



Climate Change

CARRA

Hvað er nú það?

Veðurþing 28. Nóv 2019

Bolli Pálmason





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Verkefnistjórinn Harald Schyberg (Met.no)

Copernicus Arctic Regional Reanalysis Service

PRODUCTION OF THE FIRST EUROPEAN ARCTIC REGIONAL REANALYSIS THE PROJECT TEAM



Production of the first European Arctic regional reanalysis



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CARRA vinnuhópurinn

Met.no: Harald Schyberg, Mariken Homleid, Morten Køltzow, Roger Randriamampianina, Per Dahlgren, Eivind Støylen, Teresa Valkonen

DMI: Xiaohua Yang, Kristian Pagh Nielsen, Bjarne Amstrup

SMHI: Jelena Bojarova, Heiner Körnich, Magnus Lindskog

GEUS: Jason Box, Kenneth Mankoff

VÍ: Bolli Pálmason, Sigurður Þorsteinsson

...og fleiri, **FMI** og **MF** voru með lítið hlutverk



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CARRA endurgreiningin

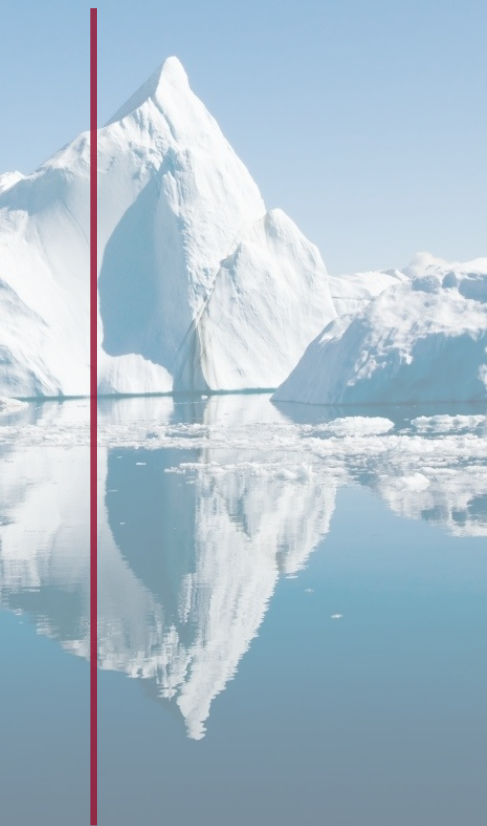
Copernicus C3S samningur 322 Lot 2:

- Endurgreining í 24 ár (júlí 1997 til júní 2021)
- HARMONIE-AROME líkanið í 2.5 km upplausn með 3D-Var gagnahermin / greiningu
- ECMWF ERA-5 á jaðrinum á 1 klst fresti
- Greining og spá: 6x +3 klst og 00/12 +30 klst
- Tvö reiknisvæði



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CARRA reiknisvæðin





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Gagnasöfnun og þróun

- Vinna hófst 2017, en fór ekki á fullt fyrir en 2018
- Gagnasöfnun:
 - Hefðbundnar athuganir (SMHI tók saman)
 - Gervitunglagögn
 - Útbreiðsla hafíss – dagleg kort (DMI og FMI)
 - Endurkast á jöklum – dagleg kort (GEUS)
 - Landgerð (VÍ)
- Þróun:
 - 3DVar
 - Lesa inn endurkast á jöklum (DMI/SMHI/VÍ)
 - Snjóskema og núllstilling á snjó og gagnahermun á snjó (Met.no/SMHI/VÍ)

September 2017:
Project start



September 2018:
Beta version of
system



April 2019:
Reanalysis
production start



June 2021:
Production
completed,
dataset released



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Hlutverk VÍ

Þeir sem komu að verkefninu hér á VÍ:

- **Undirbúningur:** Halldór, Bolli og Siggi Þ.
- **Reiknishaldið:** Jórunn og Hugrún
- **Athuganir:** Tryggvi, Siggi J., Bolli og Trausti
- **Gagnahermun:** Siggi Þorsteins.
- **Landgerð, snjóskema, endurkast á jöklum og sannprófanir:** Bolli



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Landgerðarvinnan

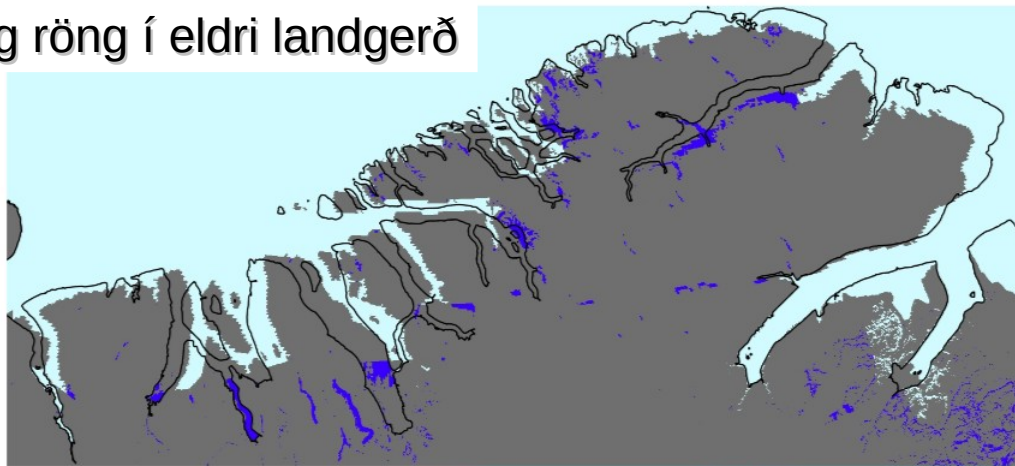




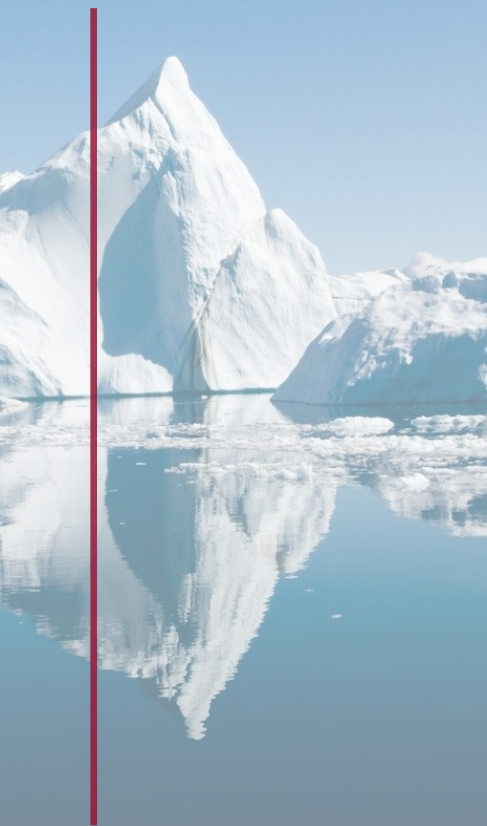
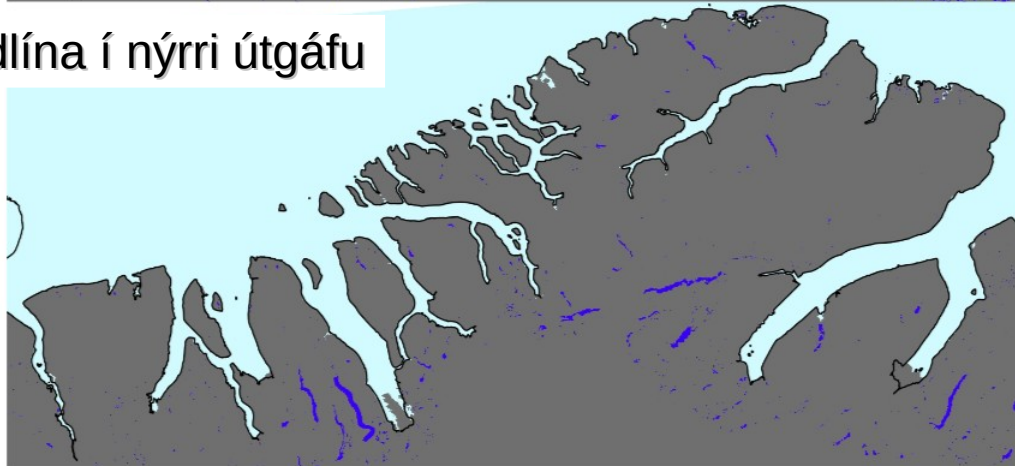
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Landgerðarvinnan

