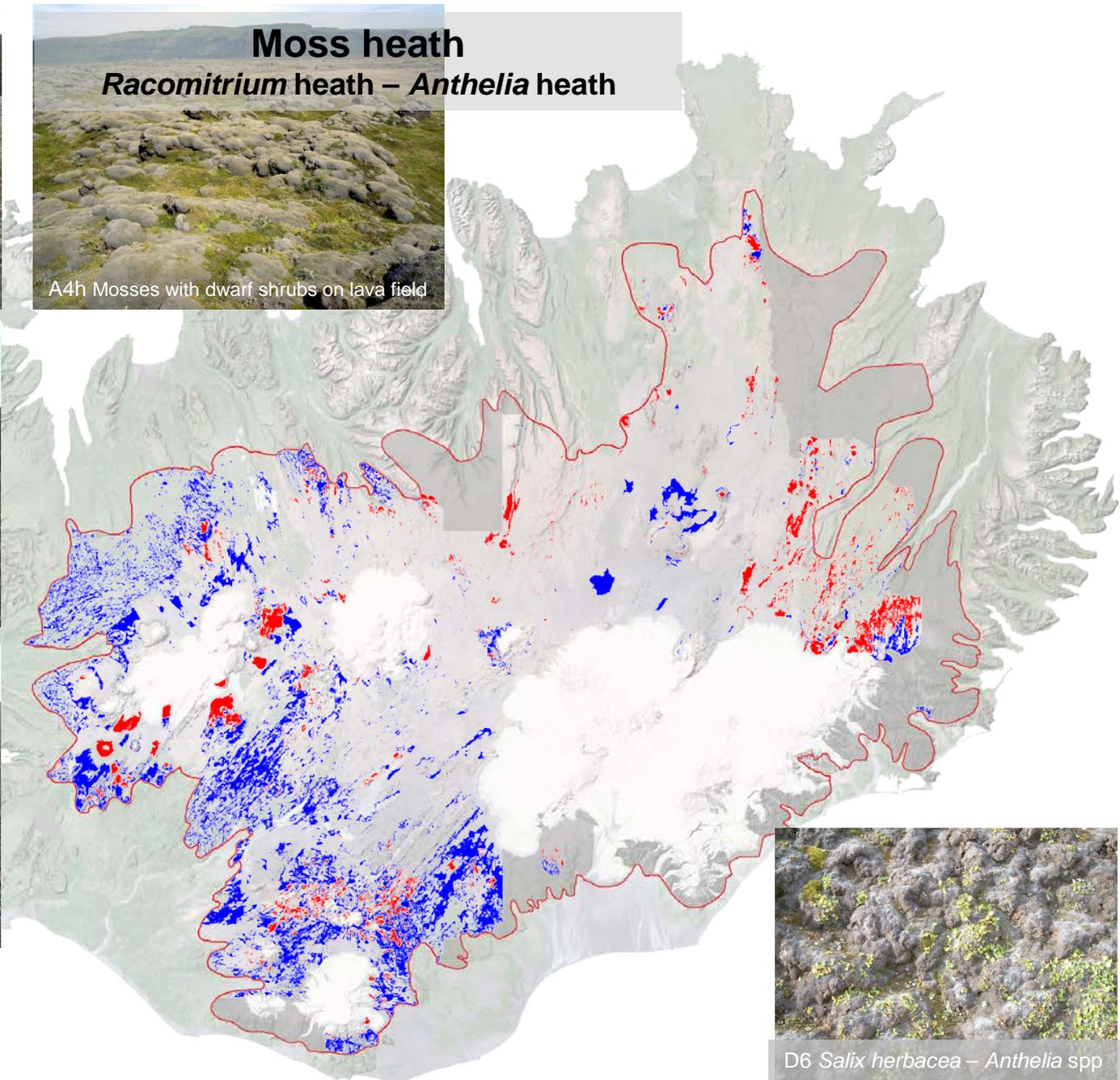
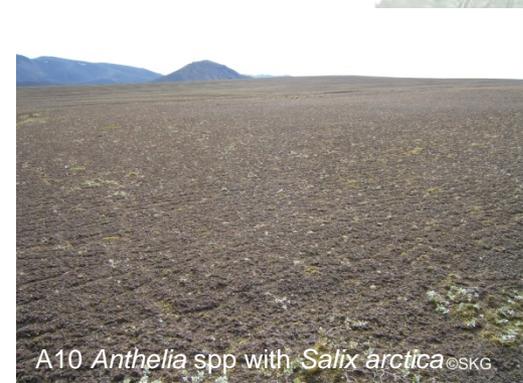


C2 *B.nana* - *K. myosuriodes* - grasses



C3 *B.nana* - *Salix* spp.





