

Breytileiki snjóhulu á Íslandi með áherslu á stafssvæði Landsvirkjunar.

**Haustþing Veðurfræðifélags Íslands
Veðurstofa Íslands, 15.11.2018**

Andri Gunnarsson, Landsvirkjun, Háskóli Íslands
Sigurður M. Garðarsson, Háskóli Íslands

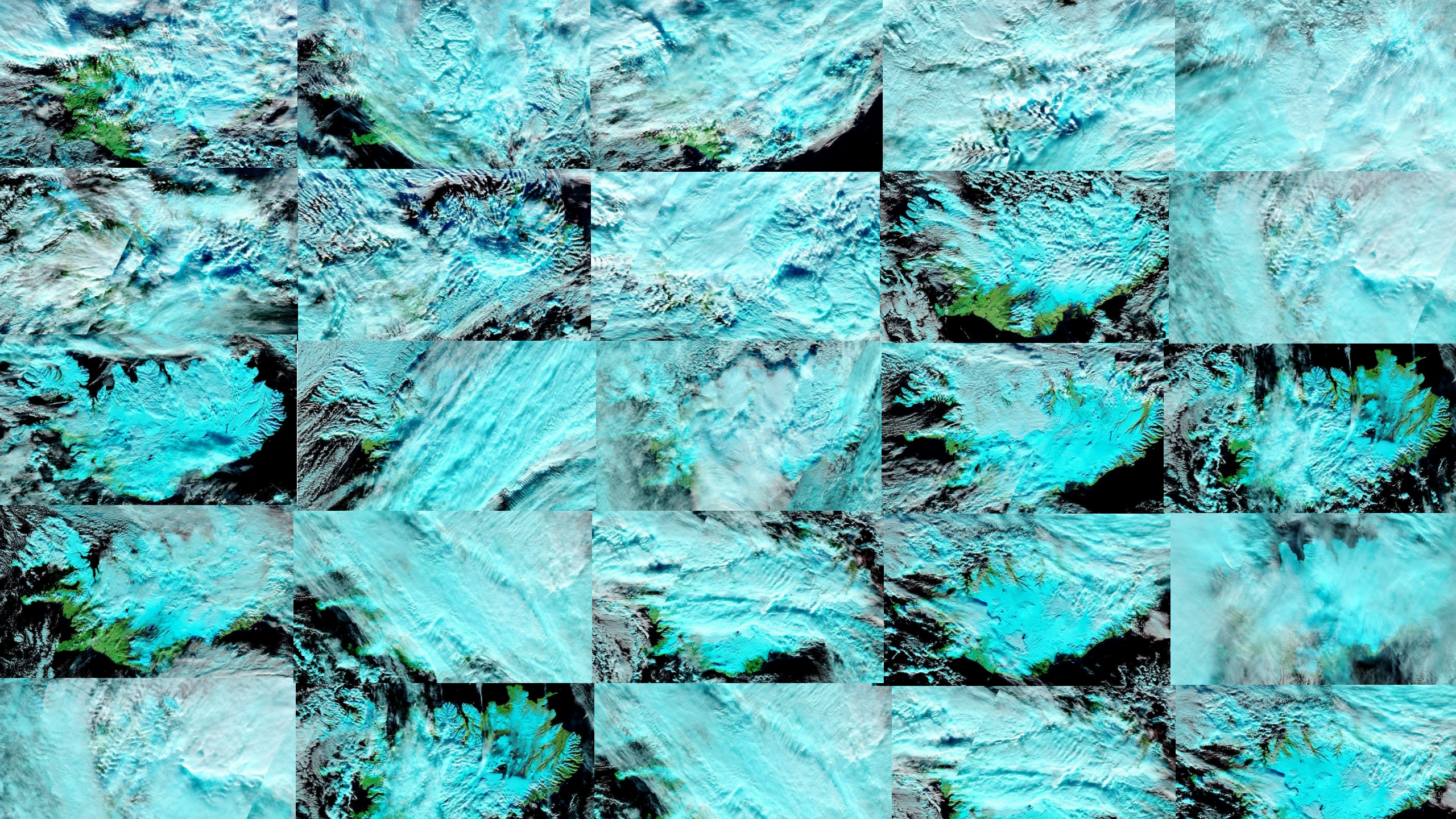


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Yfirlit

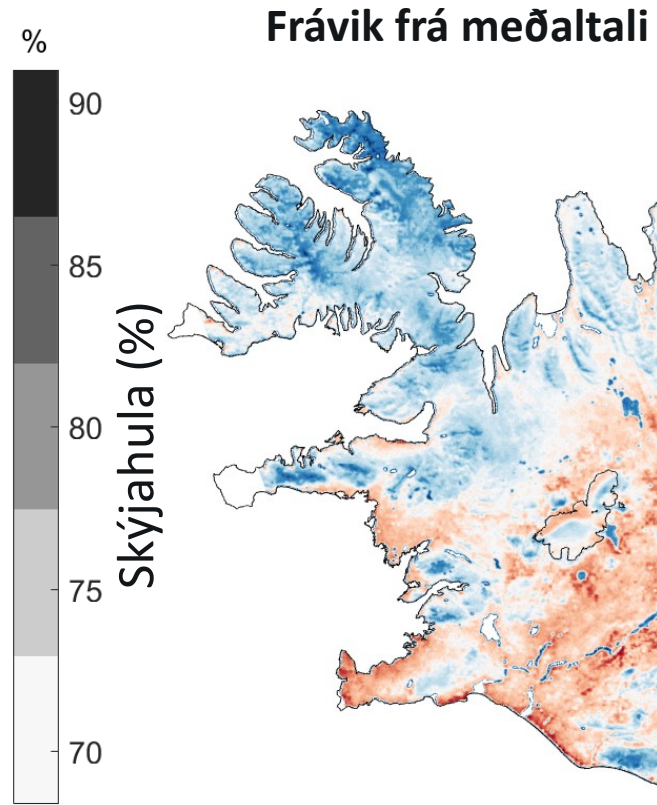
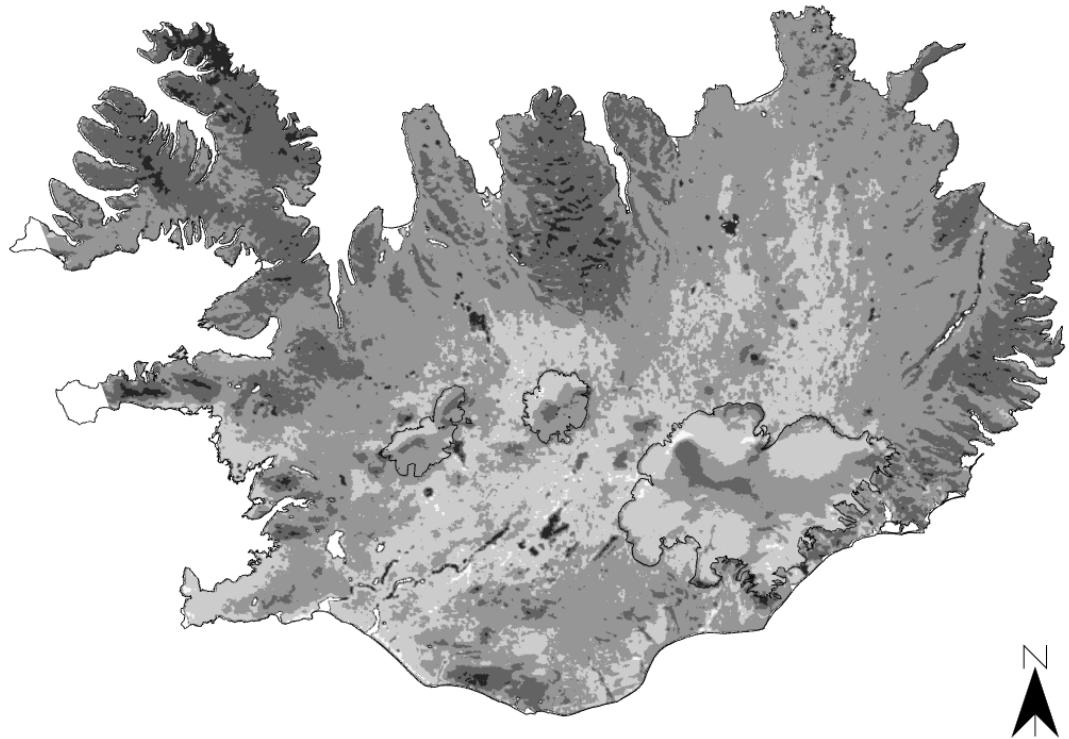
- Markmið verkefnisins
 - skilgreina aðferðarfræði til að leggja mat á snjóhulu samfelld í tíma og rúmi á Íslandi með fjarkönnun
 - greinaleg afurð sem hægt er að viðhalda í rauntíma
 - Breytingar / Samanburður við líkön / Uppfærsla líkana
- Skýjahula er stærsta vandamálið fyrir optíska fjarkönnun
- Notum Modis í upphafi en þróað til að taka á móti Sentinel 3AB og VIIRS. Medium res. gögn
- Gögn ekki tiltæk í Des/Jan (Polar Darkness)