Strandlína mjög röng í eldri landgerð



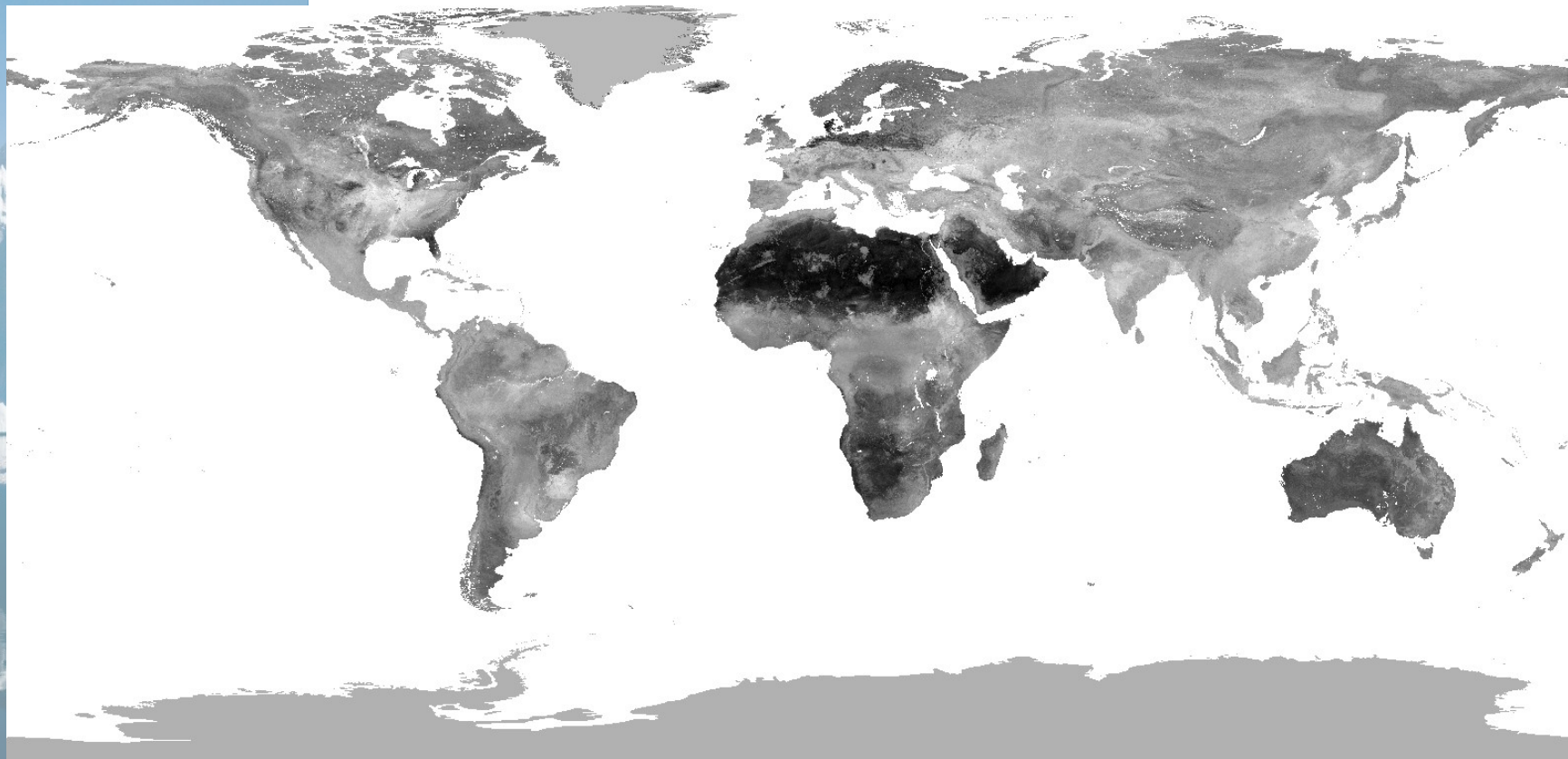
Lagfærð strandlína í nýrri útgáfu





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SoilGrids gagnagrunnurinn





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CARRA IGB uppsett með SoilGrids



HWSD sand/clay 1 km databases
overwritten with SoilGrids 250 m
databases

Overwritten with local data from
Iceland.

Coastline fixes to be in sync with the
new ECOCLIMAP-II coastline for
Greenland

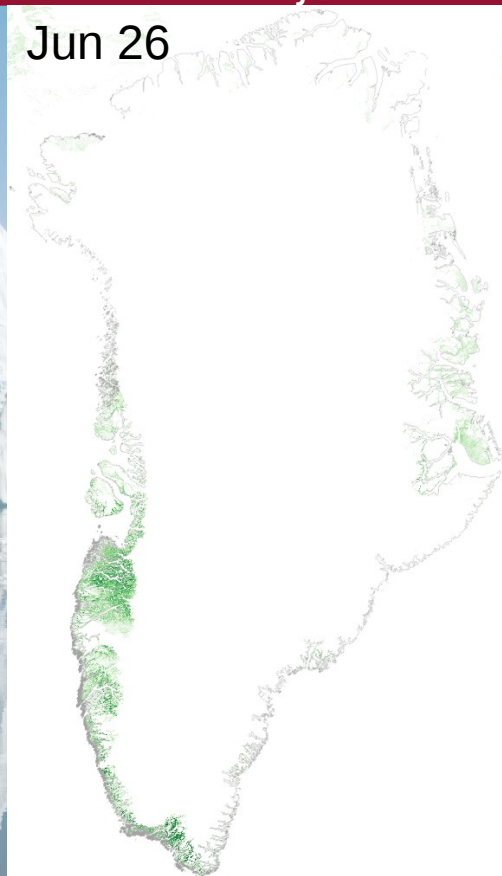
Left: CARRA IGB sand fractions with
new HWSD