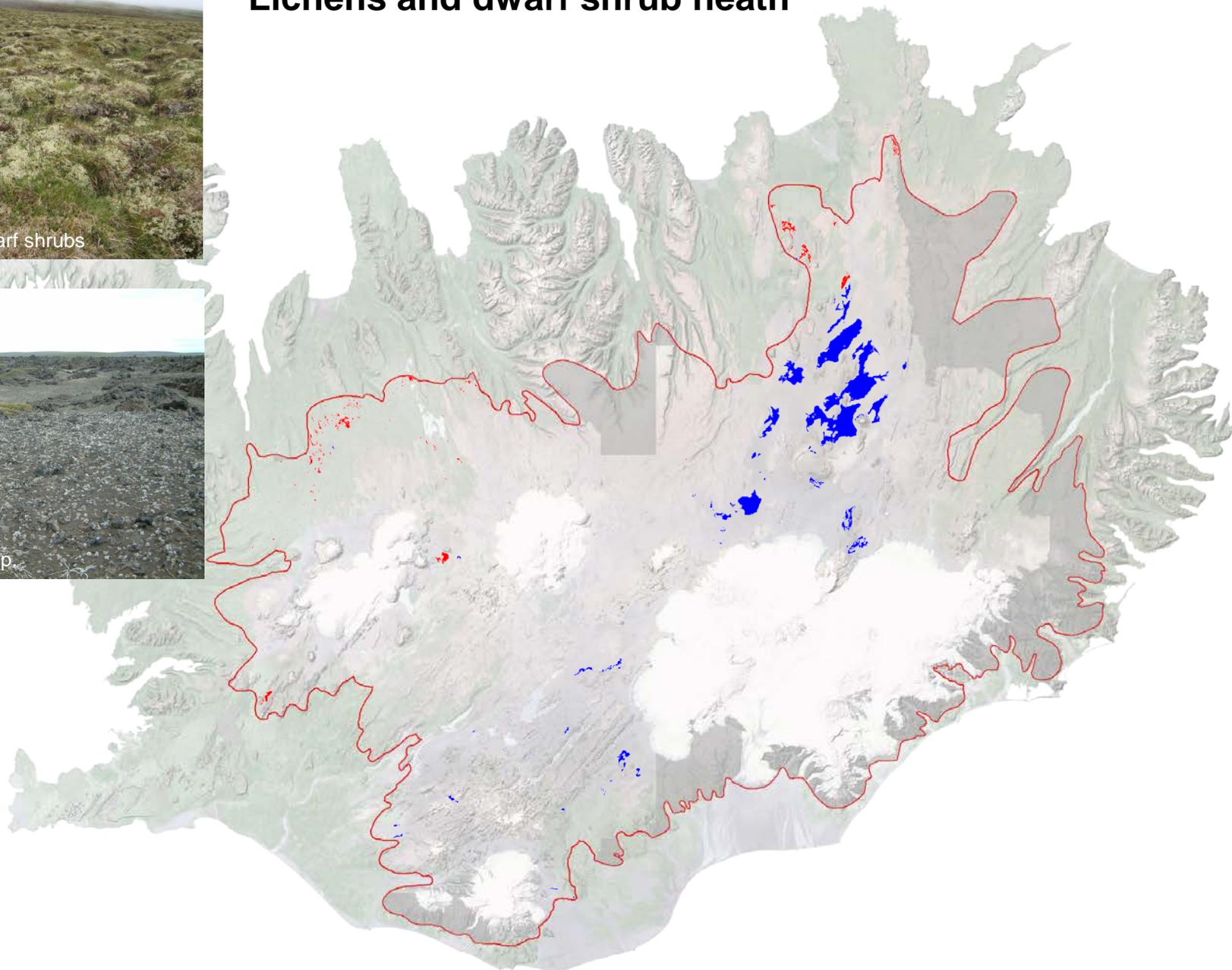
Lichens and dwarf shrub heath



J1 Lichens and dwarf shrubs



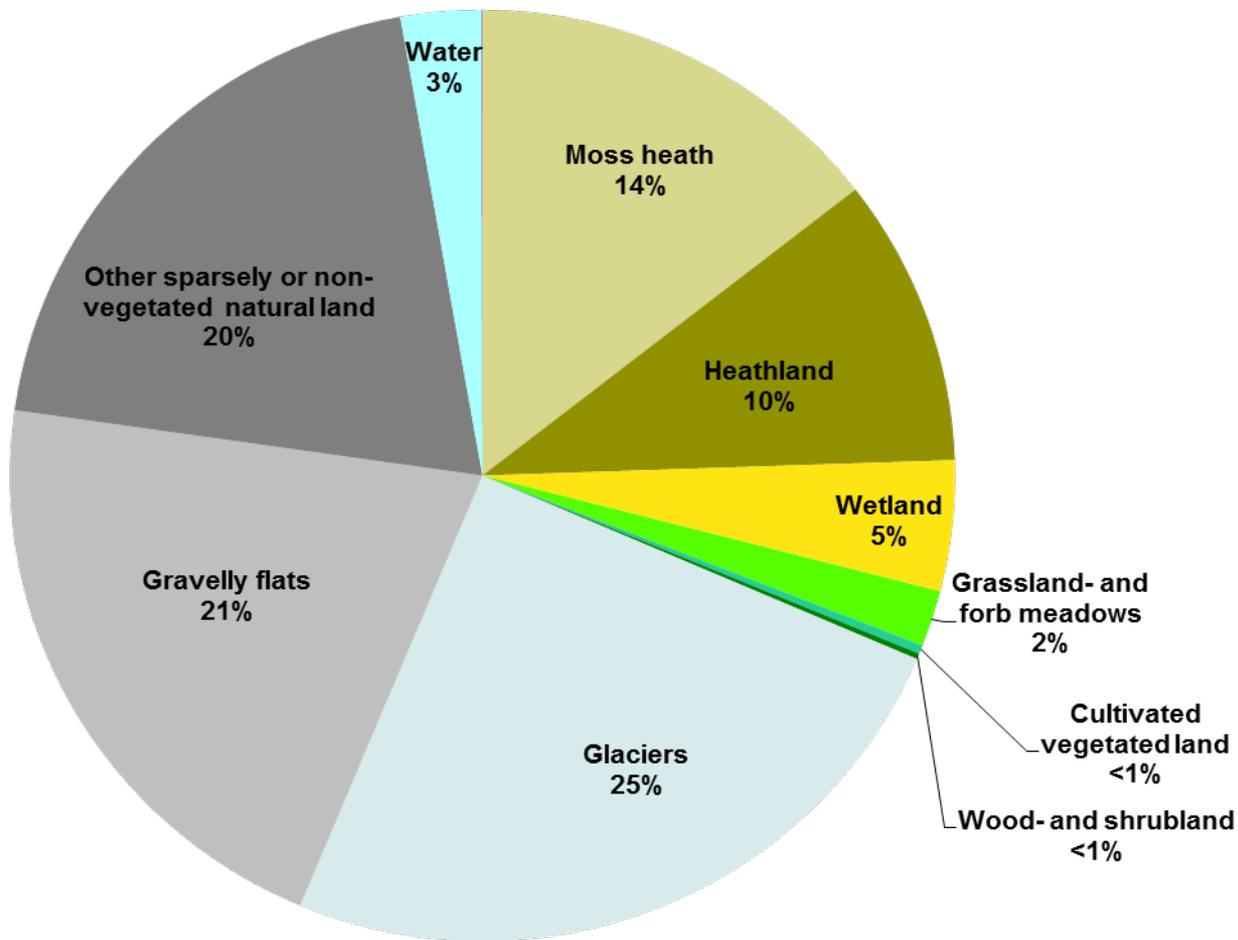
J2 *Stereocaulon* spp.