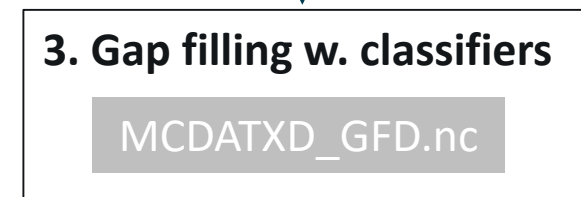
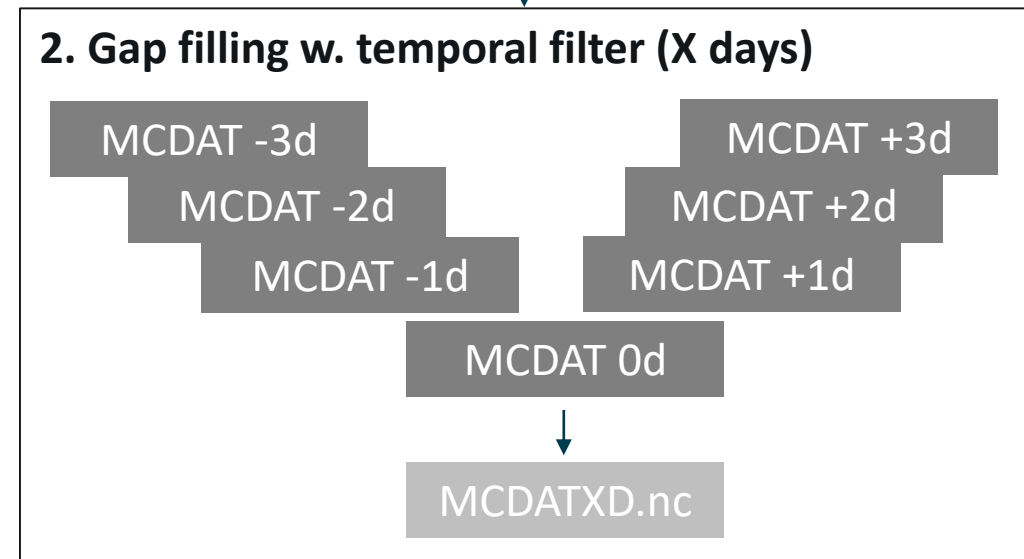
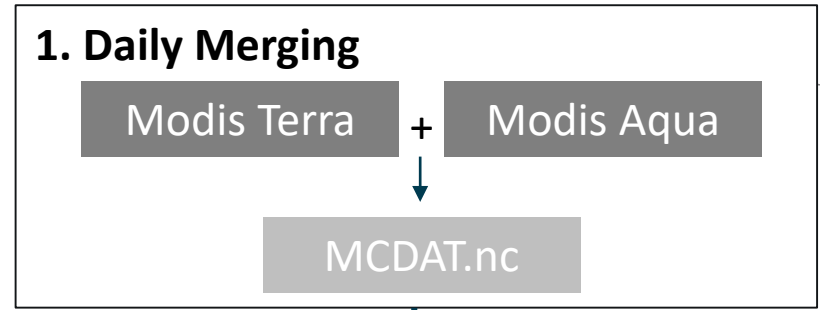
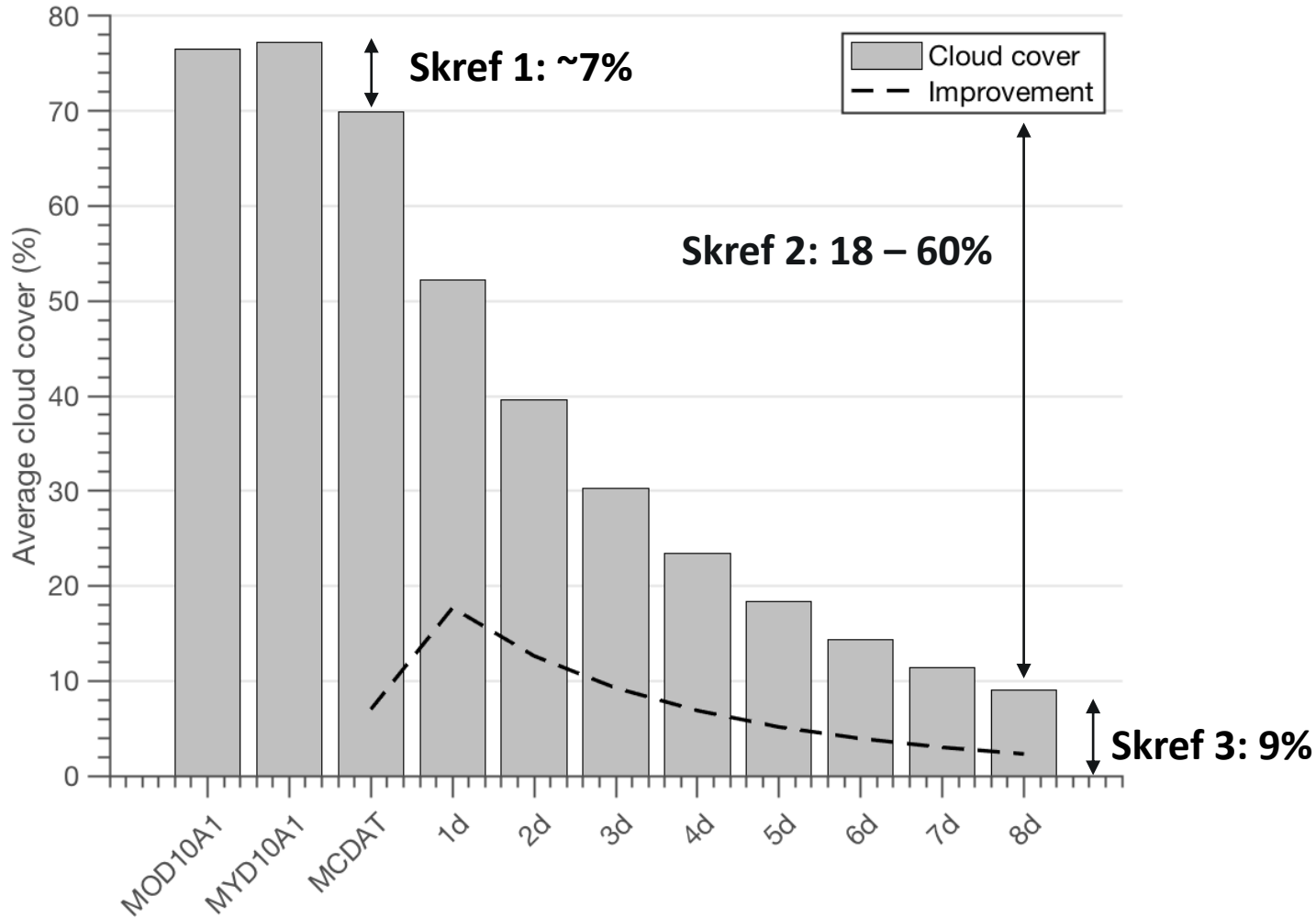
Meðalskýjahula á Íslandi / Feb 2000 – Júlí 2018

Meðalskýjahula: 74%



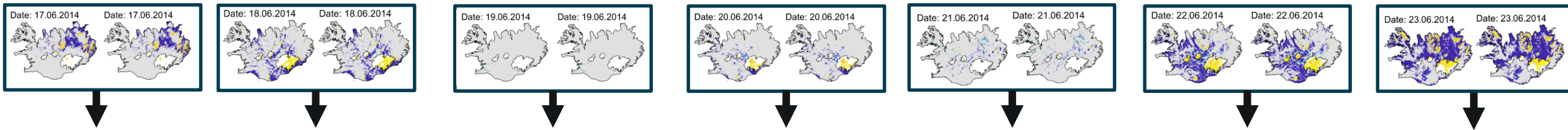
Daily Modis Aqua + Terra (Feb-Nov) ~6300 dagar

Aðferðarfræði – Gap reduction

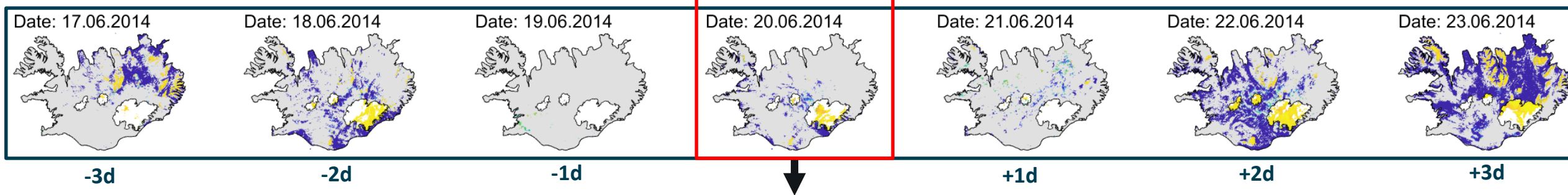


Aðferðarfræði – Gap reduction

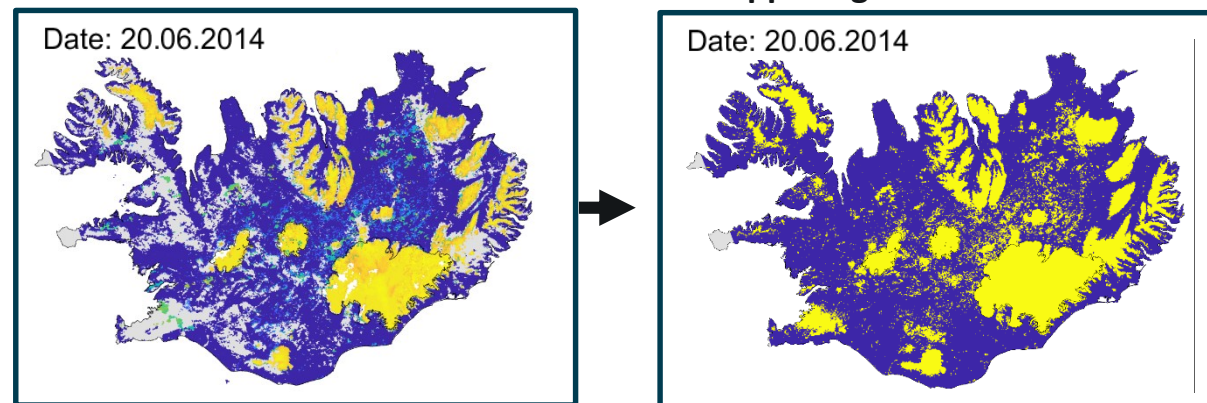
1. Daglegar myndir sameinaðar (Aqua + Terra) (MCDAT)



2. Sameining daga (MCDATXD)

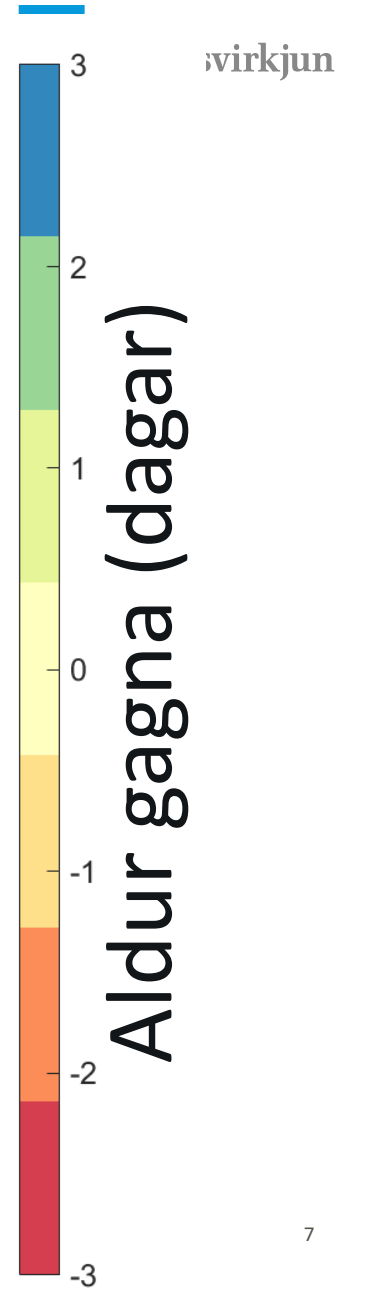
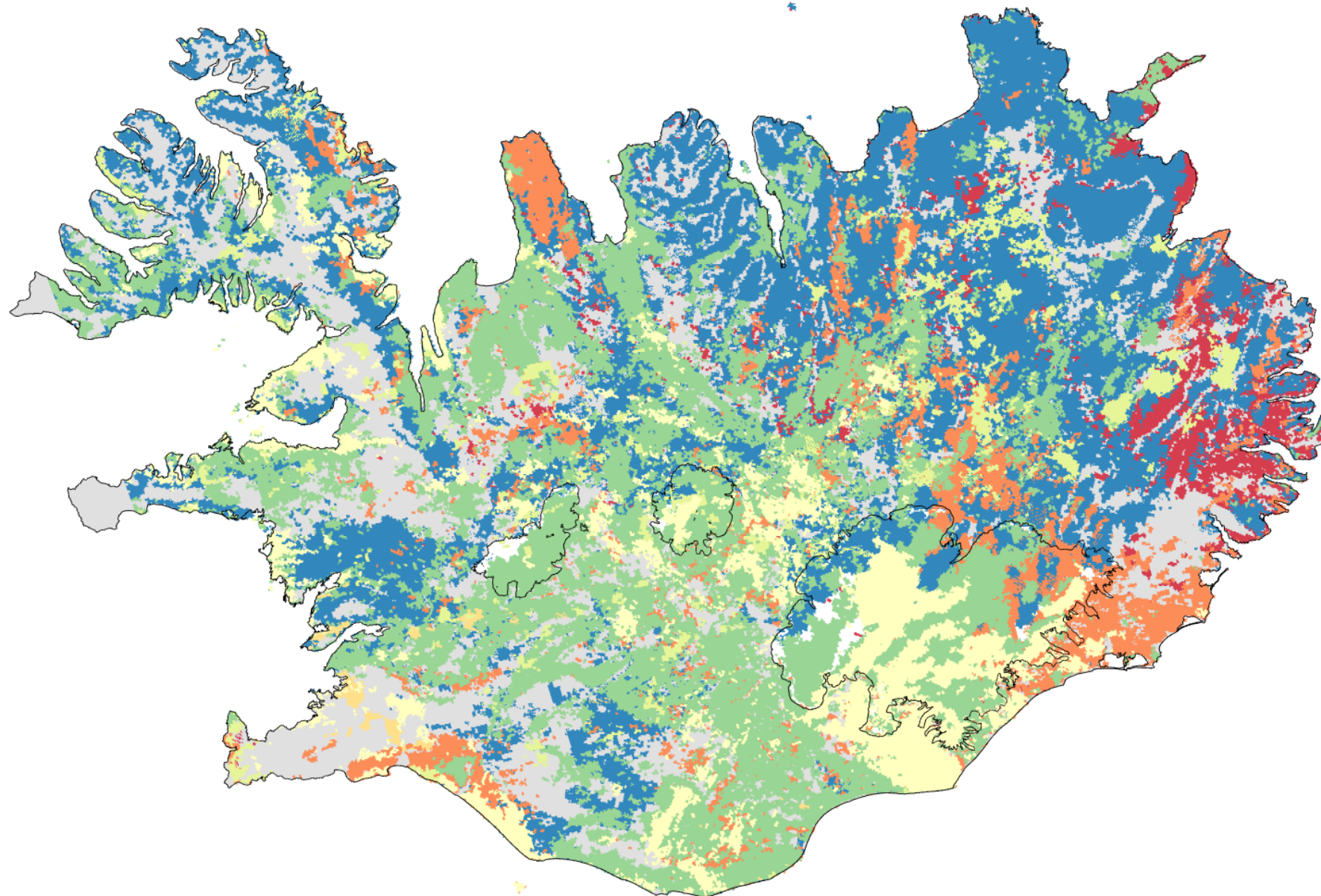