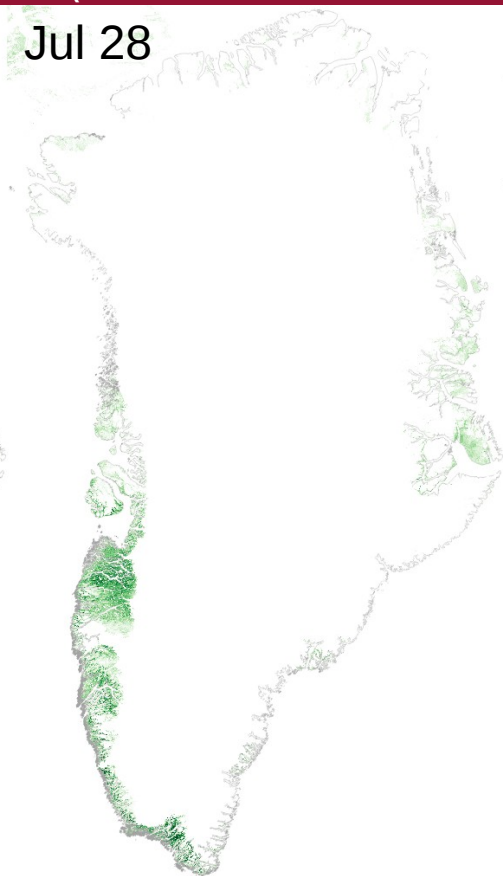
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MODIS fjölmára (2003-2017) LAI

Jun 26



Jul 28



Aug 29

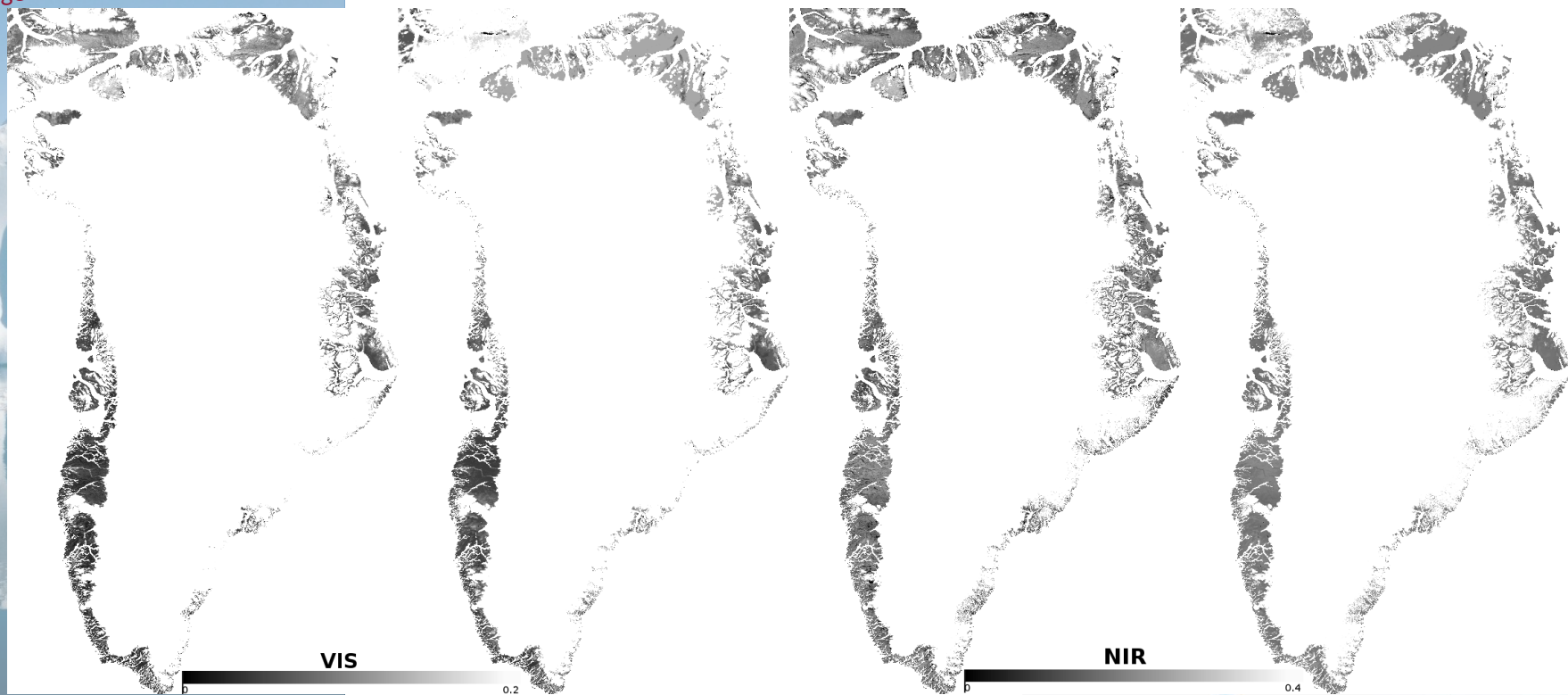




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MODIS fjölára 2000-2017 VIS/NIR

MODIS vinstri og uppsett CARRA (IT: 2017080100) hægri





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ArcticDEM yfir Grænlandi



ArcticDEM v7 kom út haustið 2018 og ég lagðist í þá vinnu að koma því inn í CARRA fyrir Grænland

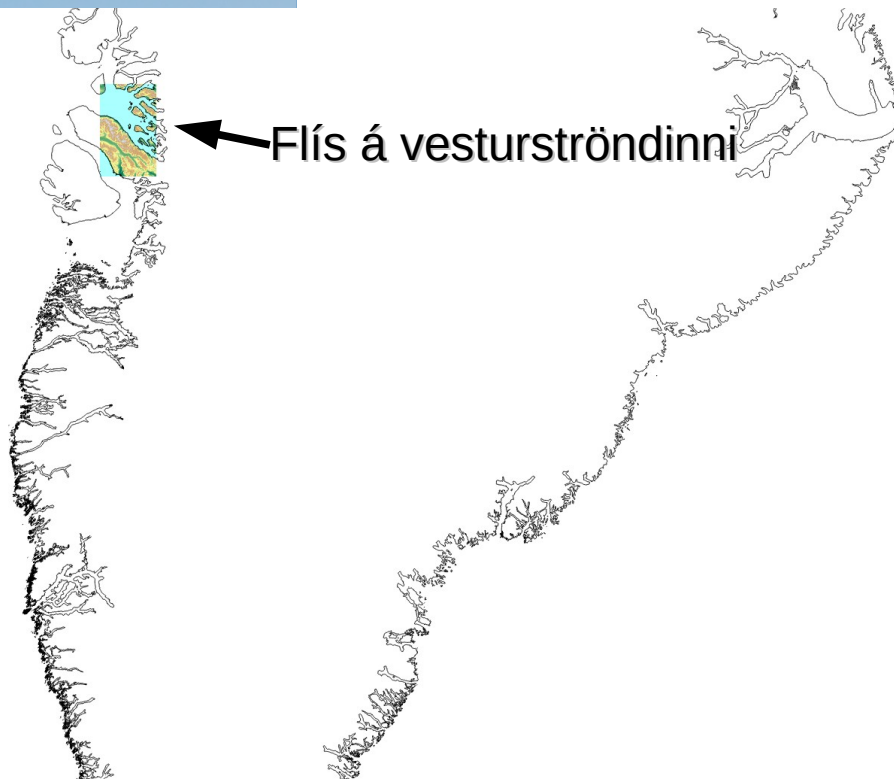
ArcticDEM v7 var góð uppfærsla frá v6, EN...