Examples of statistical results



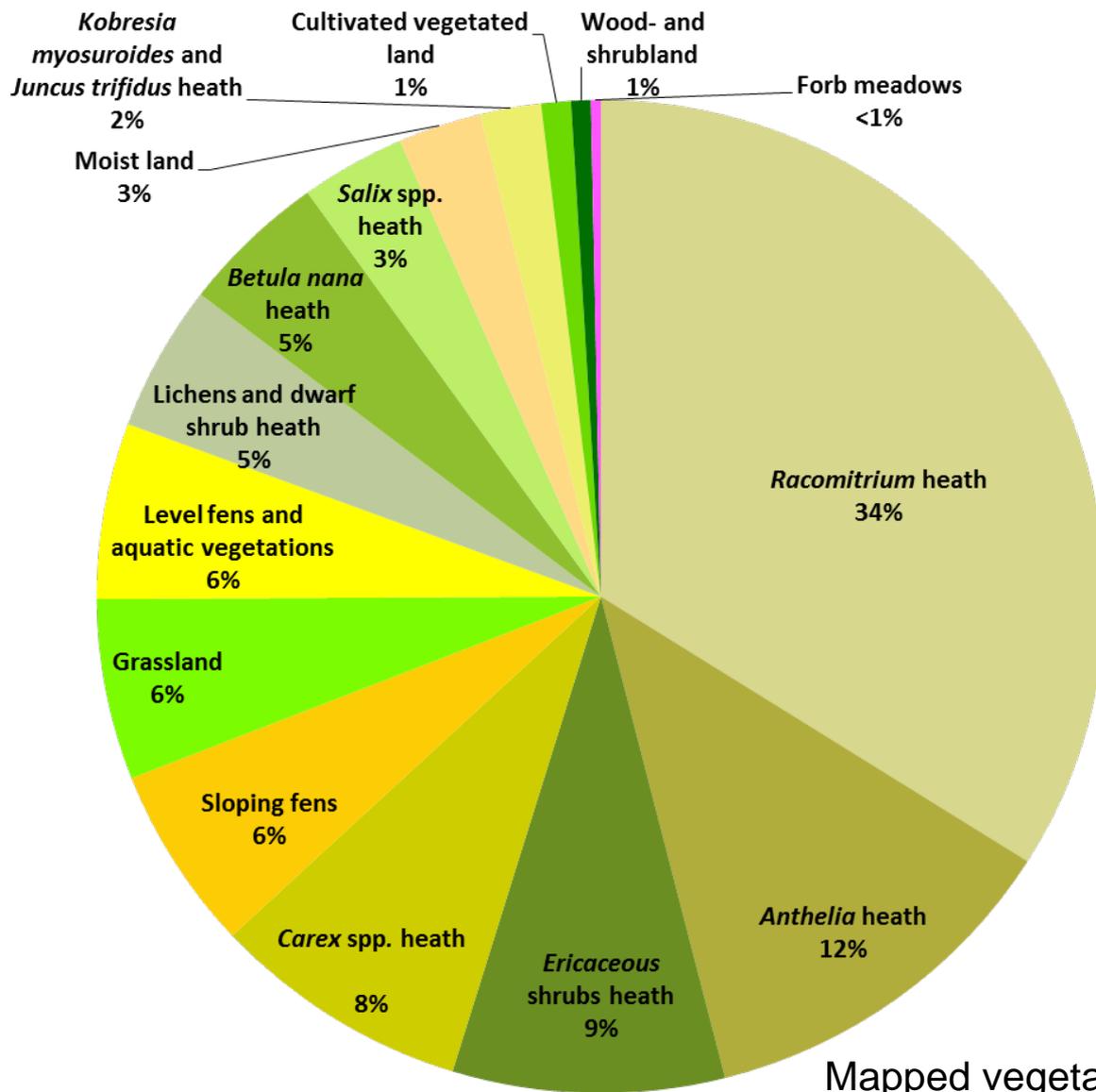
Main vegetation complexes and sparsely or non-vegetated land in the Central Highlands



Total mapped area 42.700 km²



Vegetation types in the Central Highlands

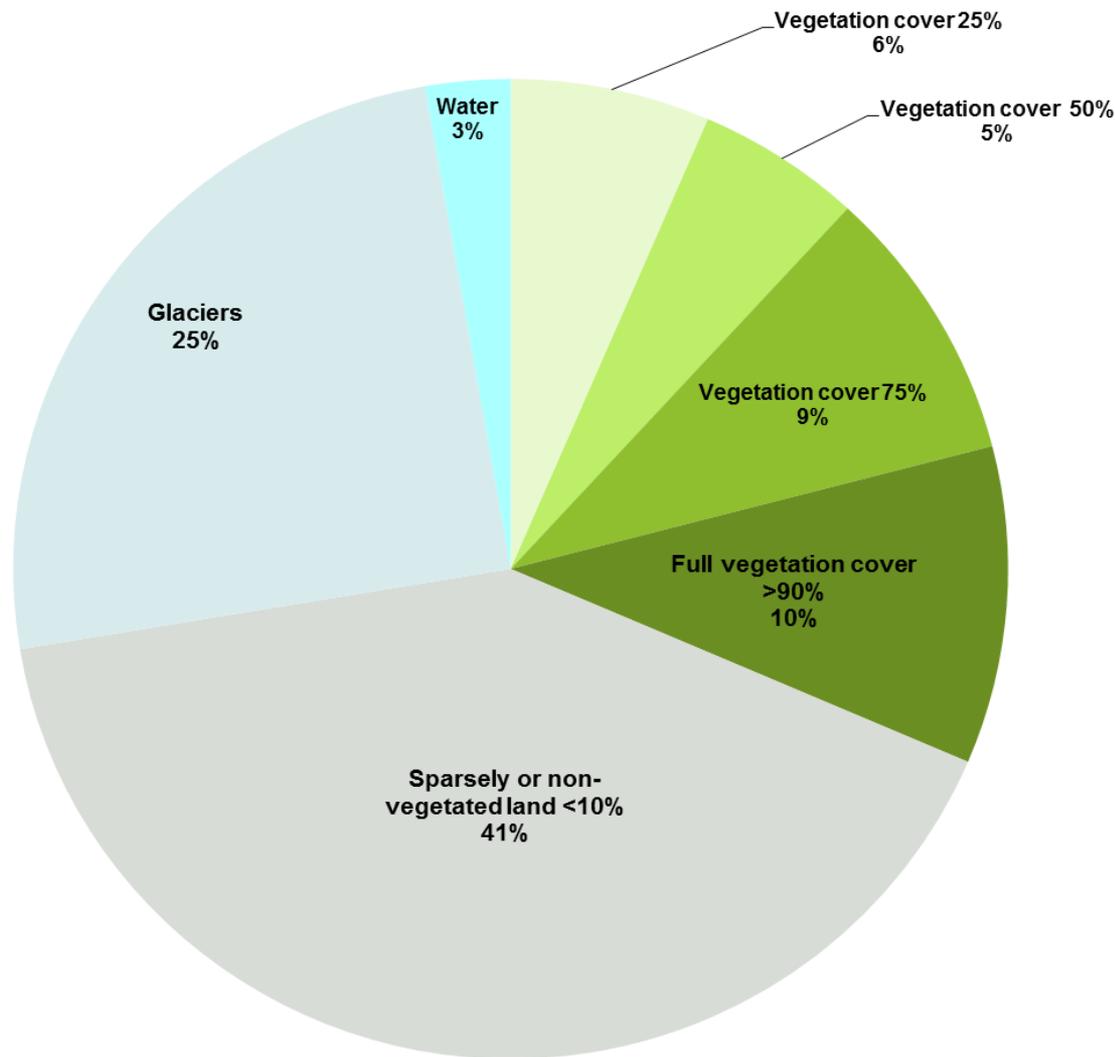


Mapped vegetated area 13.400 km²





Vegetated land (vegetation cover > 10%) and sparsely or non-vegetated land (vegetation cover < 10%) in the Central Highlands