3. Stoppað í göt



Aldur gagna fyrir 20.06.2017 – 3+3 dagar

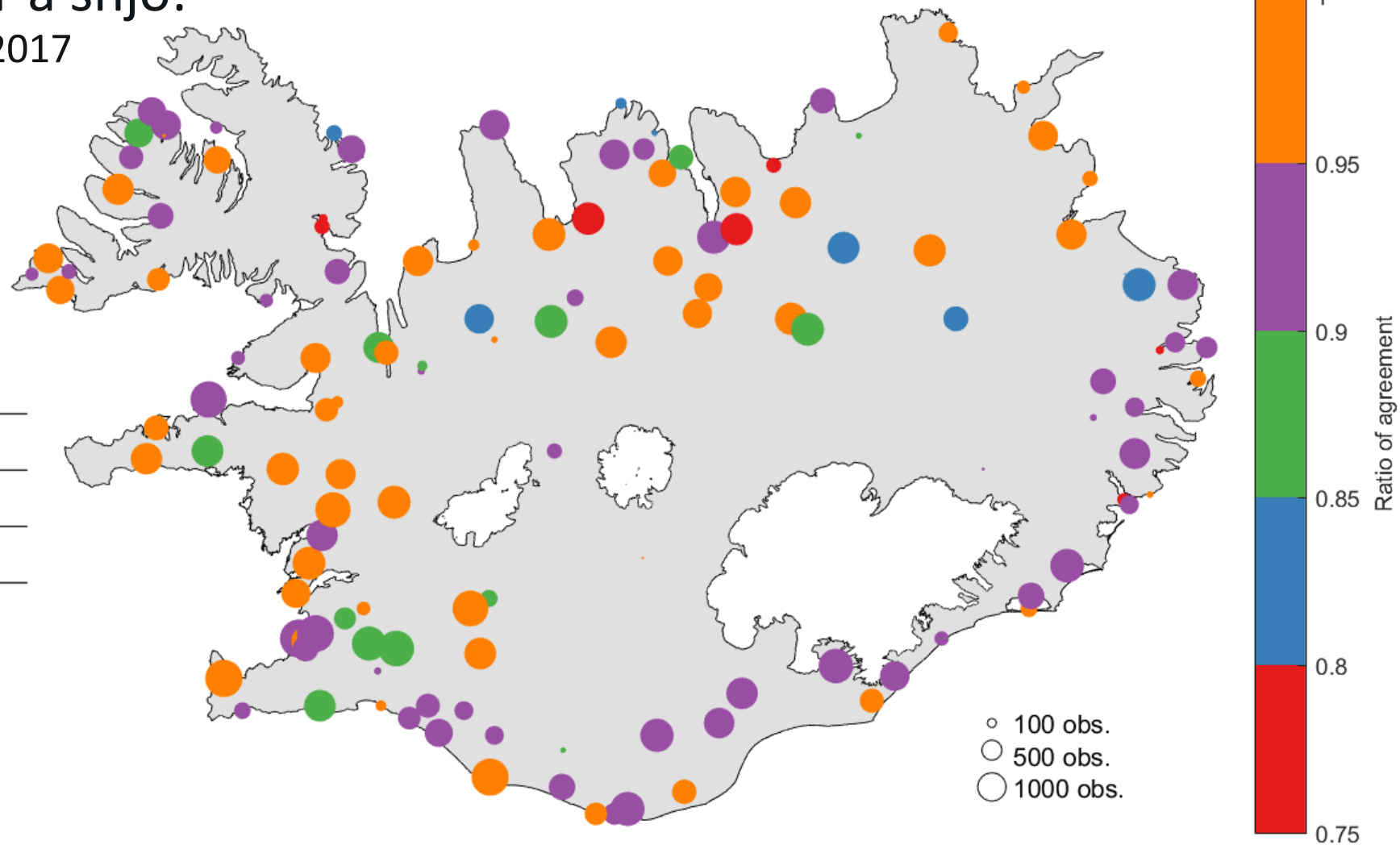
Data Age Overview: Date: 20.06.2014 / 7 day Stack



Samanburður við mannaðar athuganir Veðurstofu Íslands (2000-2017)

- Mannaðar athuganir á snjó:

- Tímabil: 1.1.2000 – 31.12.2017
- 152 stöðvar
- 585.000 athuganir
- Alautt, flekkótt, alhvítt



		MCDAT	
		No Snow	Snow
Obs.	No snow	96.9 %	3.1 %
	Snow	11.4 %	88.6 %

Samanburður við Landsat 7/8 og Sentinel 2AB

> 20% skýjahula

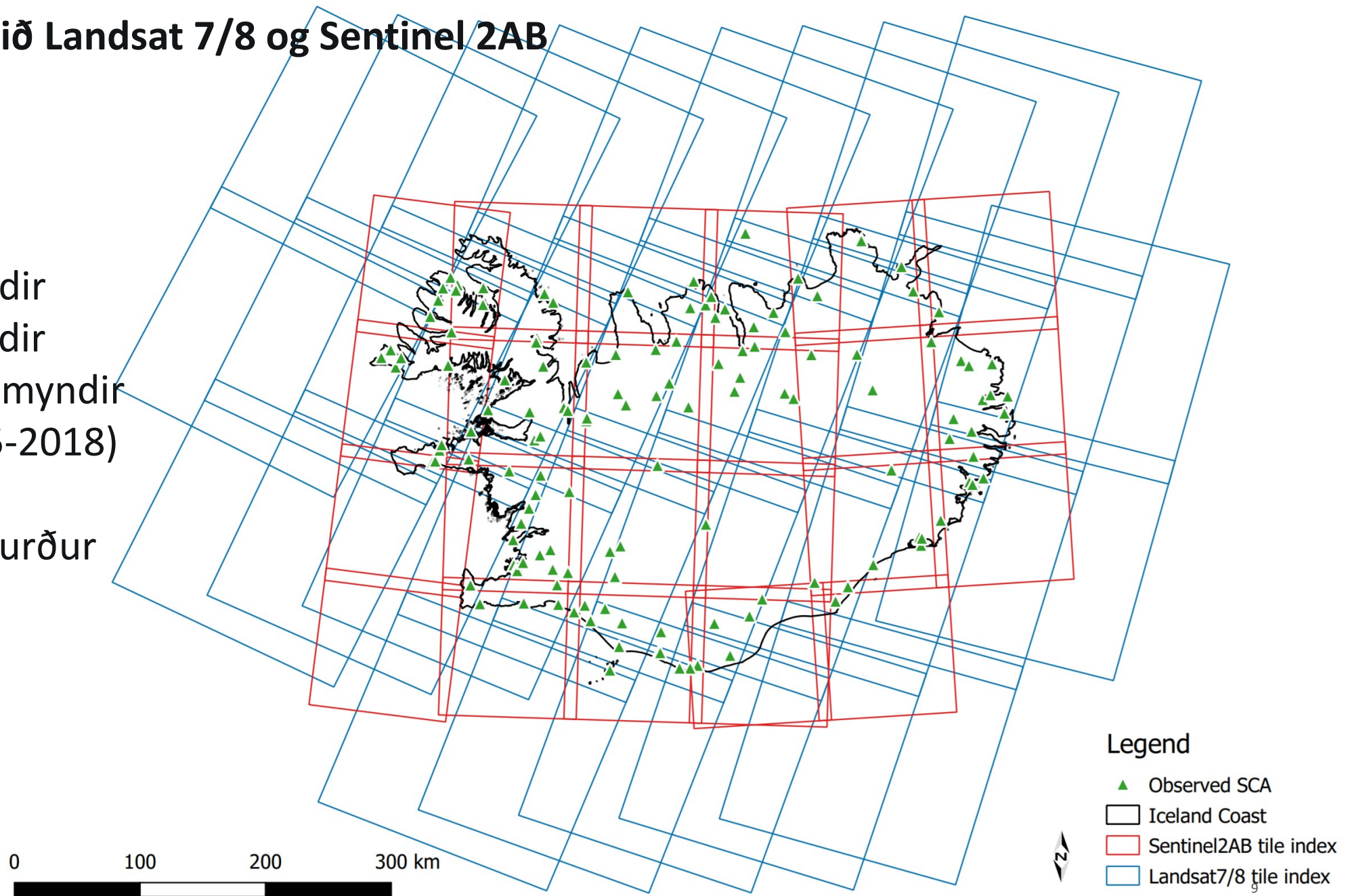
Landsat 7: 254 myndir

Landsat 8: 124 myndir

Sentinel 2AB: 1090 myndir

Sentinel 1AB: (2015-2018)

Pixel based samanburður

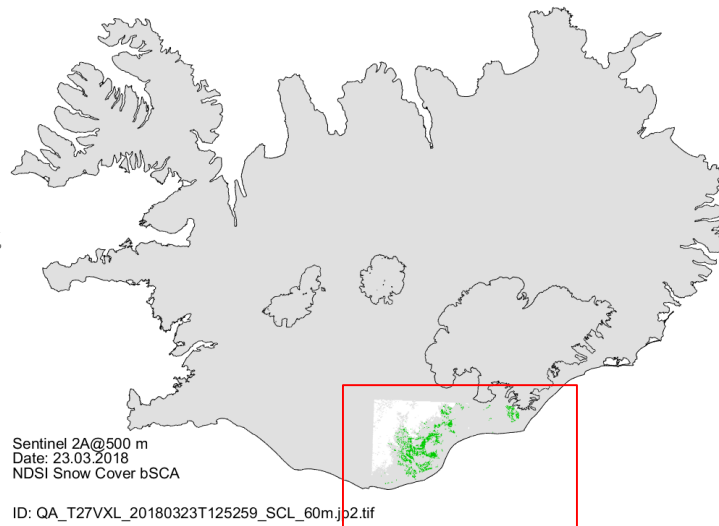


Pixel based samanburður - 23.03.2016

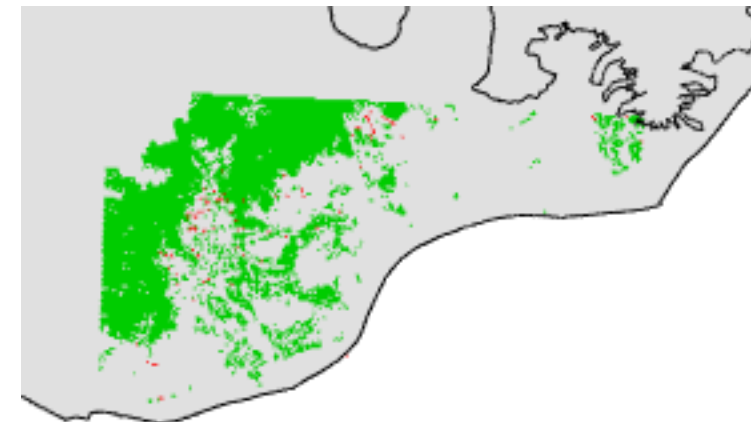
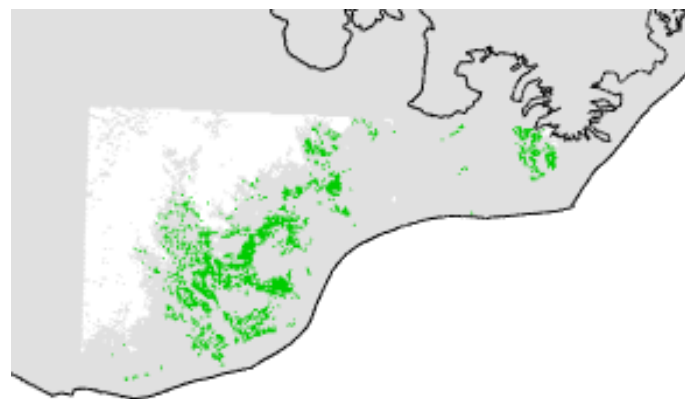
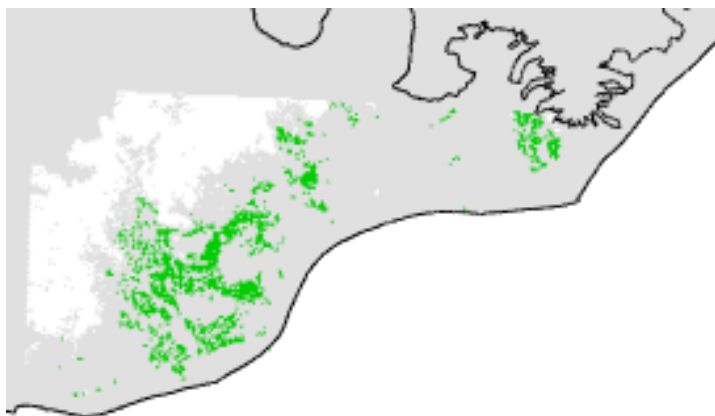
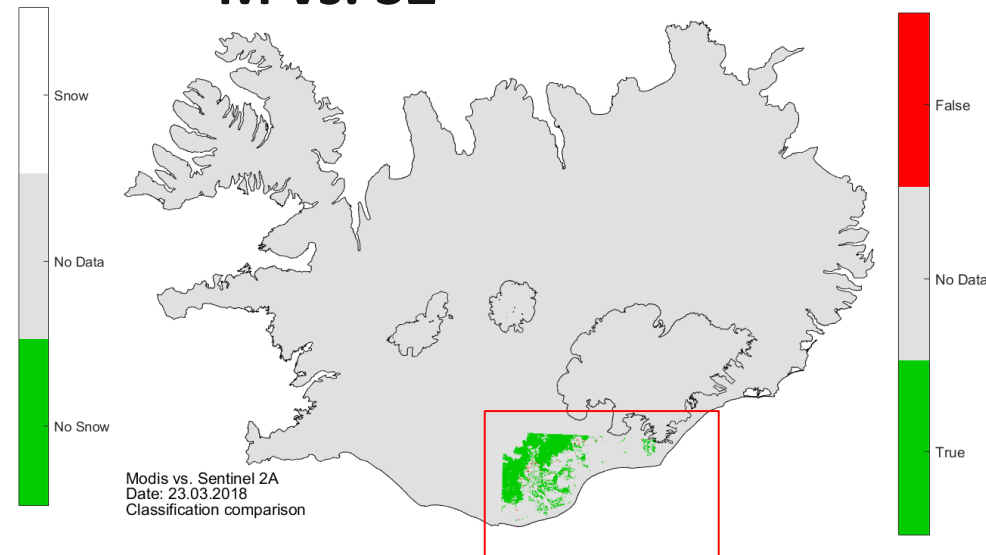
Modis