- Þegar rýnt er í smáatriði koma í ljós mikið af götum (nodata)
- Við nánari skoðun mátti sjá að það voru ekki alltaf sömu holur í v7 og v6
- Ég ákvað að reyna að lagfæra v7 með v6, en þurfti líka að nota brúun, AsterDEM og í einstaka tilfellum handavinnu
- Allt gert í GDAL/QGIS/Python í 90 m. upplausn



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ArcticDEM v7 vinnuaðferðin



Grænlandi skipt upp í 171 flísar yfir ströndinni og inn í jökulísinn (ekki þurfti að leiðrétta miðjuna)

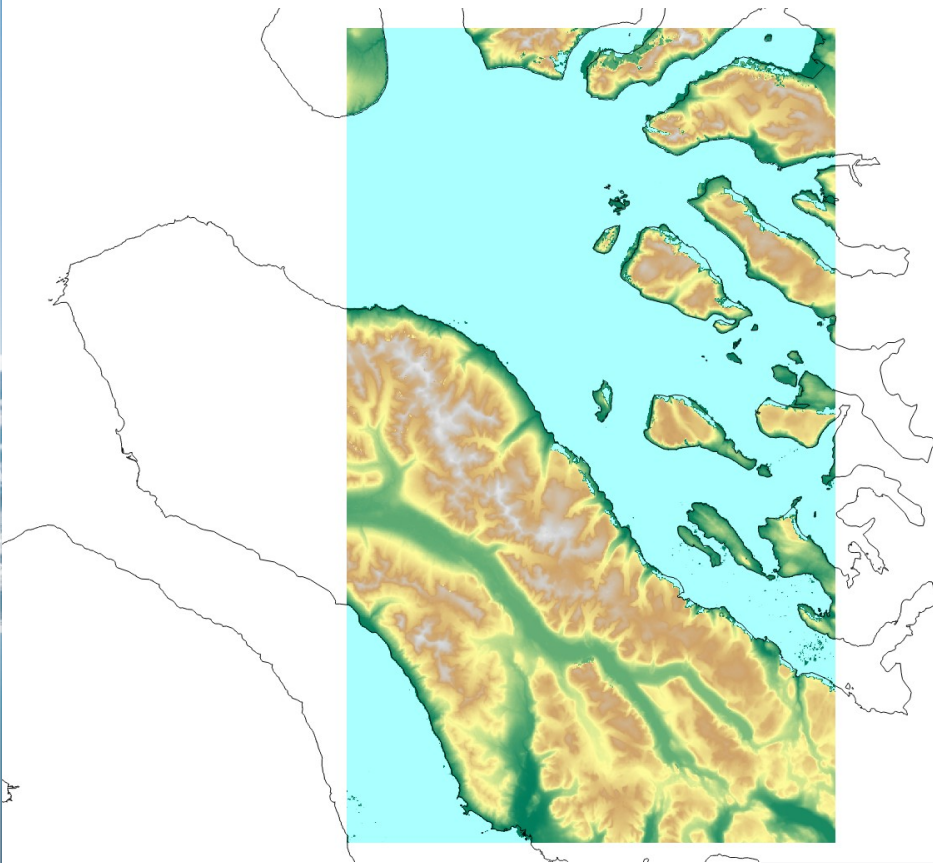
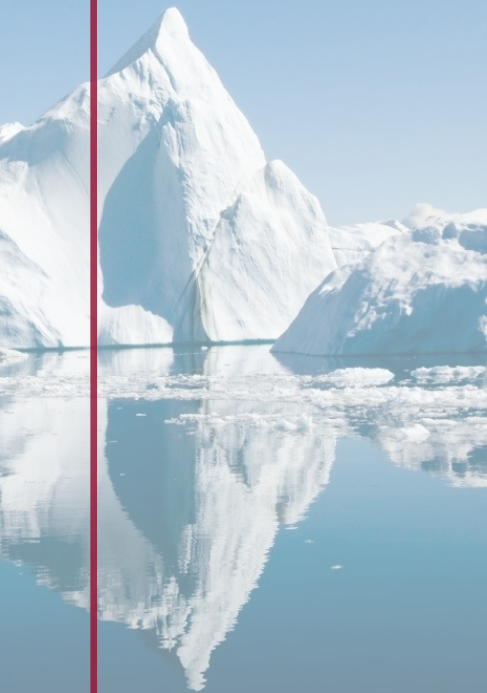
Fyrir hverja flís var gerðar margar flísar:

- 1) A.DEM v7 holufyllt með v6
- 2) A.DEM v6
- 3) A.DEM v7 holufyllt með brúun (bi-linear)
- 4) AsterDEM
- 5) TanDEM-X til samaburðar
- 6) Mismunakort milli 1) og allra hinna kortanna