Total mapped area 42.700 km²

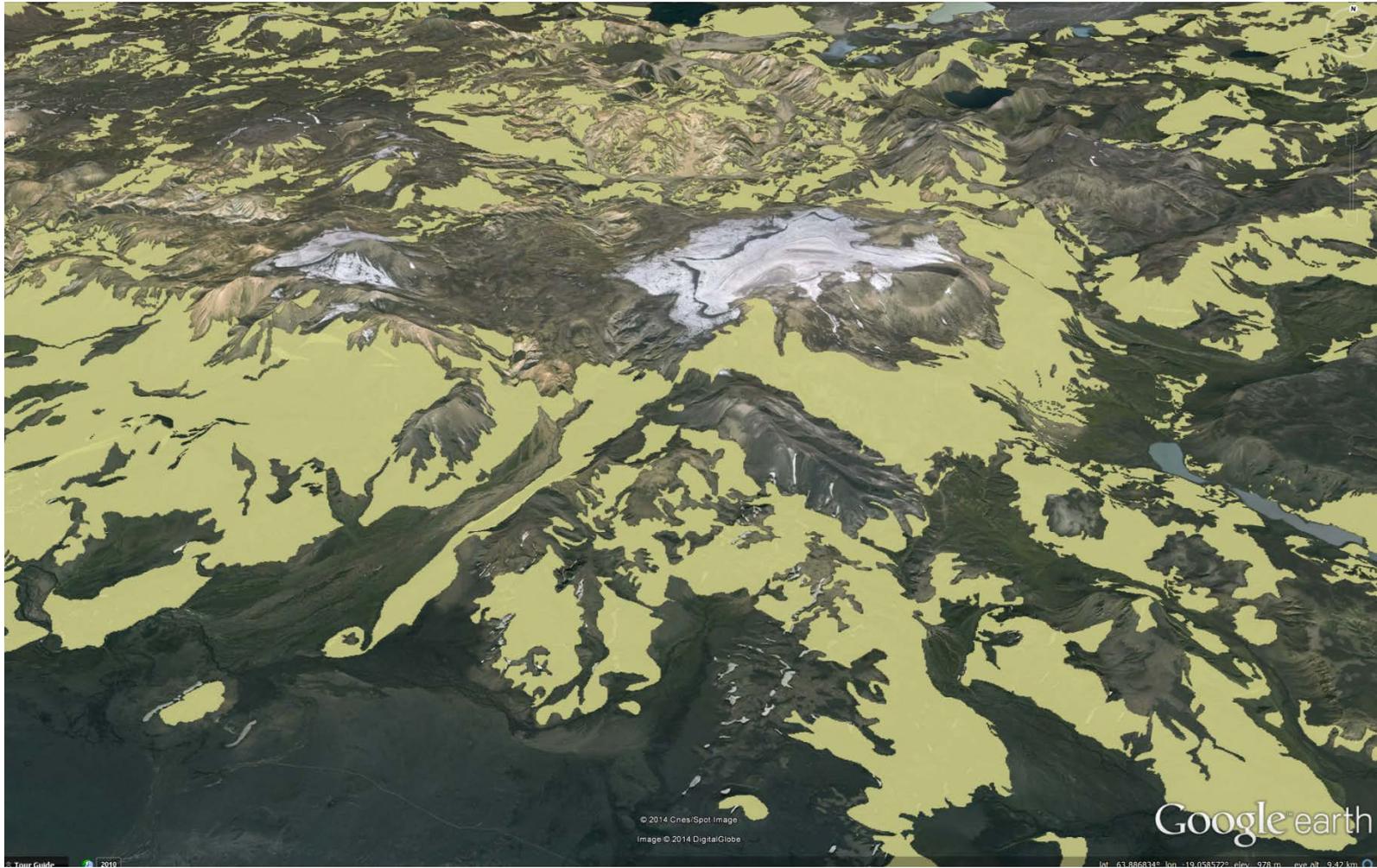


Presentation of the data

Example: *Racomitrium* moss heath







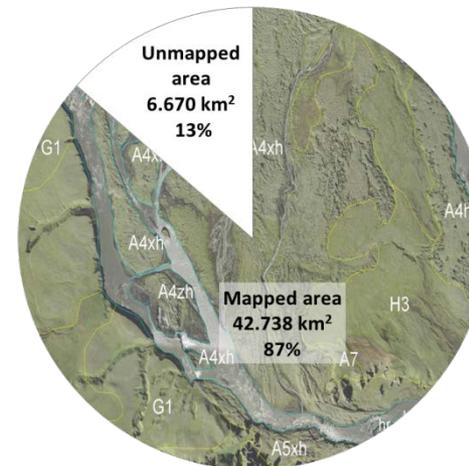
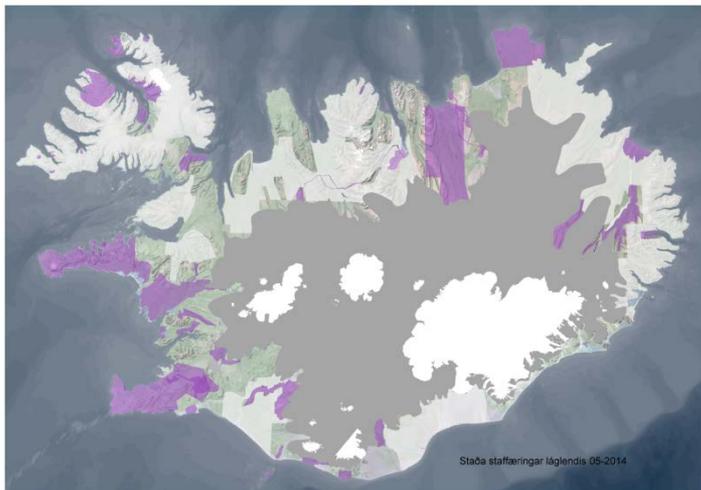