Sentinel 2

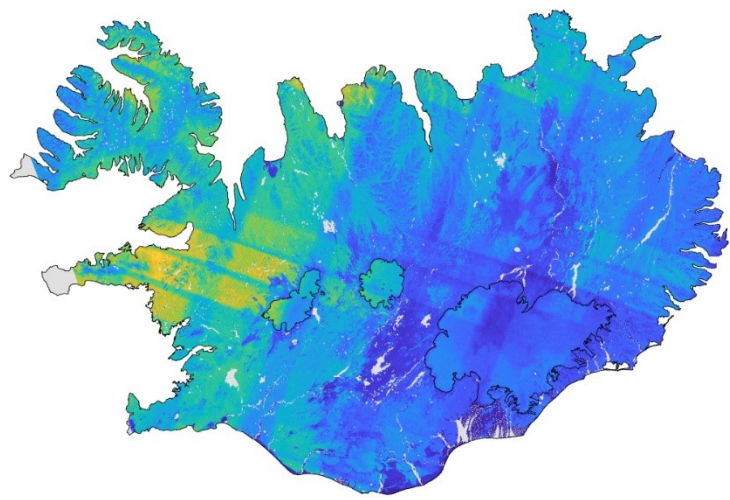


M vs. S2

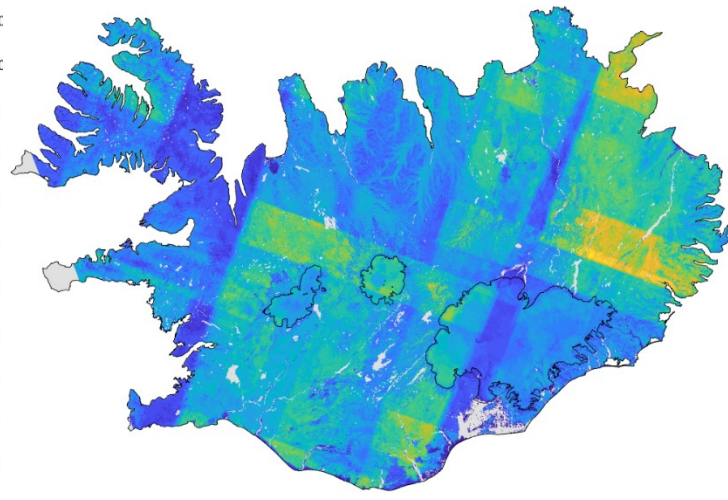


Samanburður / Fjöldi reita / Fylgni (Pixel based) Snjór vs. snjór

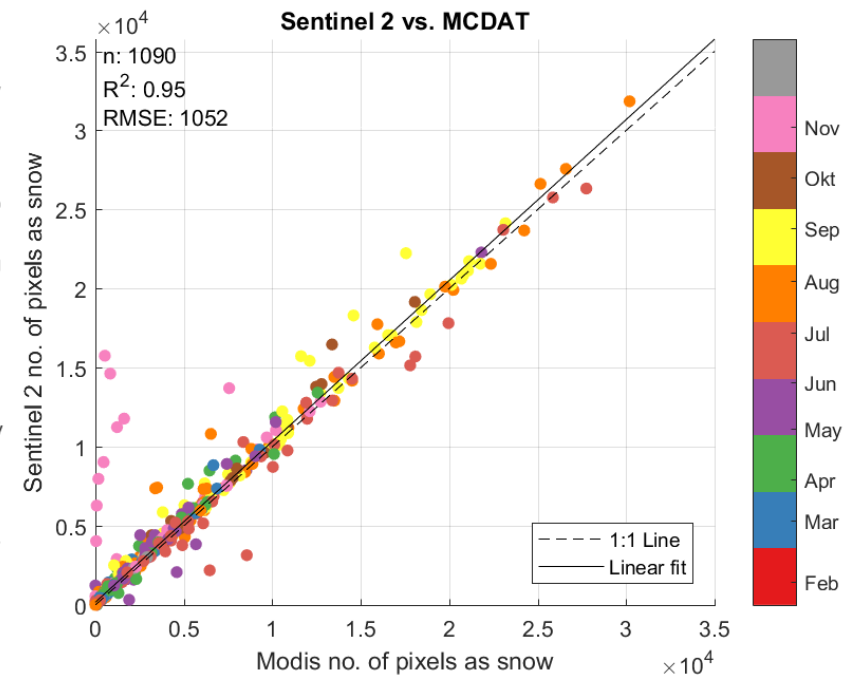
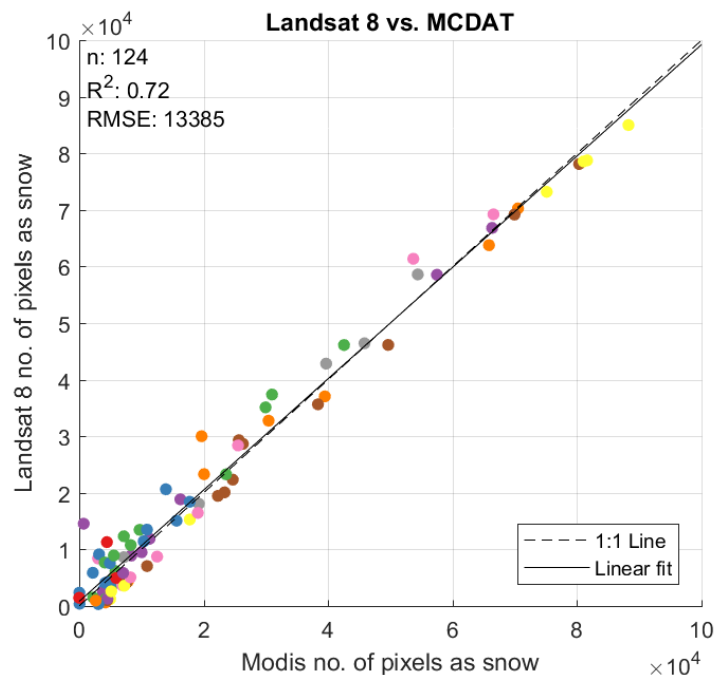
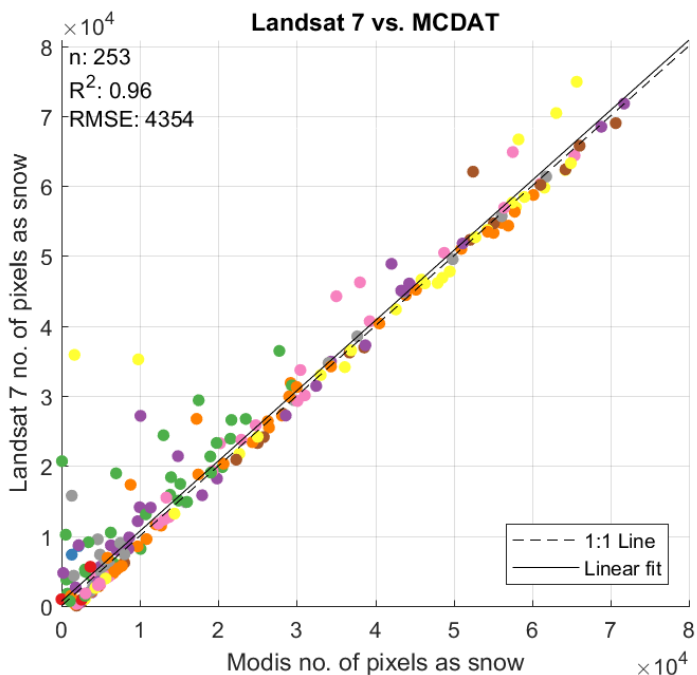
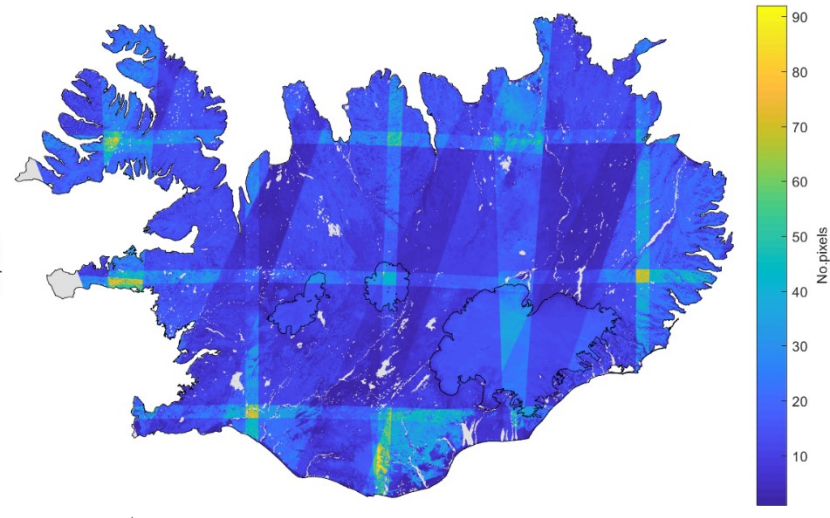
Landsat 7