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Flís á vesturströndinni



ECMWF

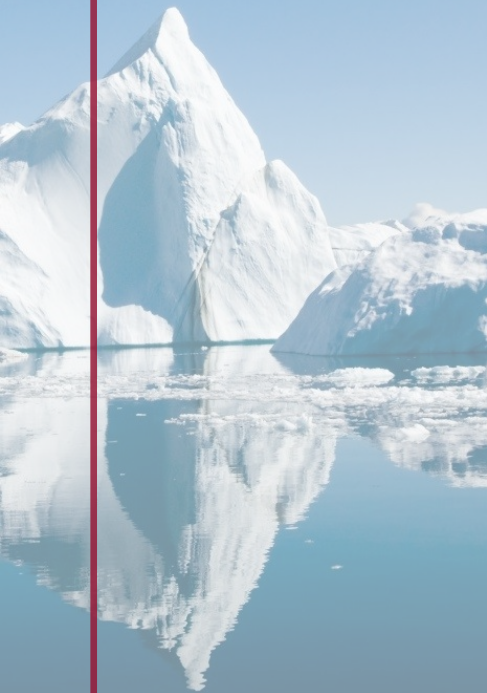
Copernicus
Europe's eyes on Earth

European
Commission



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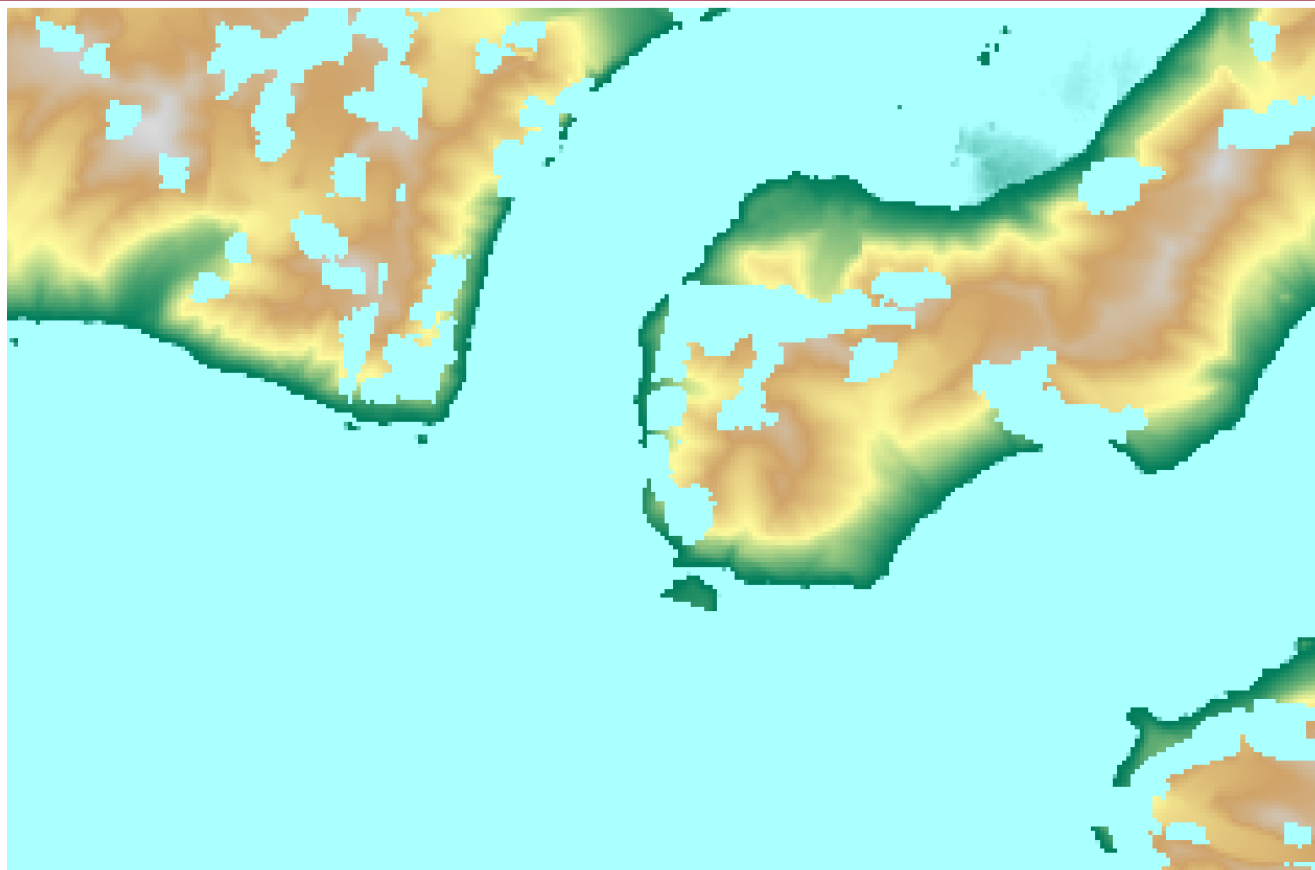
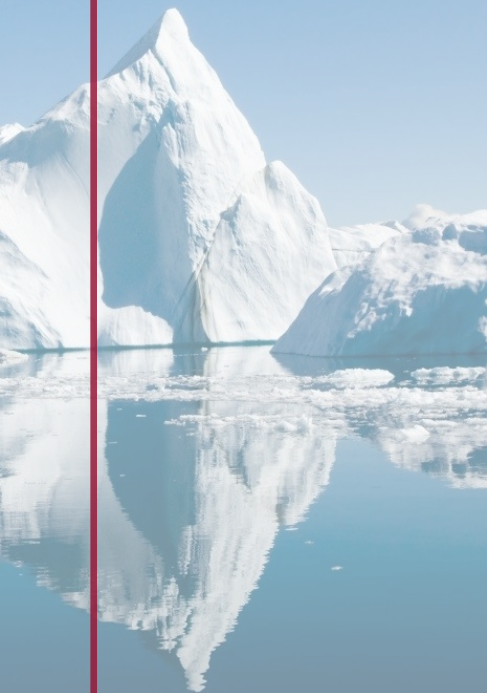
Sentinel 2 yfir norðurhluta flísar





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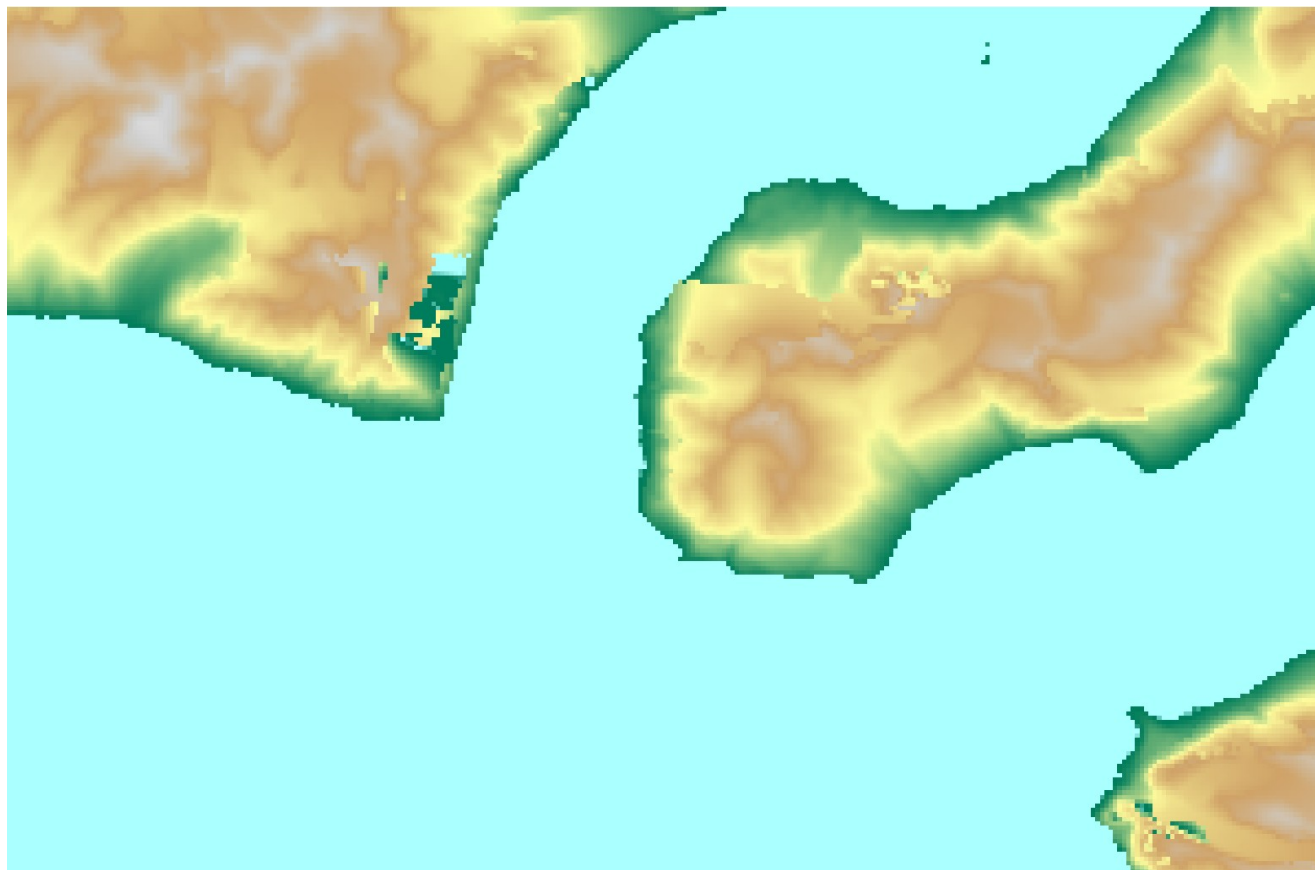
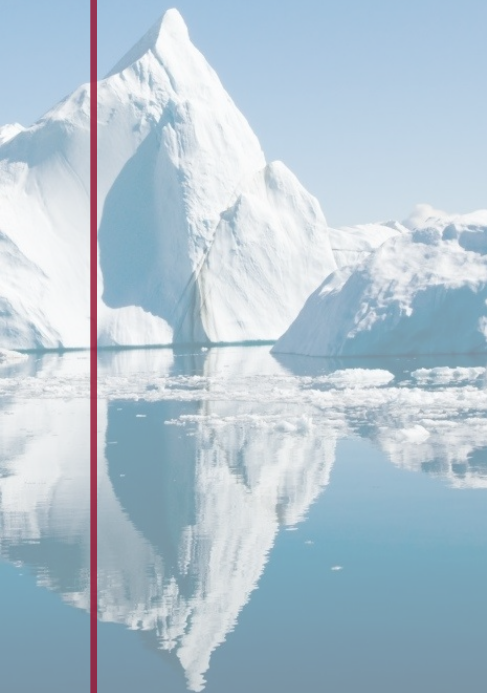
ArcticDEM v7