Status of vegetation mapping and development of methods



Status of vegetation mapping in Iceland

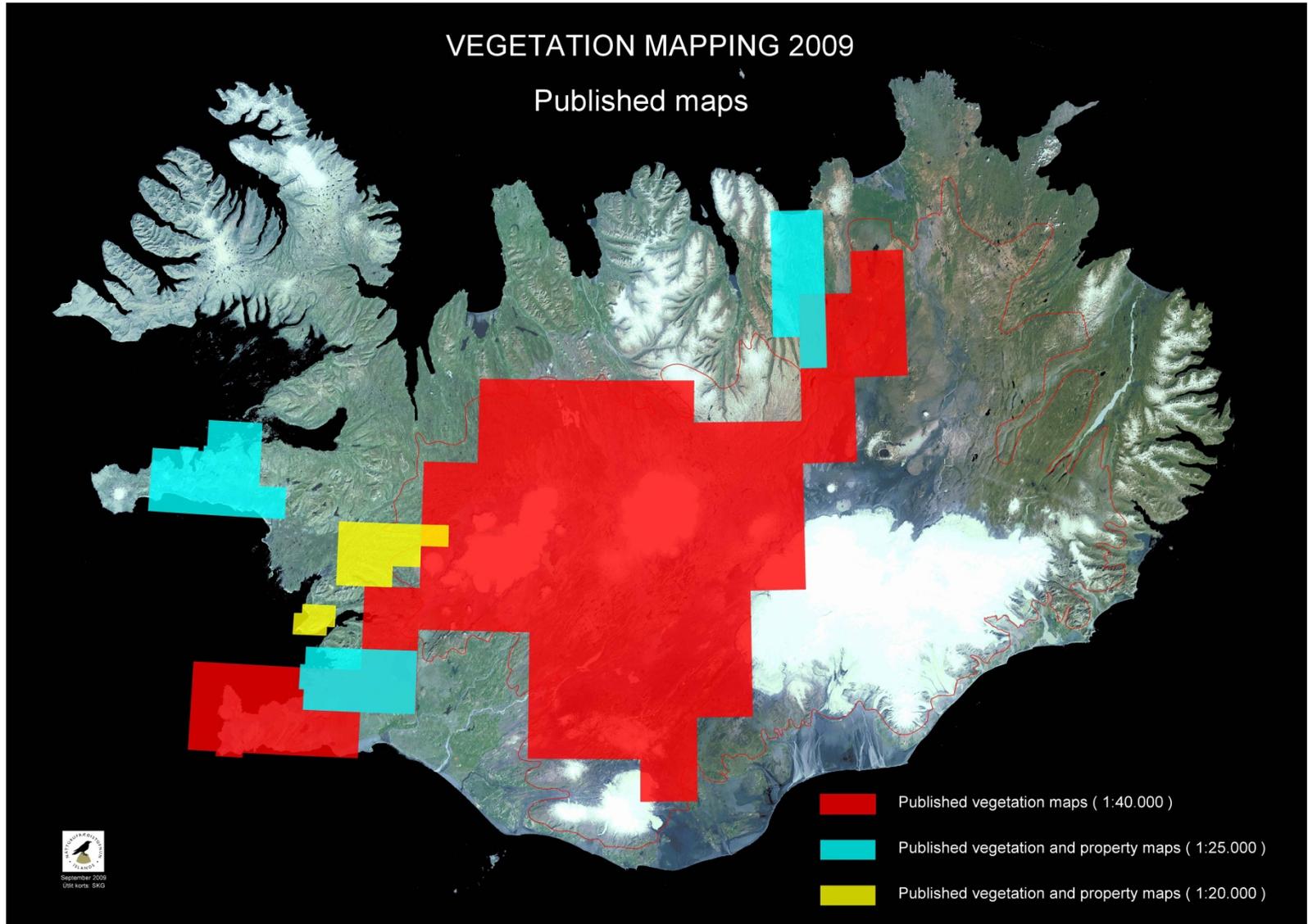
- Within the Central Highlands boundaries only 13% is unmapped
- Of the whole country 1/3 is still unmapped





VEGETATION MAPPING 2009

Published maps



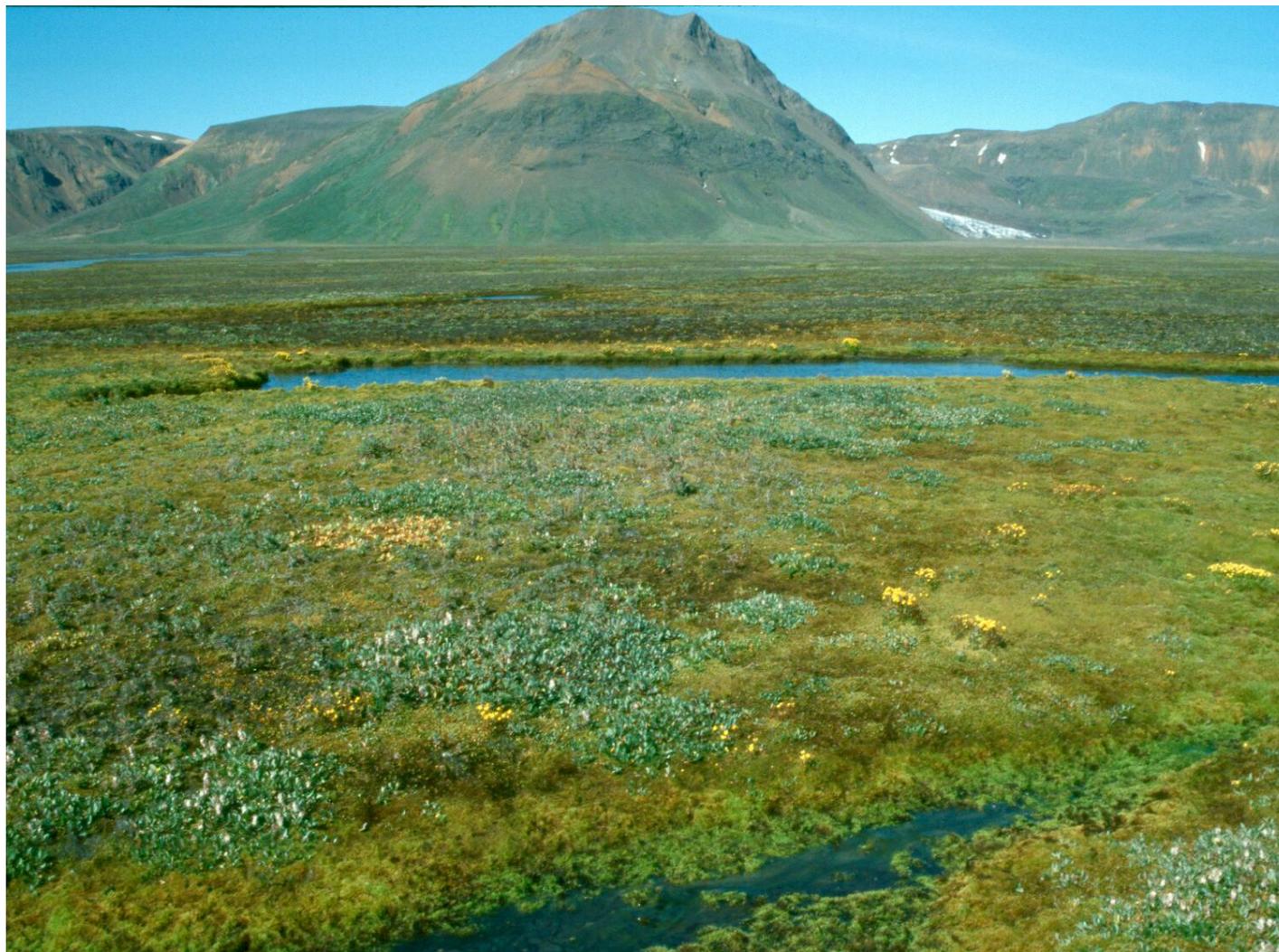


Available vegetation data differ in time and qualities

- Differ in age, up to 59 years old
- Differ in analysis capabilities
- Different technology in fieldwork
- Different methods in final map processing
- Technology development = increased quality of vegetation maps
- Coarse mapped areas redrawn more accurate with better images