Landsat 8



Sentinel 2

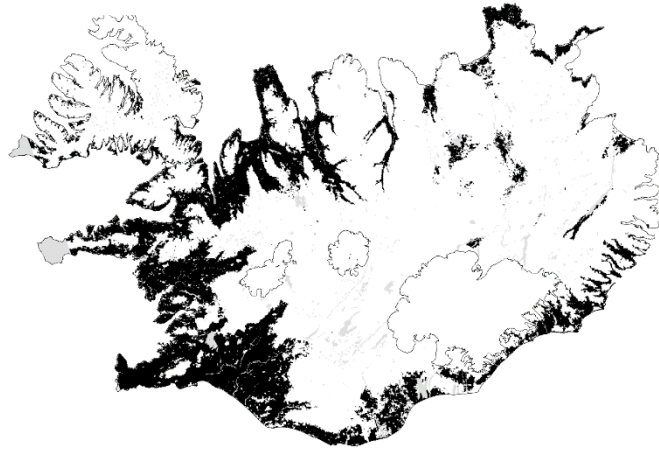


Snjóhula 15. Maí

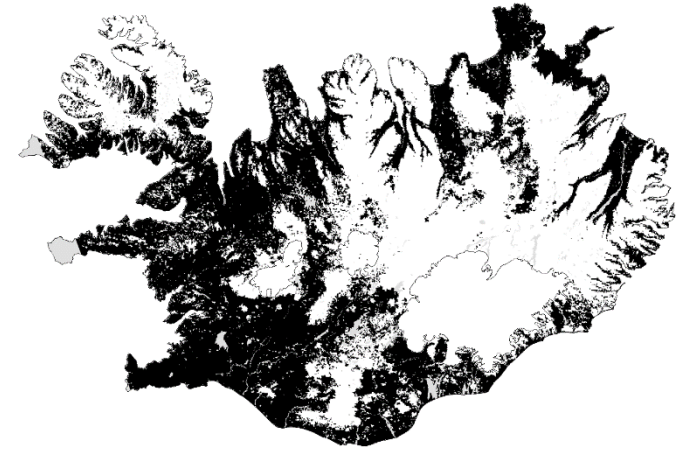
2003



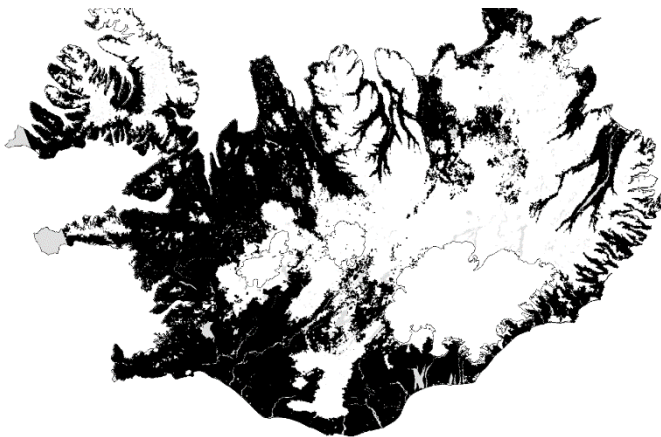
2015



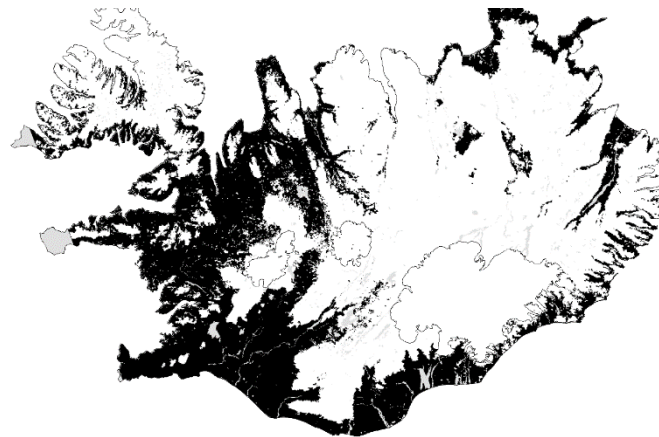
2010



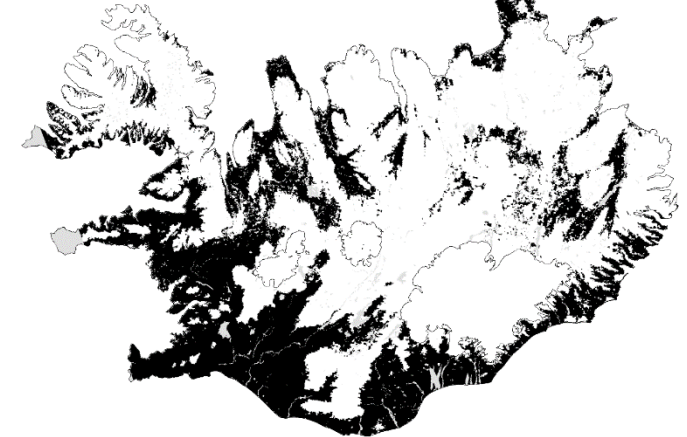
2001



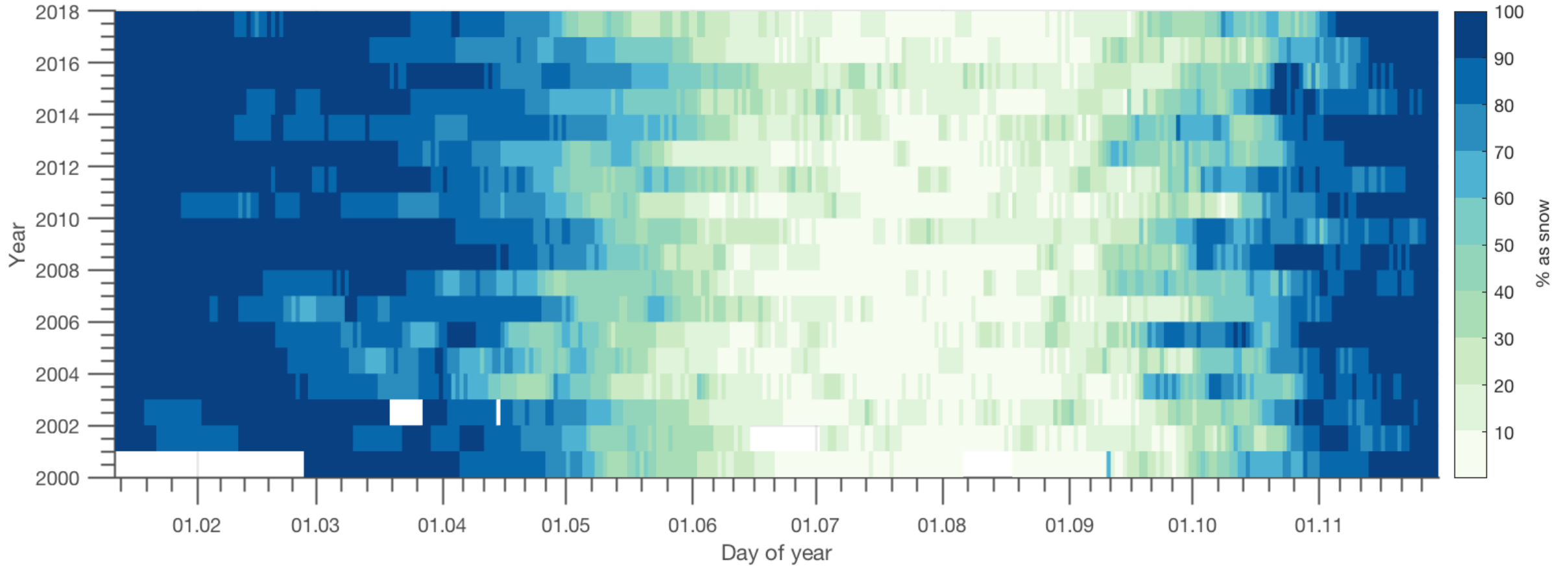
2013



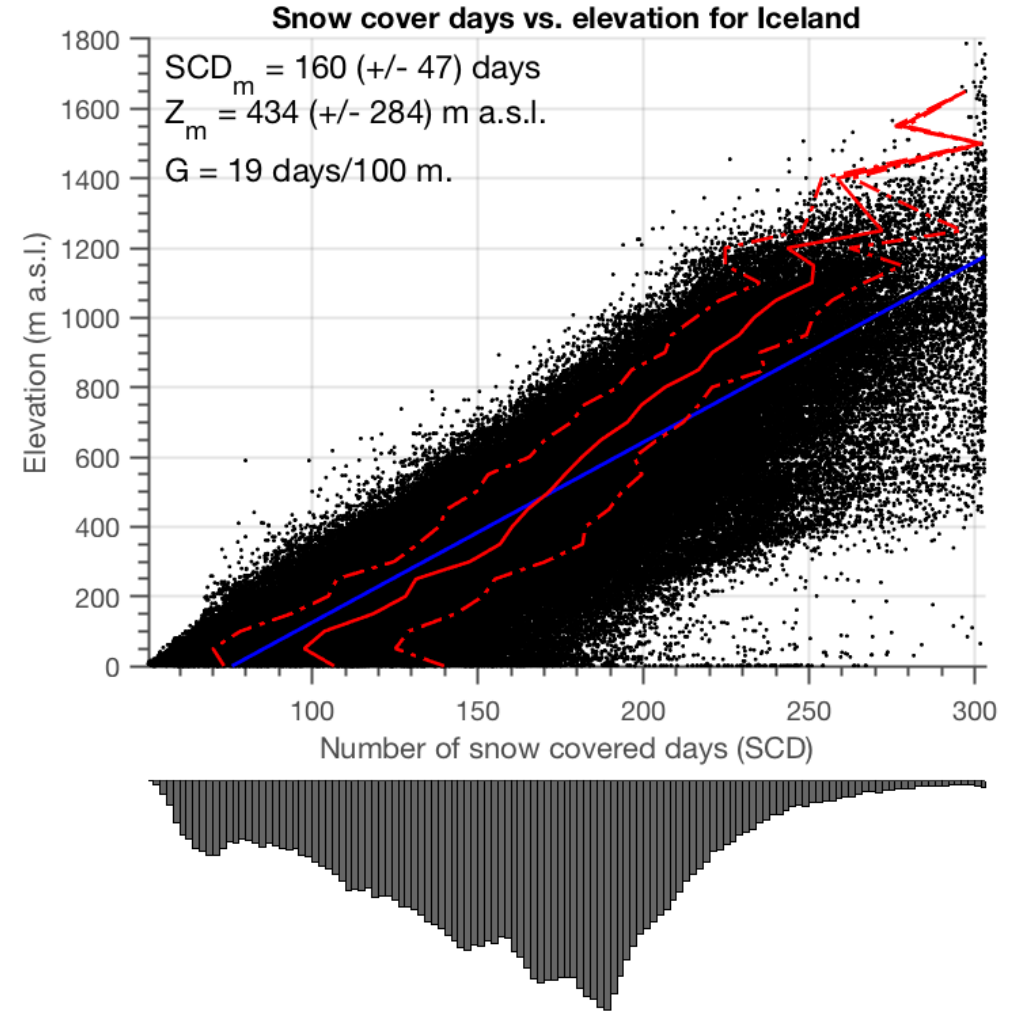
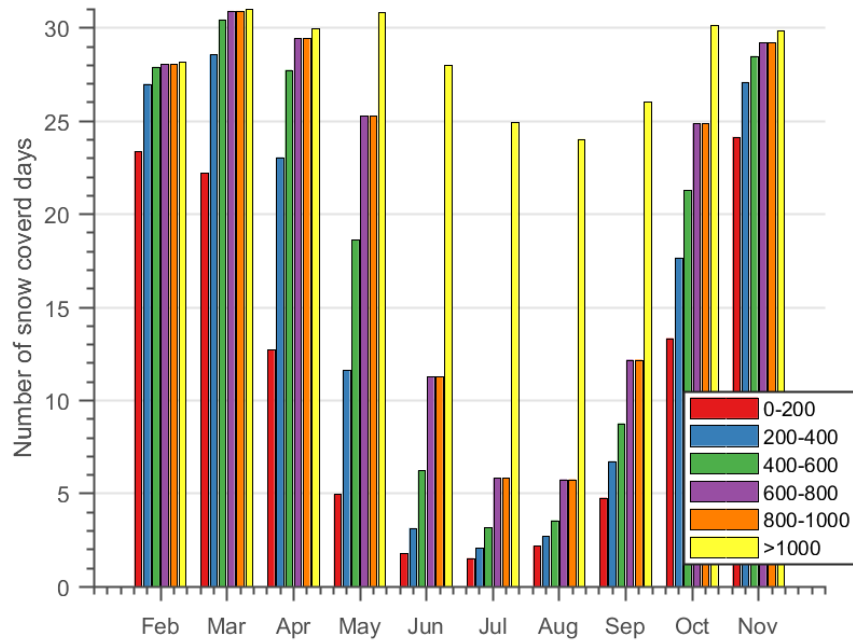
2012