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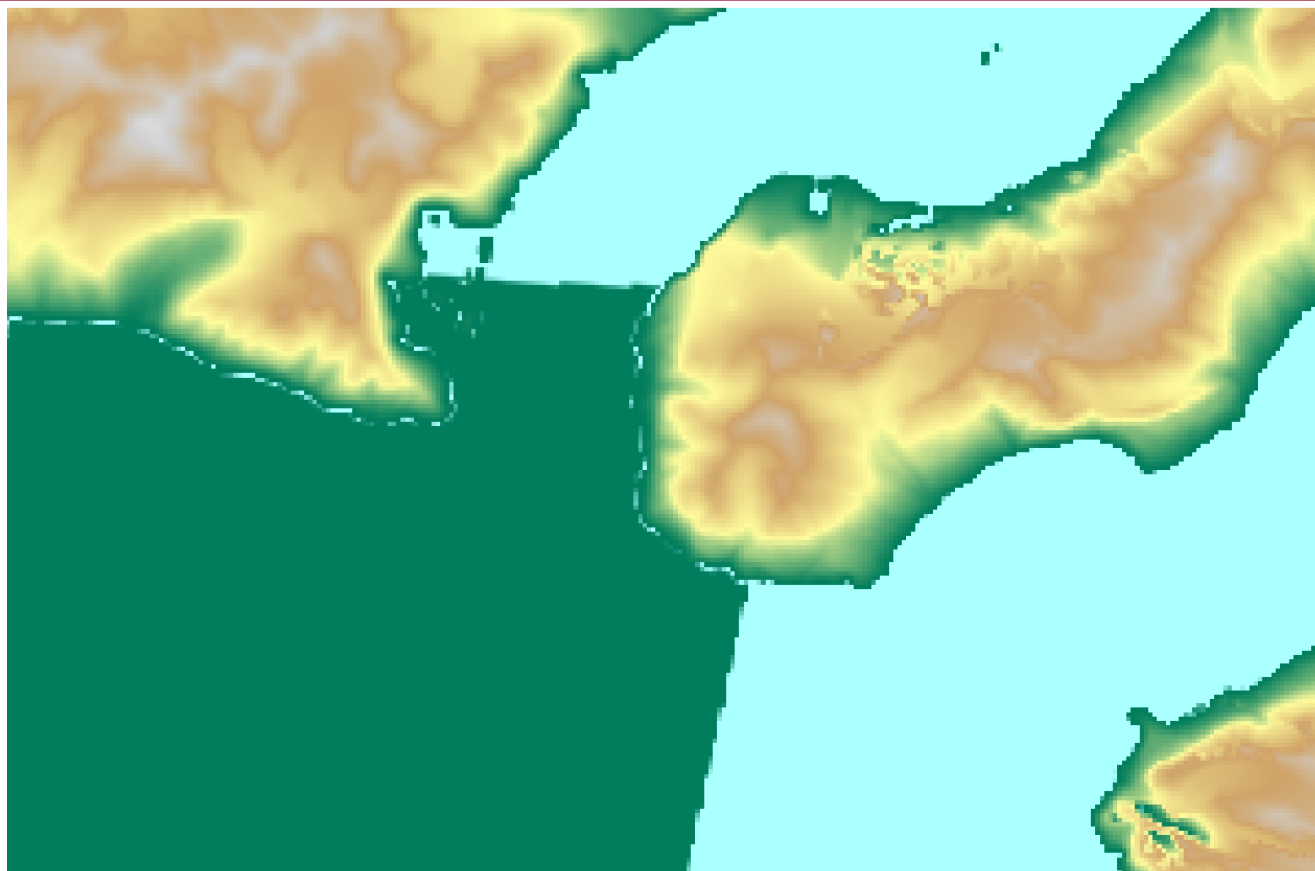
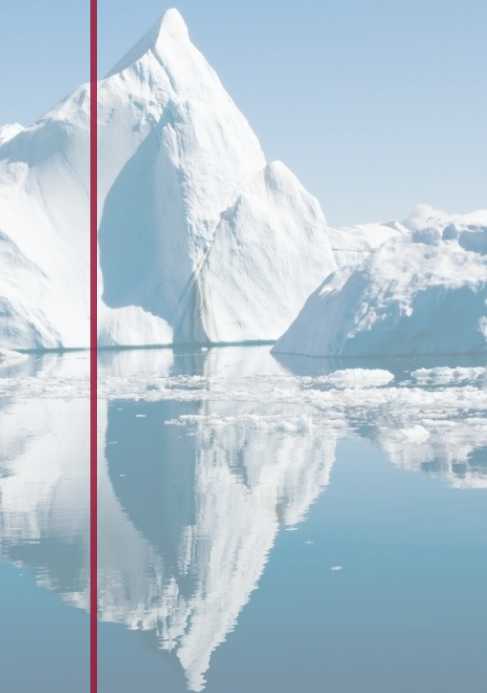
ArcticDEM v7 holufyllt með v6





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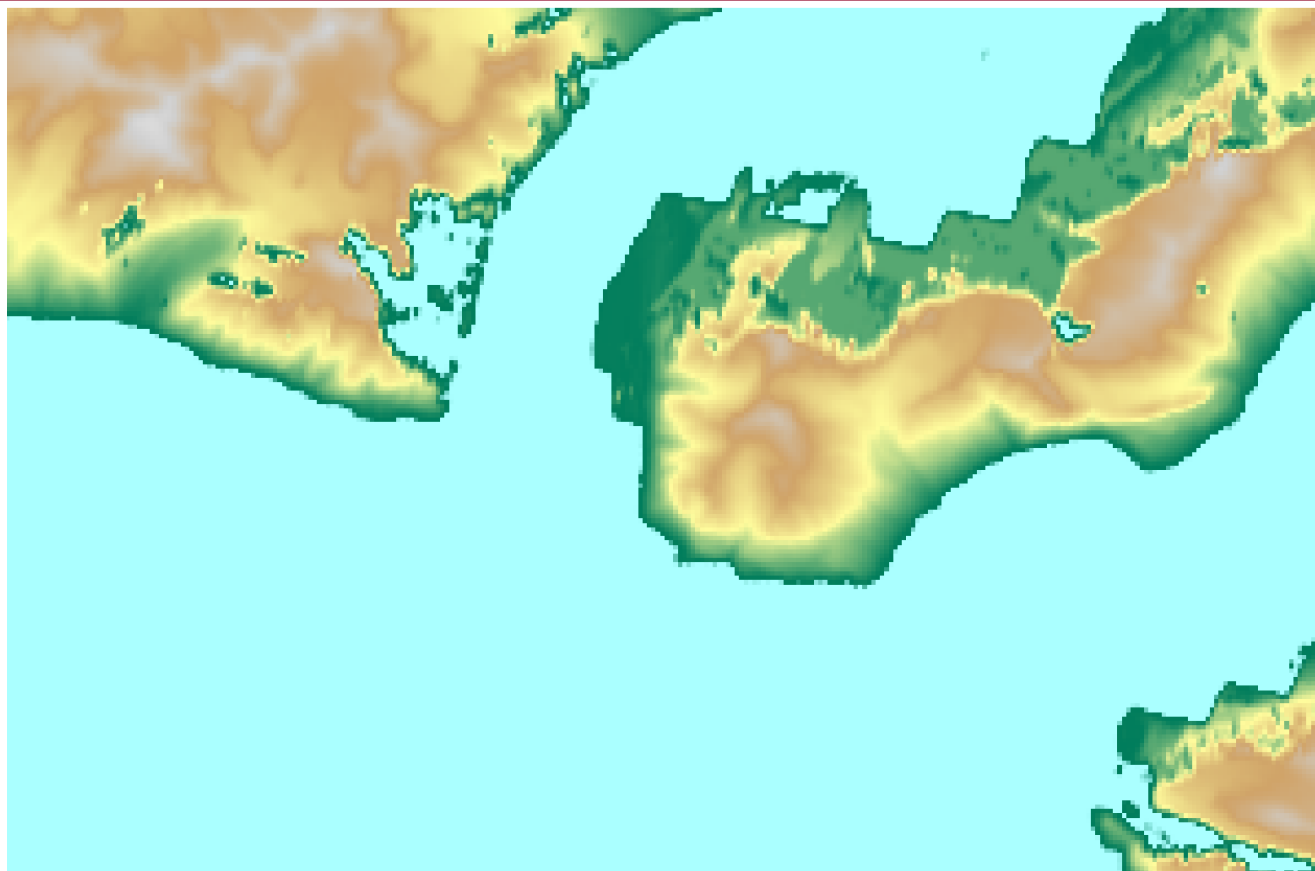
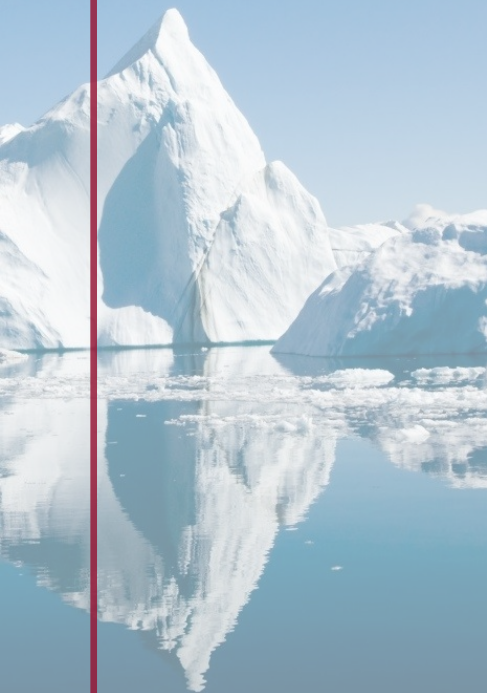
ArcticDEM v6