Examples from Þjórsárver Nature reserve in the Central Highland

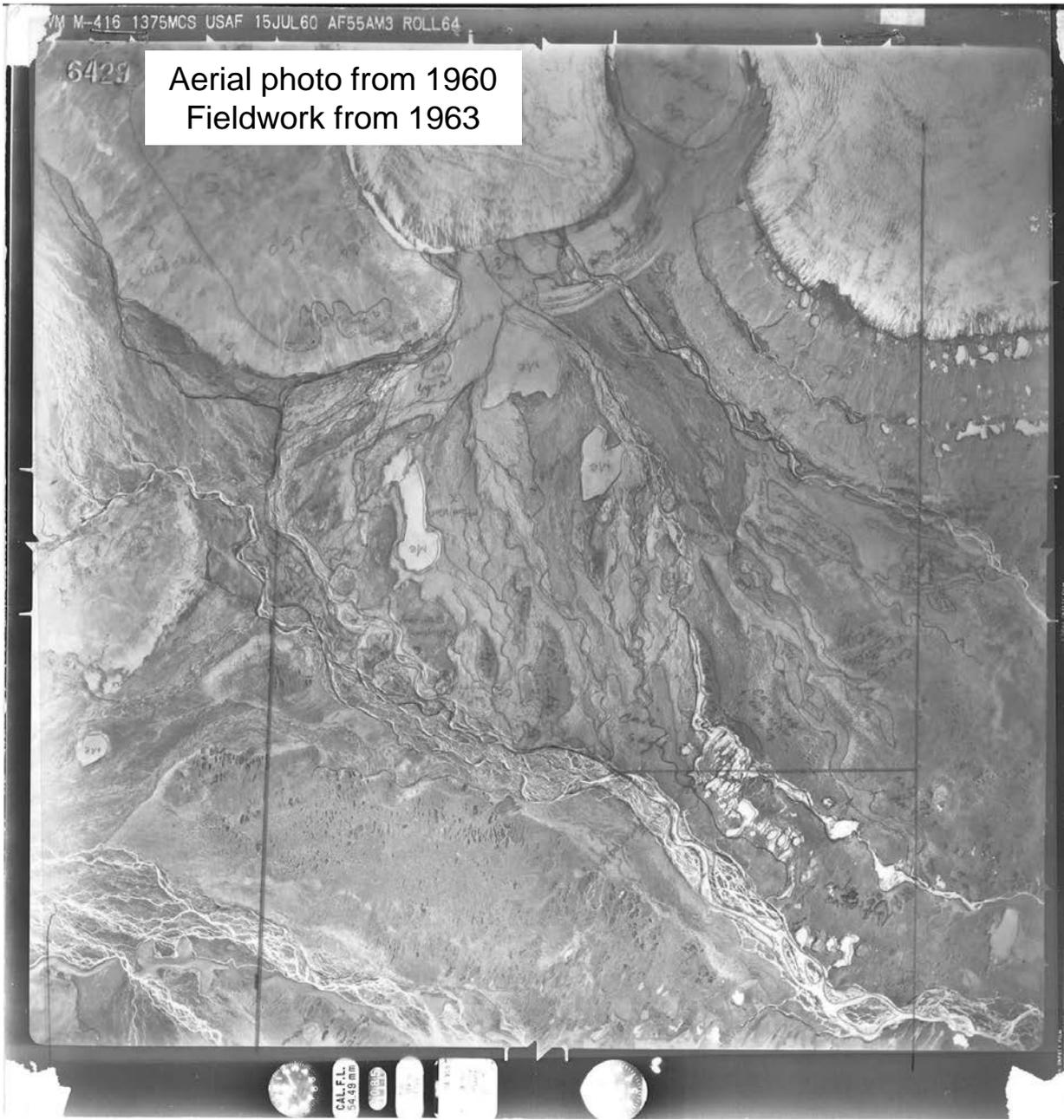




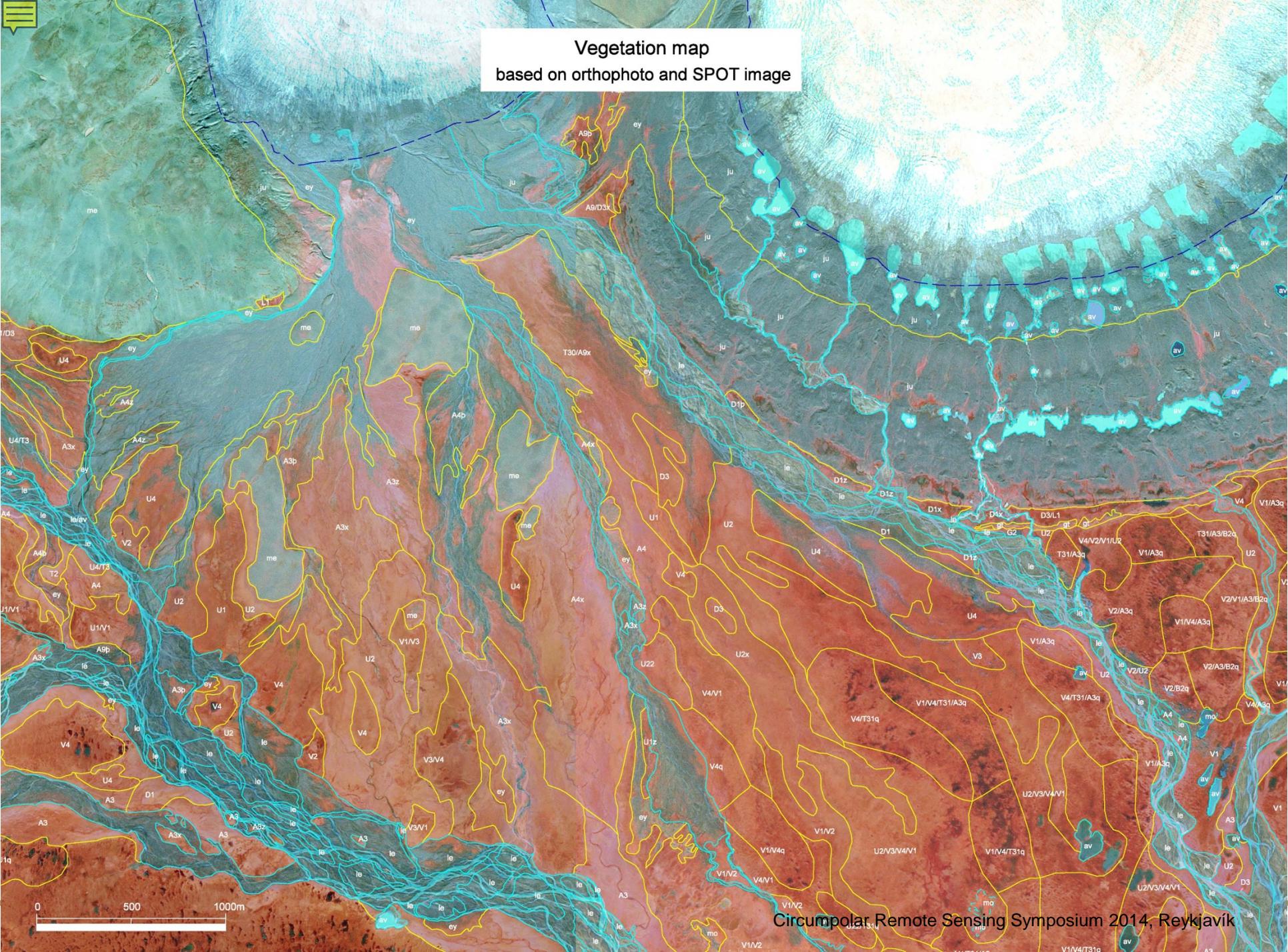
WM M-416 1375MCS USAF 15JUL60 AF55AM3 ROLL64