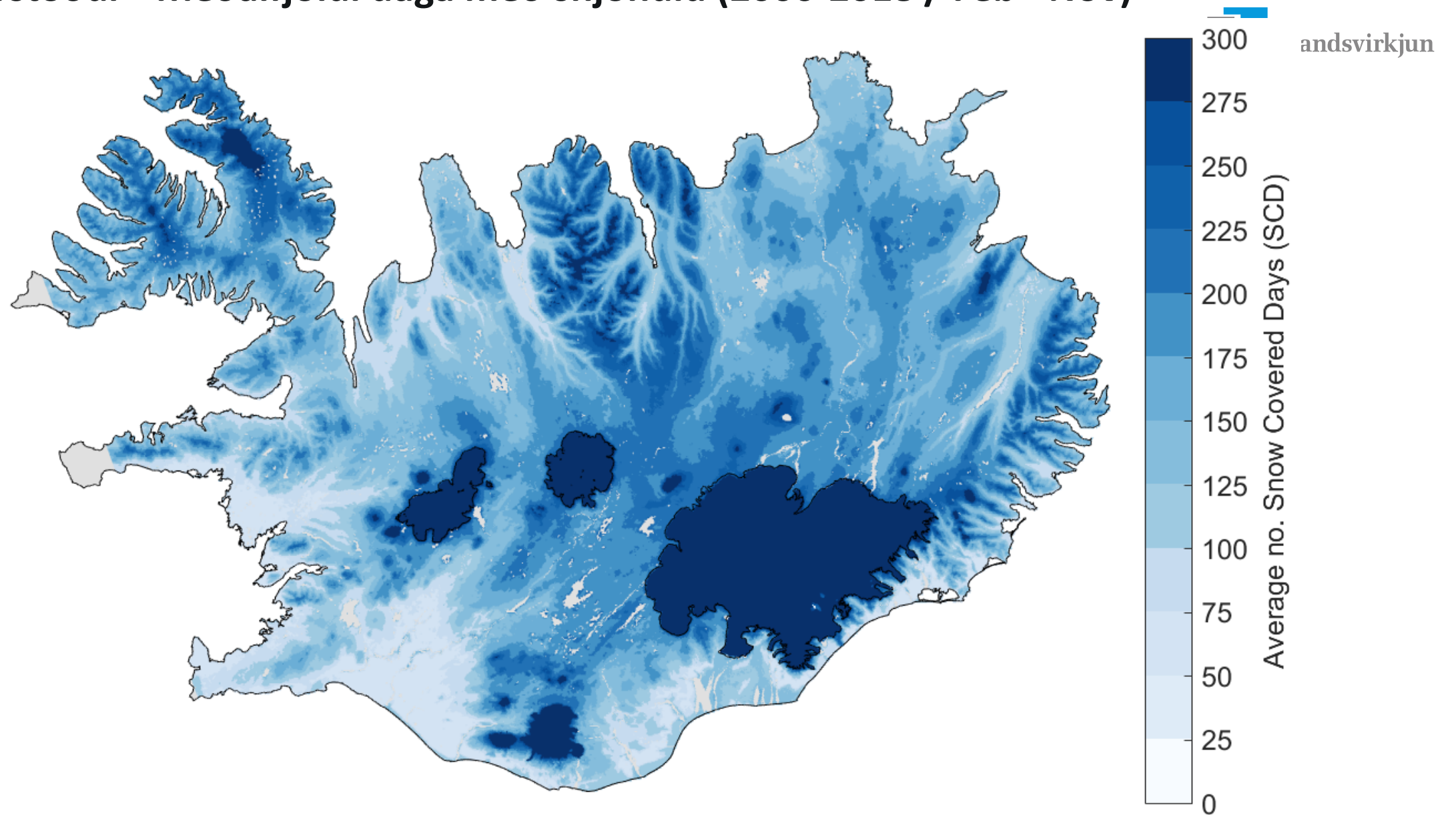
Snjóhula á Íslandi (Feb - Nón) (utan jökla)



Fjöldi daga með snjóhulu (SCD – Snow Cover Days)



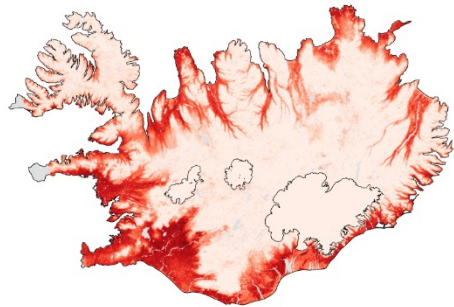
Niðurstöður - Meðalfjöldi daga með snjóhulu (2000-2018 / Feb - Nób)



Breytileiki mánaða (2000-2018 / Feb - Nón) (Staðalfrávik)

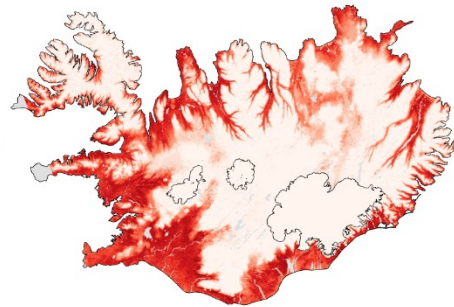
Febrúar

Standard deviation of SCD, Month: 2



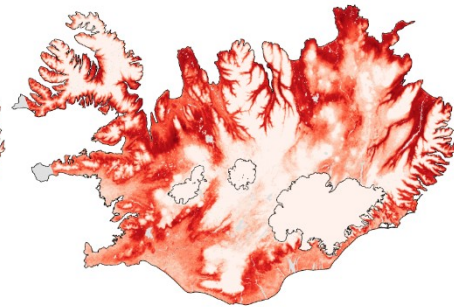
Mars

Standard deviation of SCD, Month: 3



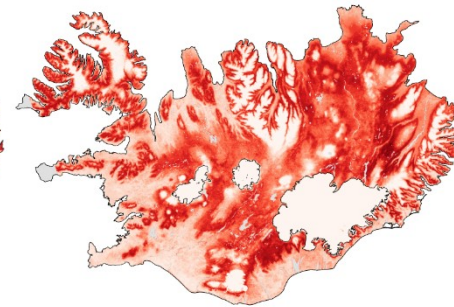
Apríl

Standard deviation of SCD, Month: 4



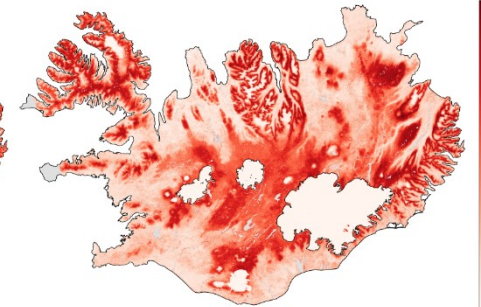
Maí

Standard deviation of SCD, Month: 5



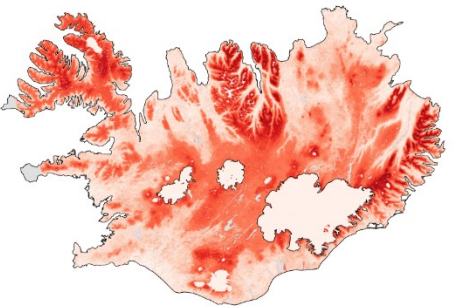
Júní

Standard deviation of SCD, Month: 6



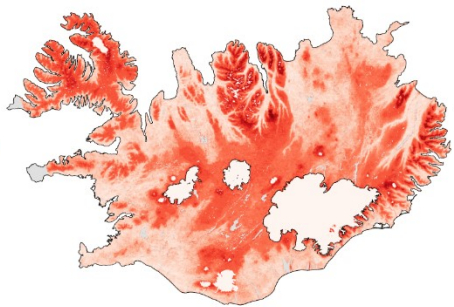
Júlí

Standard deviation of SCD, Month: 7



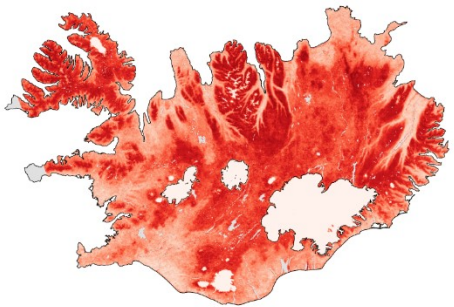
Ágúst

Standard deviation of SCD, Month: 8



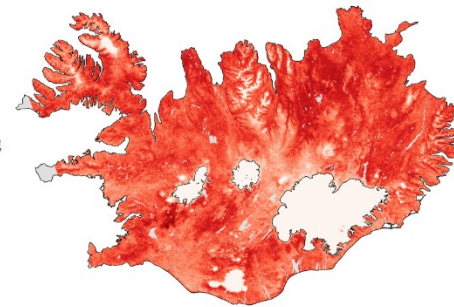
September

Standard deviation of SCD, Month: 9



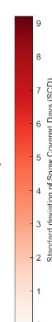
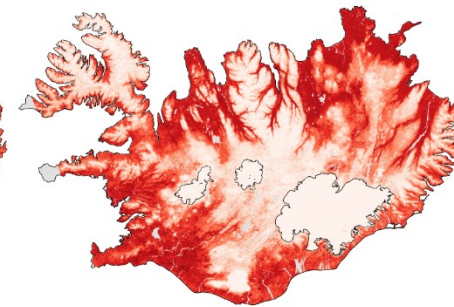
Október

Standard deviation of SCD, Month: 10



Nóvember

Standard deviation of SCD, Month: 11



Lítill breytileiki

0

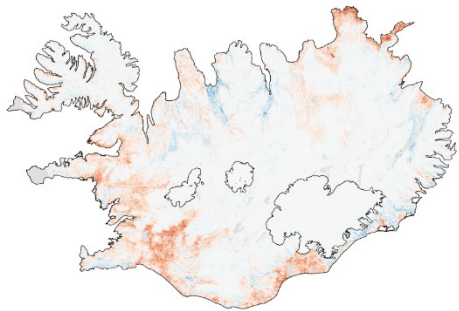


12

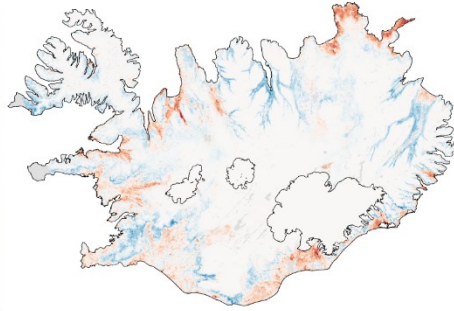
Mikill breytileiki

Leitni mánaða (2000-2018 / Feb - Nón)

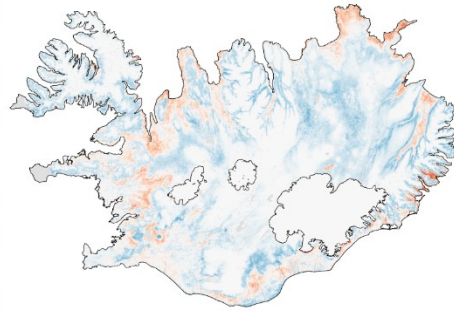
Febrúar



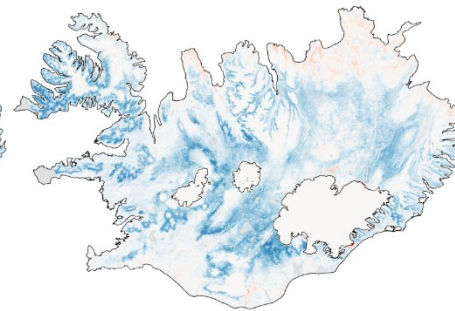
Mars



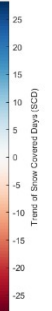
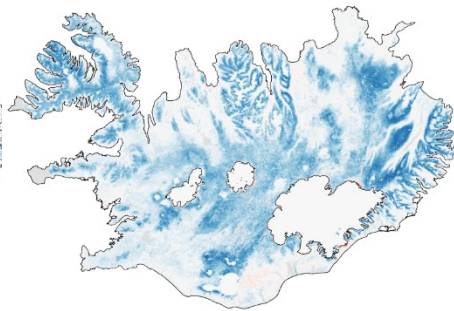
Apríl