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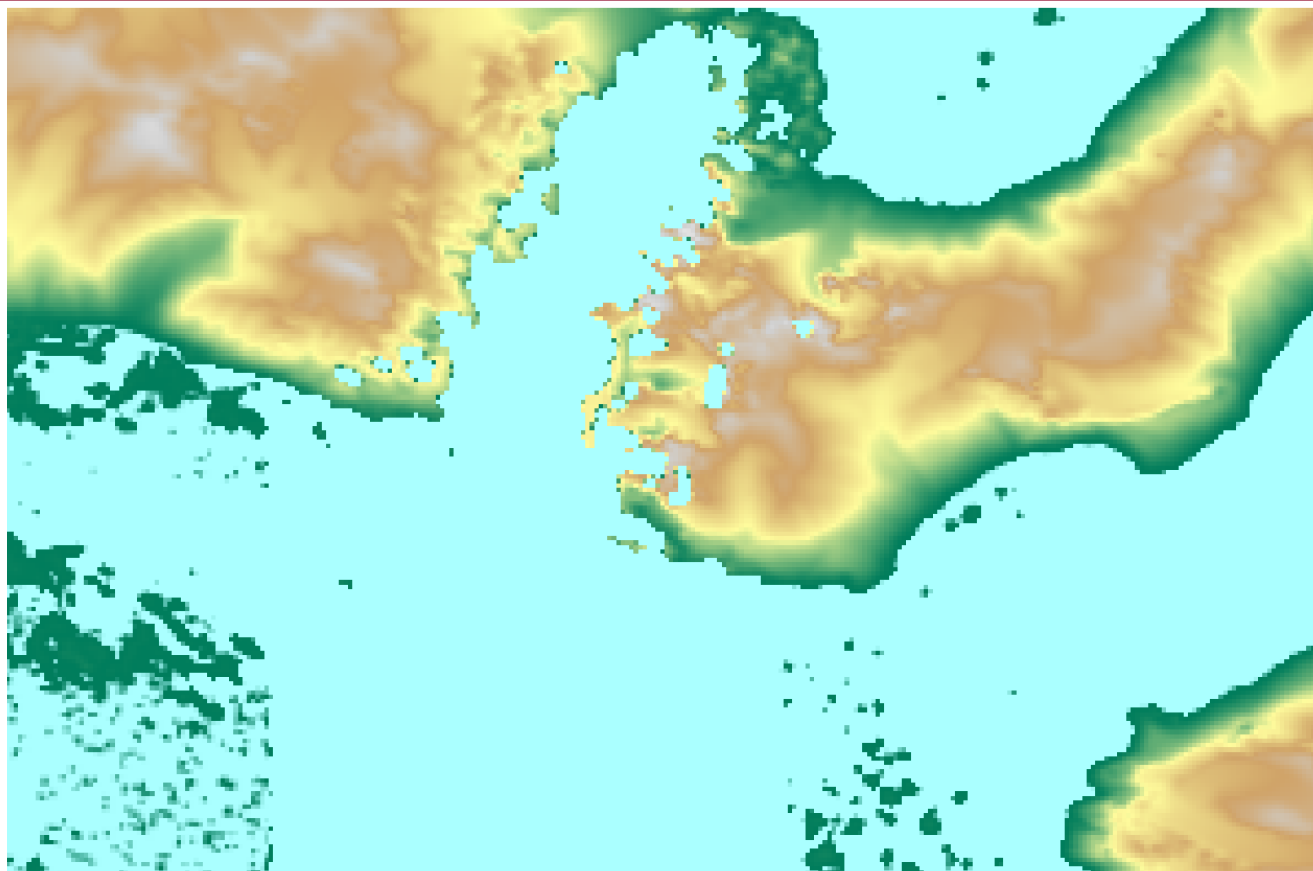
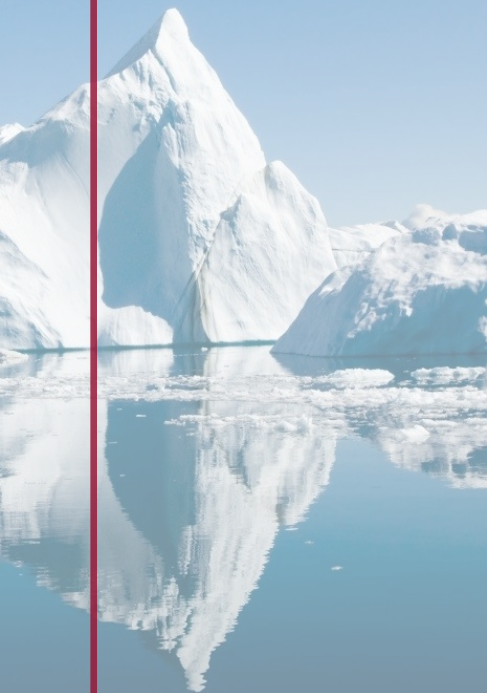
AsterDEM





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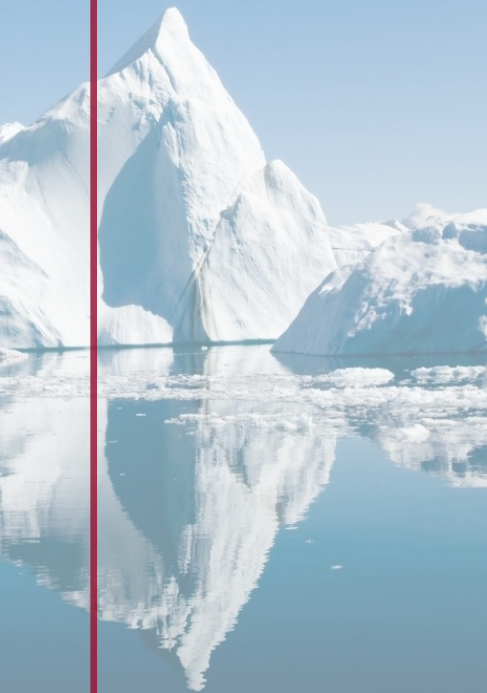
TanDEM-X