6429

Aerial photo from 1960
Fieldwork from 1963



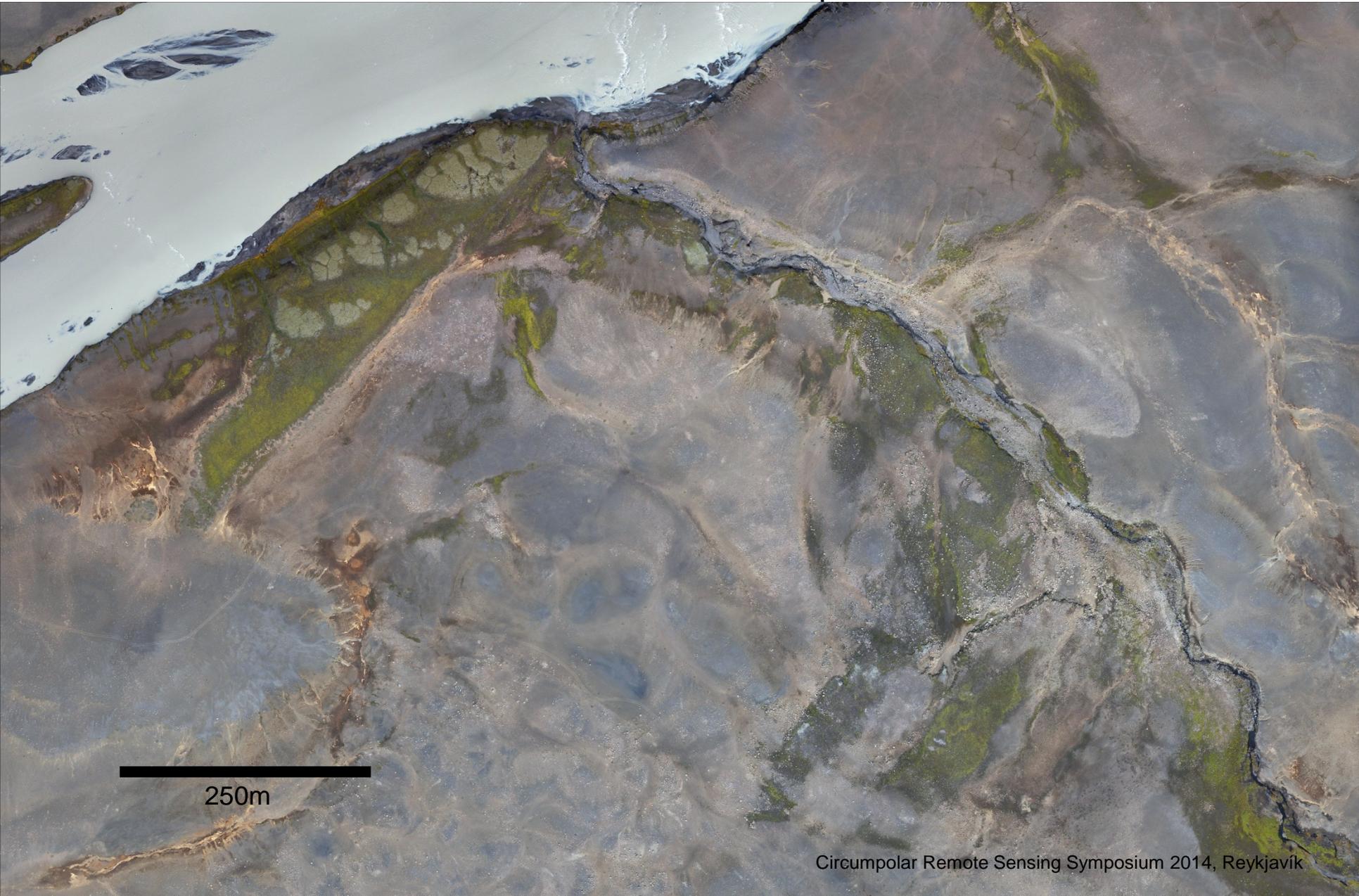
**Vegetation map
based on orthophoto and SPOT image**