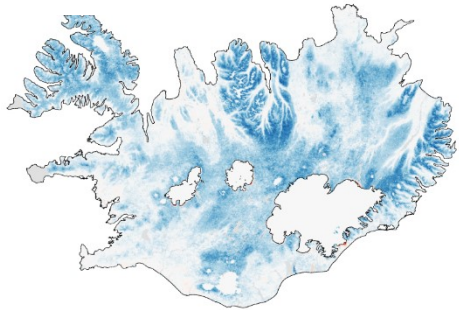
Maí



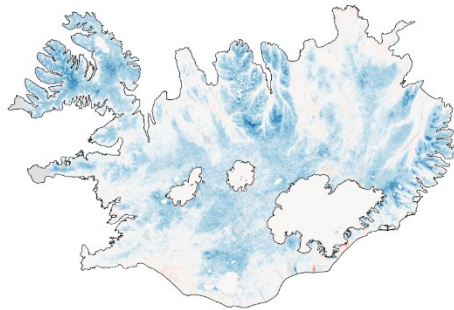
Júní



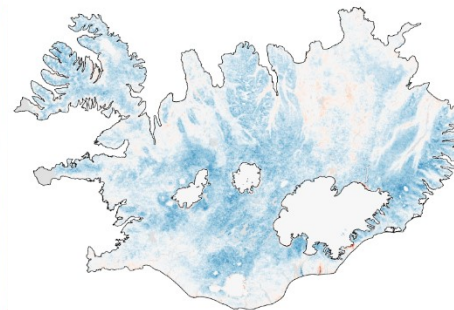
Júlí



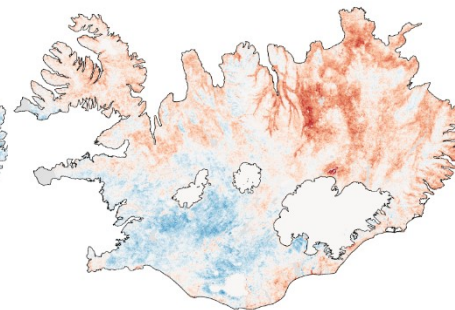
Ágúst



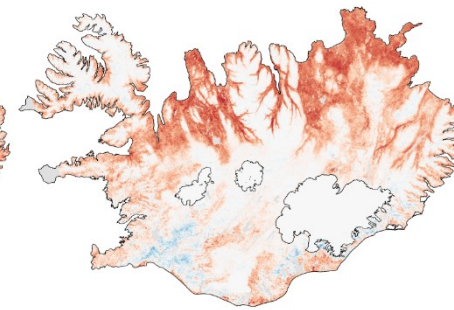
September



Október



Nóvember



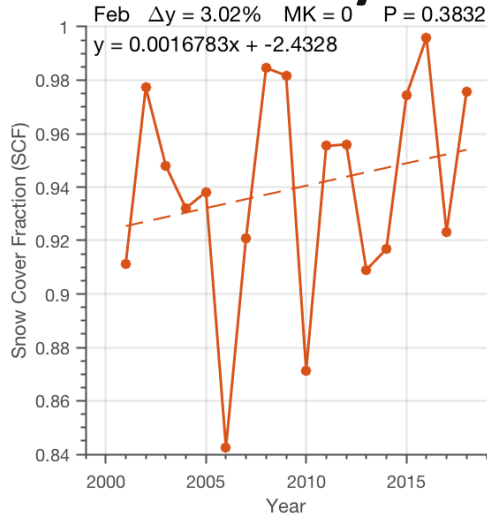
Færri dagar með snjóhulu



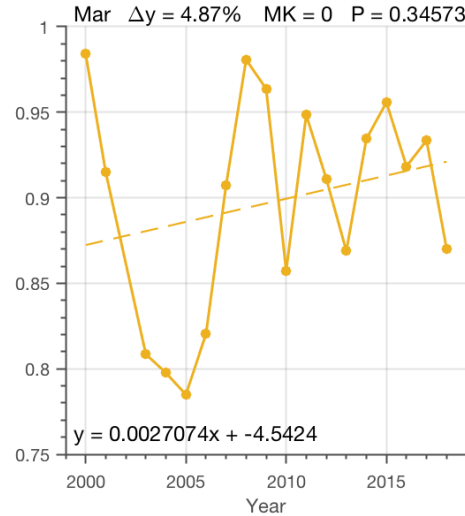
Fleiri dagar með snjóhulu

Leitni mánaðarmeðaltala fyrir Ísland (2000 - 2018)

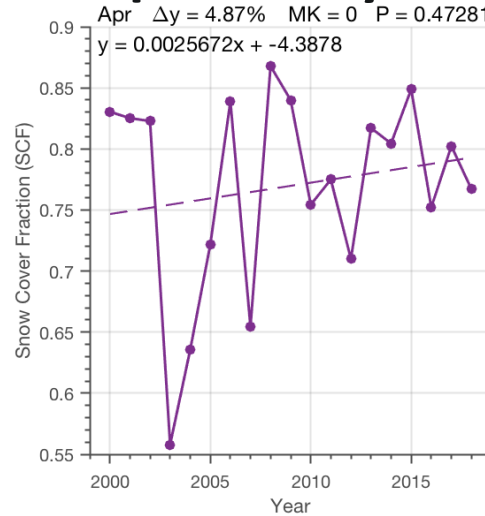
Feb Δy 3.02%



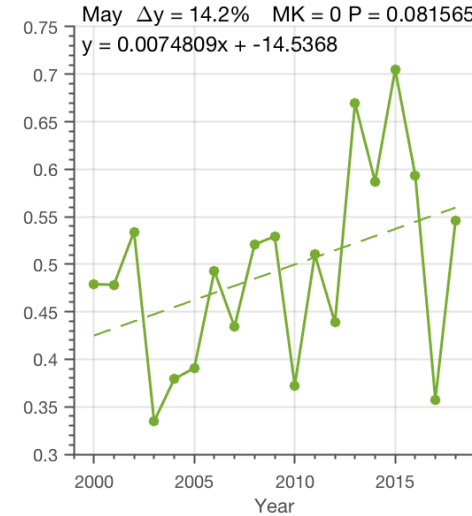
Mar Δy 4.7%



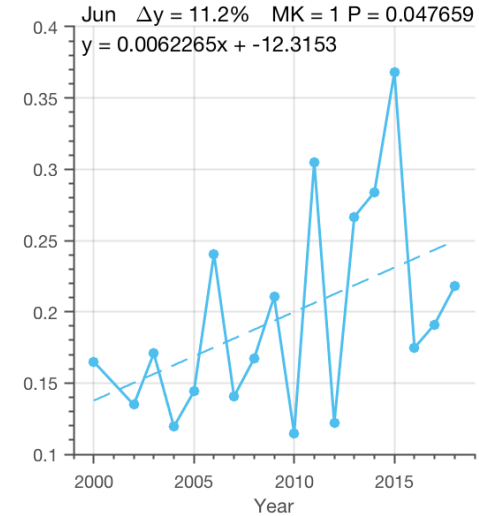
Apr Δy 4.8%



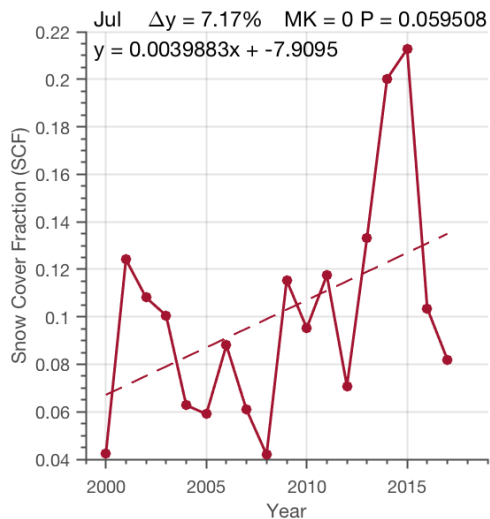
Mai Δy 14.2%



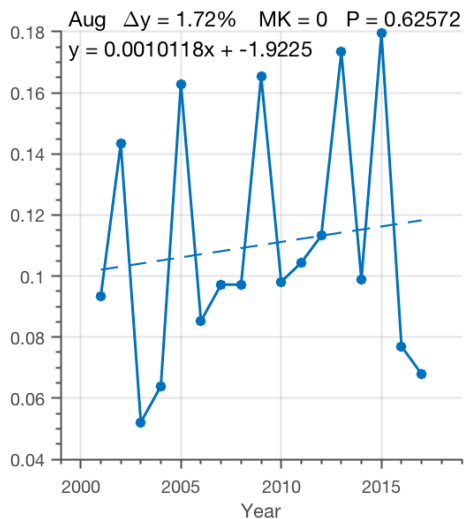
Jún Δy 11.2%



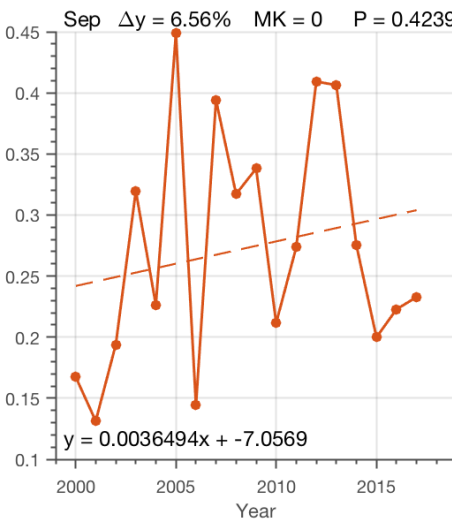
Júl Δy 7.17%



Ágú Δy 1.72%



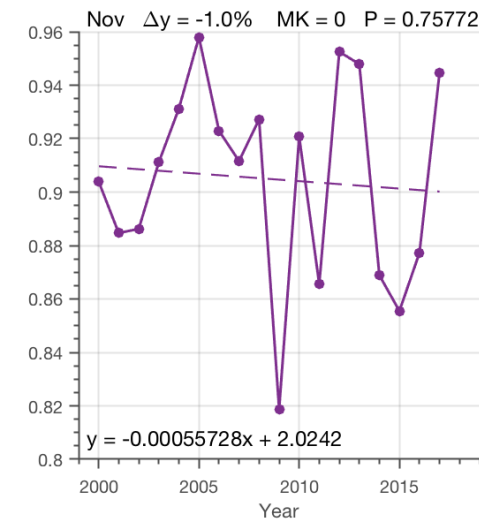
Sep Δy 6.56%



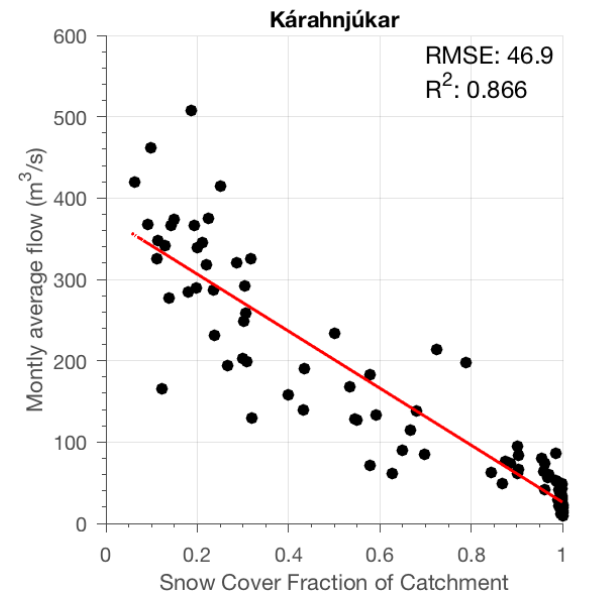
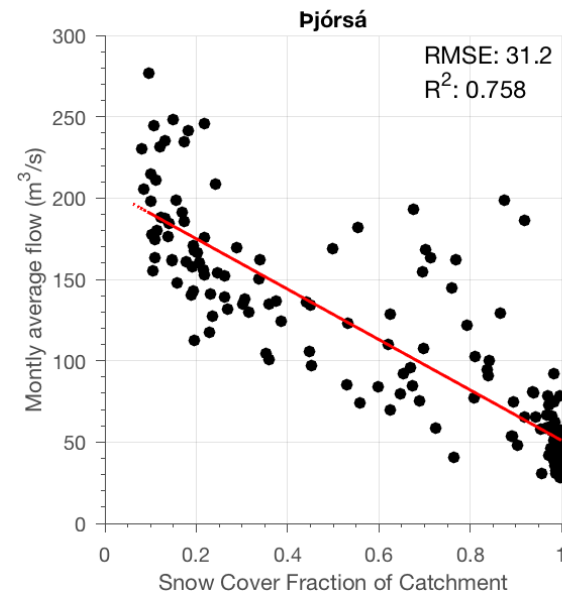
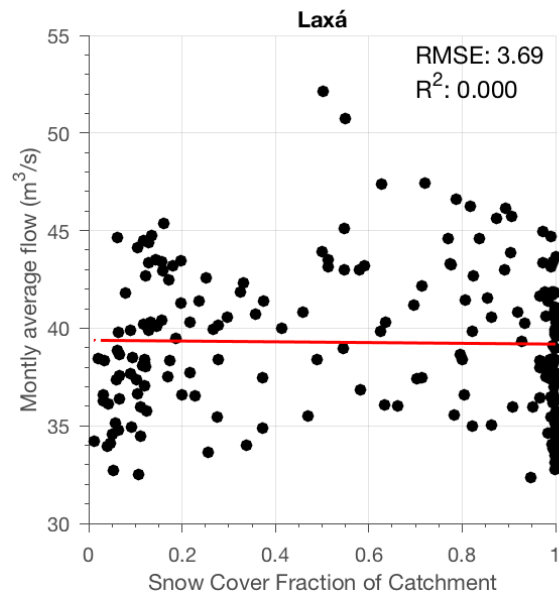
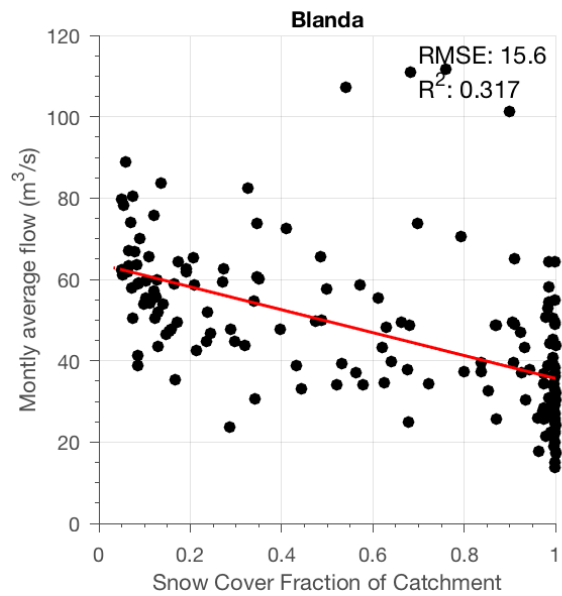
Okt Δy -3.4%



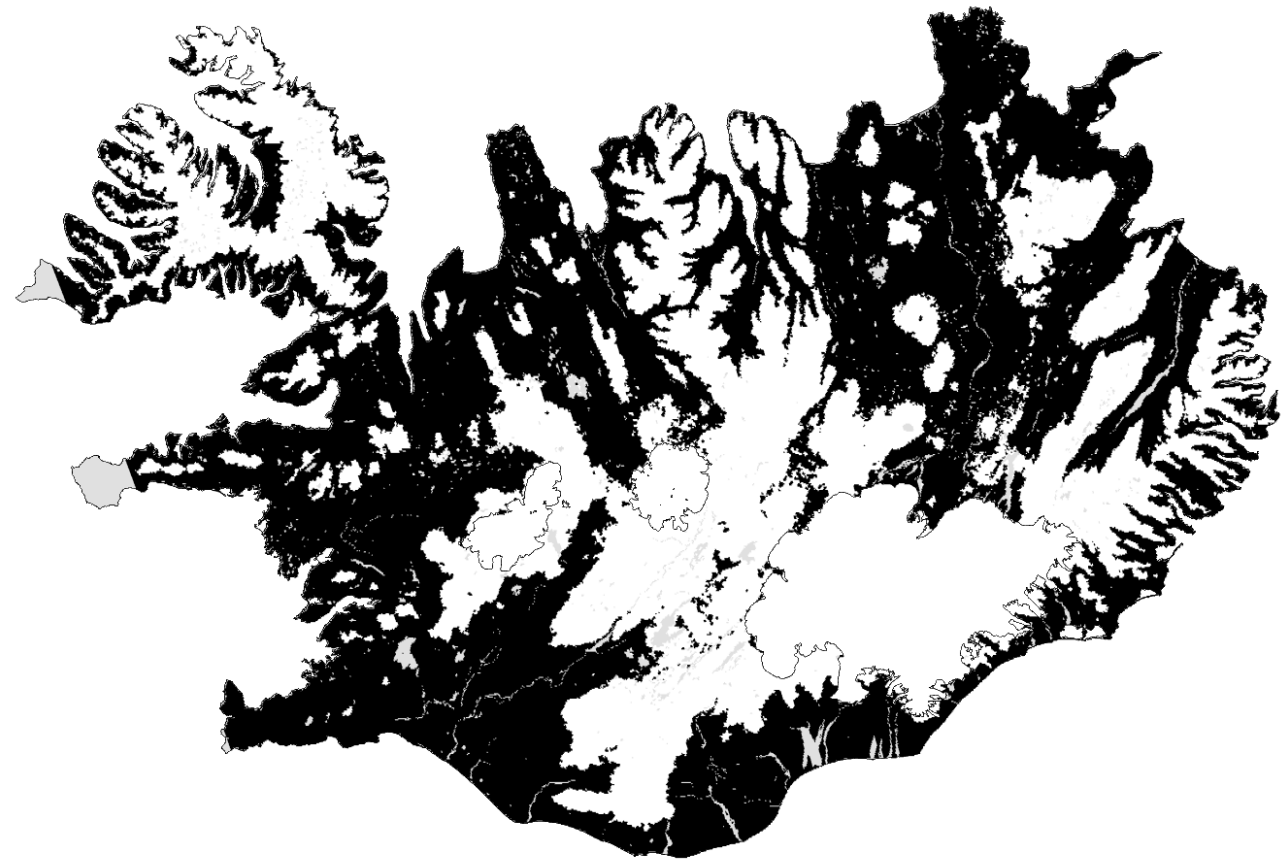
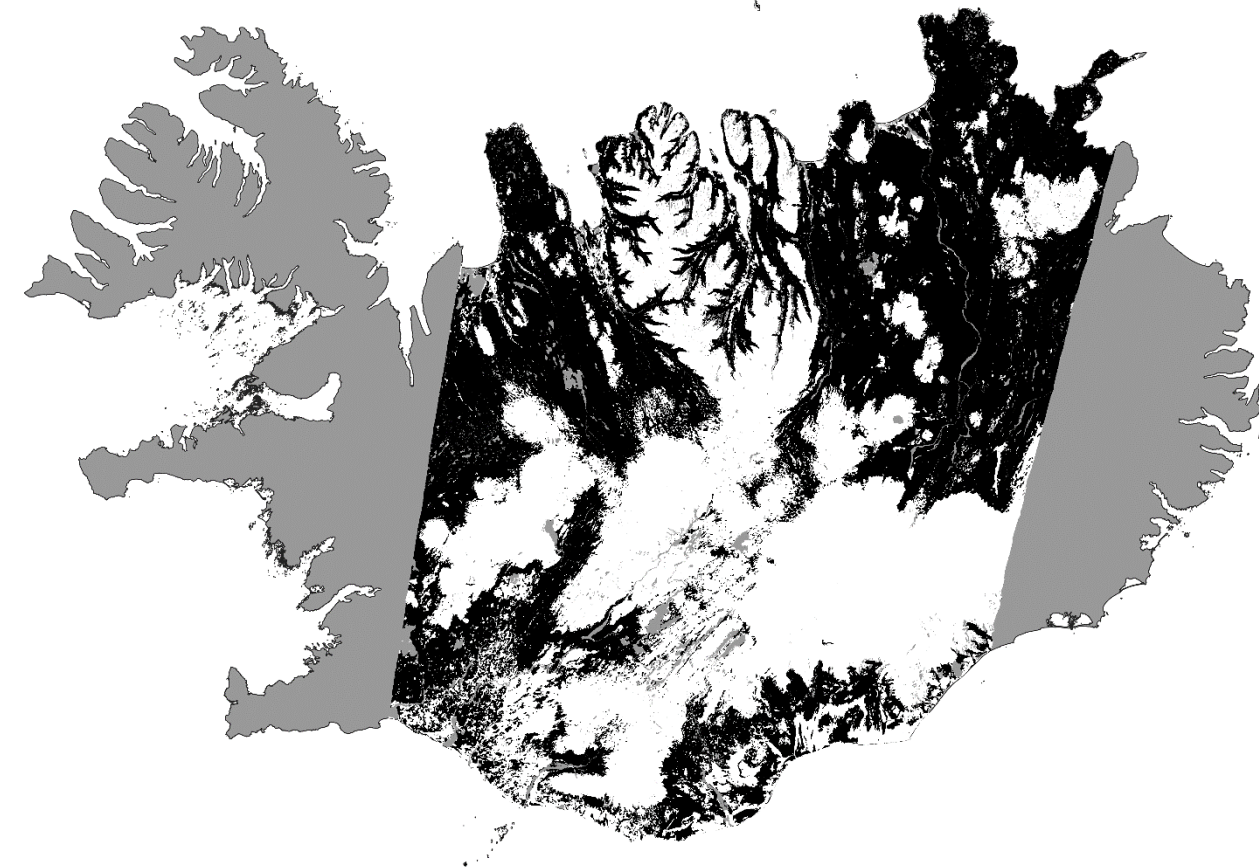
Nóv Δy -1.0%



Fylgni snjóhulu við rennsli

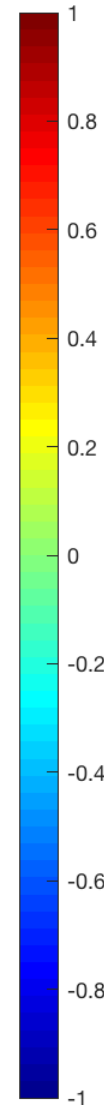
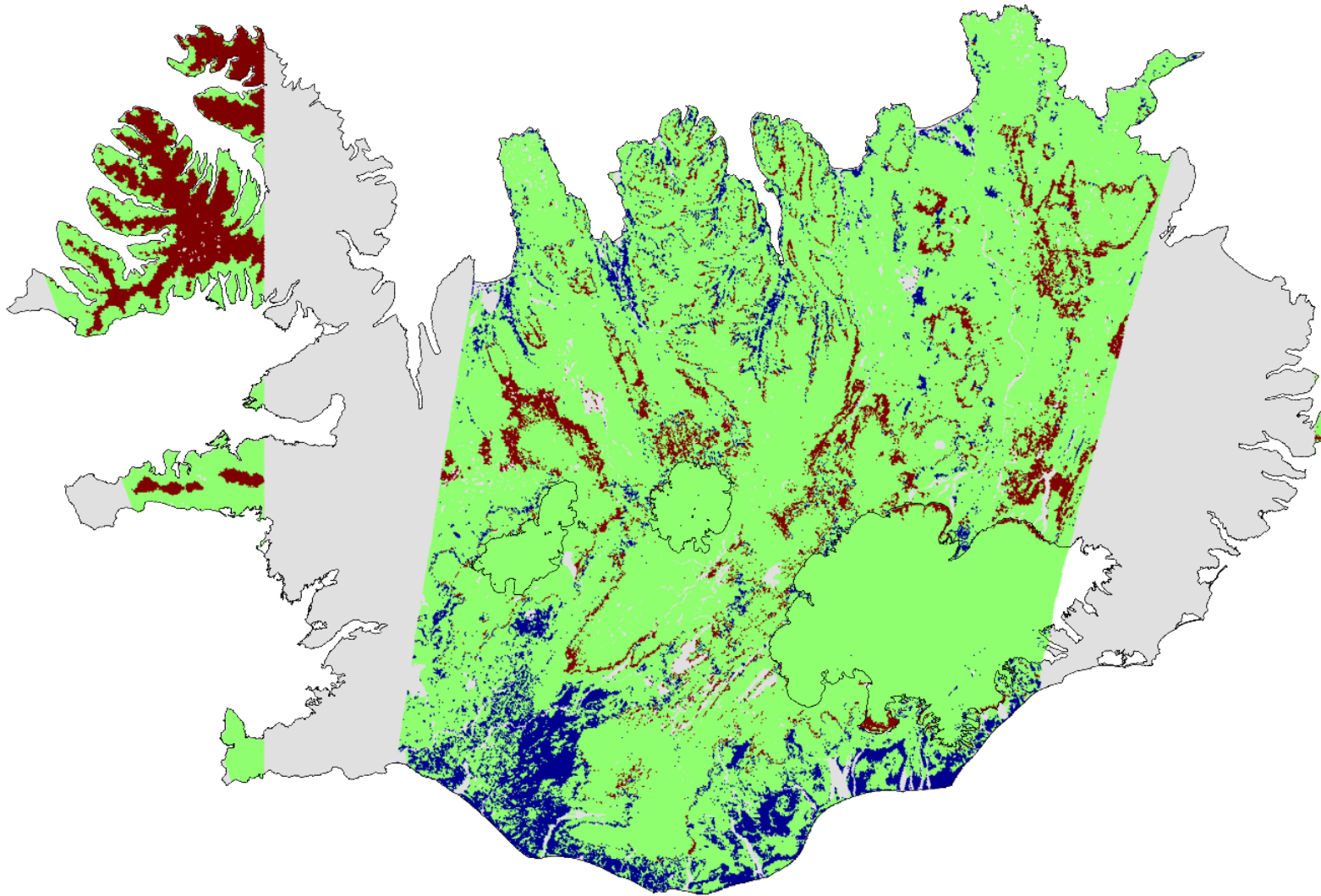


Næstu skref: Sentinel 1 vs. Modis



Mismunur afurða

Date: 05-May-2017



Modis = Snow
Sentinel 1 = No Snow

Modis = S1

Modis = No Snow
Sentinel 1 = Snow