Orthophoto map

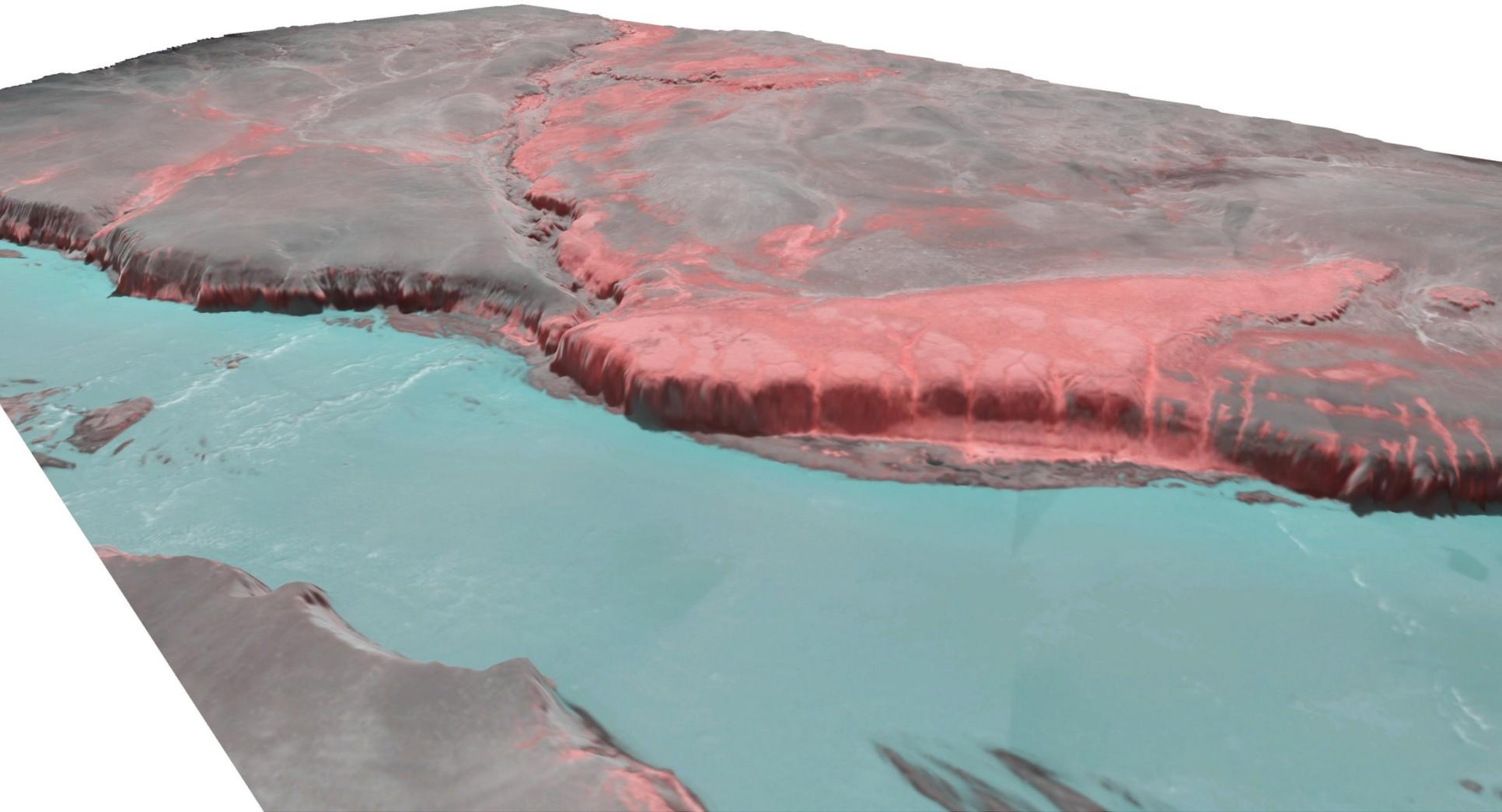
Natural color, drone 20 cm pixel size





DTM/orthophoto

infrared color, drone 20 cm pixel size



Conclusions



The digital map allows multiple uses

- comparison of distribution of different vegetation types in the highlands
- evaluation of vegetation cover
- condition of common grazing lands
- environmental impact assessments
- base for habitat type maps
- regional planning



Benefits of the digital data from the Central Highlands

- Clear and accessible references about vegetation
- Diverse feasibility for statistical description of vegetation and comparison between defined areas.
- Analysing damages caused by natural hazard and to plan reclamation or restoration





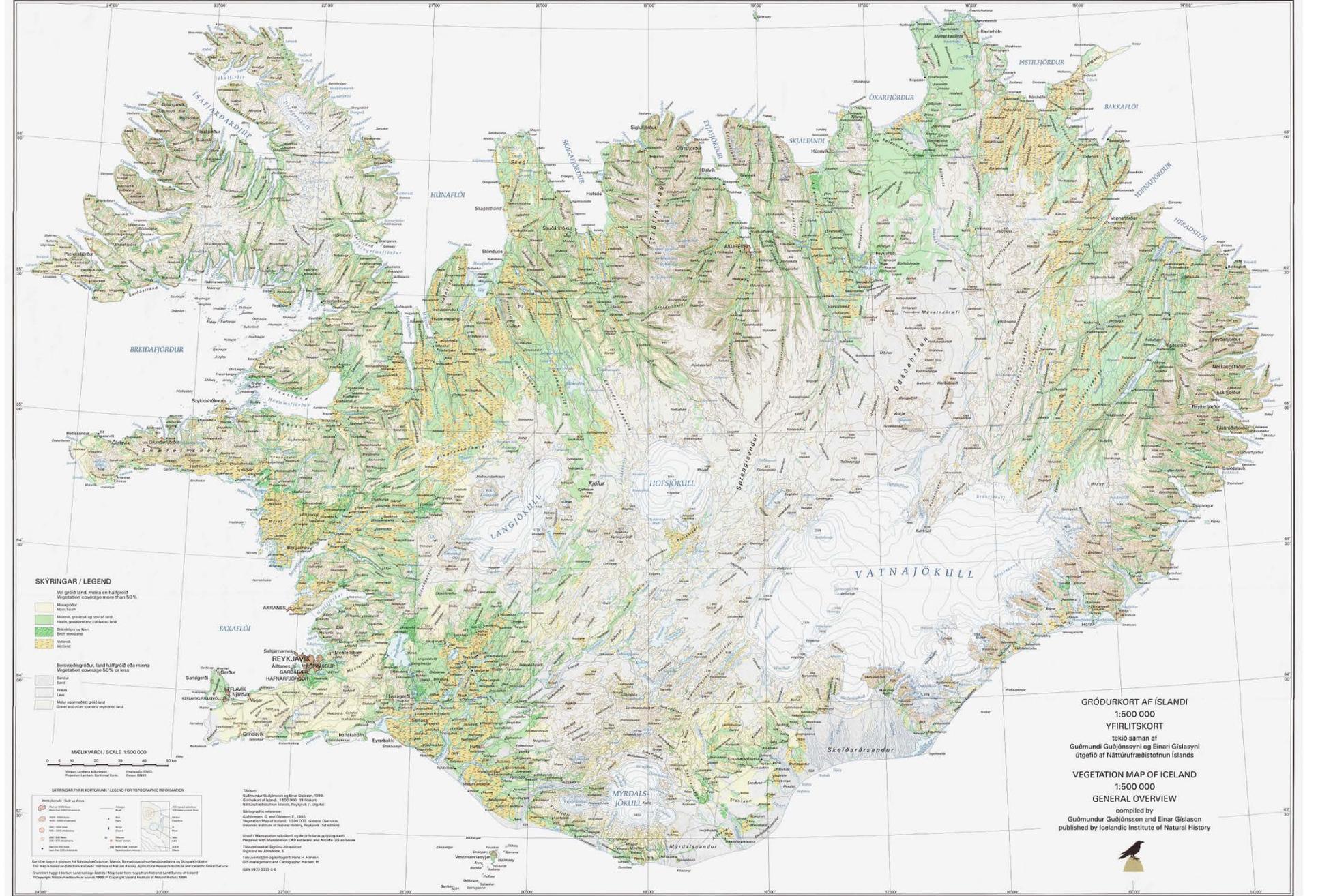
Next steps

Our next step is to use automatic interpretation to help us to find detectable incorrectly interpreted polygons for the whole map

Then we hope that our detailed map will among other things be effective as a ground truth for processing habitat type map of Iceland







SKÝRINGAR / LEGEND

- Vit grótt land, meira en hálfgjót
Vegetation coverage more than 50%
- Mýrland
 - Mýrland
 - Mýrland, grótt og rjúkull land
 - Mýrland og rjúkull land
 - Blátt mýrland
 - Mýrland
- Beislaþingur, land hálfgrót eða minna
Vegetation coverage 50% or less
- Sandur
 - Sandur
 - Flakur
 - Flakur
 - Mjúk og smátt gróttland
 - Sandur and other sparse vegetation land

MÆLIKVÆÐI / SCALE 1:500 000

SKÝRINGAR FÜR KORTUNIN / LEGEND FOR TOPOGRAPHIC INFORMATION

Örn
 Örn