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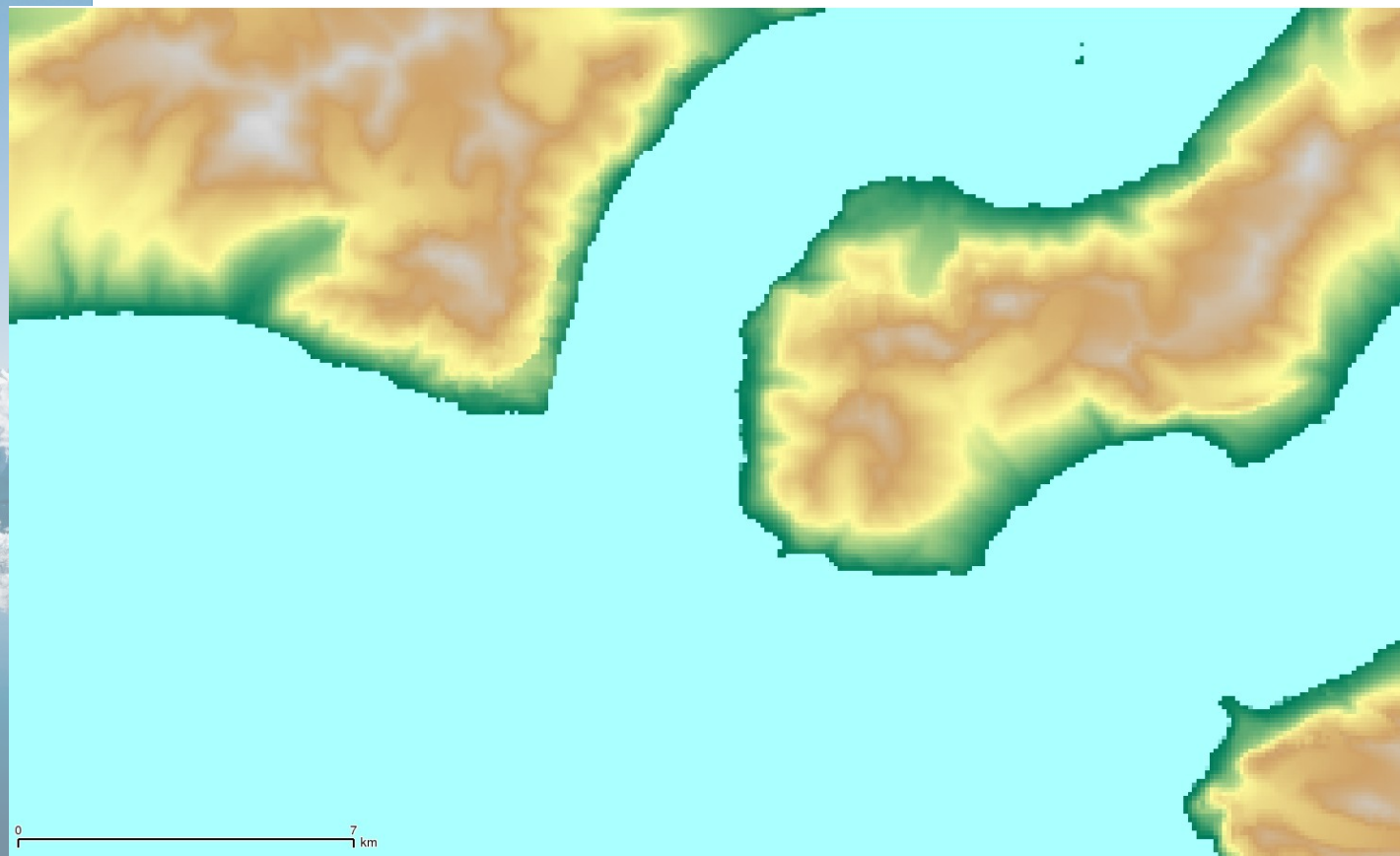
Sentinel 2





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Nýtt lagfært ArcticDEM





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Nýtt ArcticDEM

Upplausn 90 metrar á EPSG:3574 LAEA vörpun

Af 171 flís:

- Ekkert þurfti að gera við 67
 - Holufylling með v6 virkaði vel
- Rest:
 - Holufylling með v6 víðast notuð
 - Nokkur dæmi fyllingu með AsterDEM
 - Nokkur dæmi um að brúun kom best út
 - Einstaka tilfellum þurfti að skálda í eyður



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Endurstilling á snjó 1. September

- Ekki keyrt með jökullíkani - snjóskema líkansins notuð
- Þar sem jökulþekja í reiknihniti er meiri en 99% eru sett 9990 kg SWE, en minna á jaðra jöklana
- Fyrsta september hvert ár er gert eftirfarandi:
 - 1) Ef $\text{perm_snow_fr} > 0.99$ setjum $\text{SWE} = 9990 \text{ kg/m}^2$
 - 2) Annarstaðar:
 - i. ef $\text{SWE} > 100 \text{ kg/m}^2 \Rightarrow \text{SWE} = 100 \text{ kg/m}^2$
(Snjóskeman lagfærir á jöðrum jöklanna þar sem þarf að vera $\text{SWE} > 100 \text{ kg/m}^2$)
 - ii. annars SWE er haldið óbreyttu



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Keyrslurnar

- Keyrslur hófust í apríl á þessu ári
- Keyrt á CCA/CCB hjá ECMWF
- DMI sér um vestursvæðið, en Met.no um austur svæðið
- Byrjað að keyra þrjá strauma fyrir hvort svæði, en svo var bætt við tveimur straumum

Last update: 2019/11/28 04:07:12 UTC

Total progress: 29.34%

expId	current DTG	DTGEND	Completion date	Start of production	Avg. speed (7d)	Avg. speed (30d)
carra_NE_1	2000022100	2006083121	2021/01/31	2019/06/20	(5.14) days/day	(5.53) days/day
carra_NE_2	2008121409	2014083121	2021/01/07	2019/06/27	(4.71) days/day	(5.13) days/day
carra_NE_3	2016112609	2021063021	2020/11/02	2019/06/30	(4.57) days/day	(4.93) days/day
carra_IGB_1	1999062700	2002083121	2020/06/28	2019/07/14	(4.71) days/day	(5.43) days/day
carra_IGB_1B	2003122412	2006083121	2020/05/18	2019/09/06	(4.57) days/day	(5.7) days/day
carra_IGB_2	2008072300	2010083121	2020/05/07	2019/07/15	(4.43) days/day	(4.77) days/day
carra_IGB_2B	2011020112	2014083121	2020/10/25	2019/10/20	(3.57) days/day	(3.93) days/day
carra_IGB_3	2016070312	2021063021	2020/12/11	2019/07/20	(4.29) days/day	(4.8) days/day



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Eftirlit með keyrslum

← → ↺ ↻ hirlam.org/portal/oprint/WebgraF/CARRA/Prod/index.html?choice_ind=0

../ Prod

Throughput ▾

Domain

All streams

West domain

East domain

Stream

all

1996-

2001-

2005-

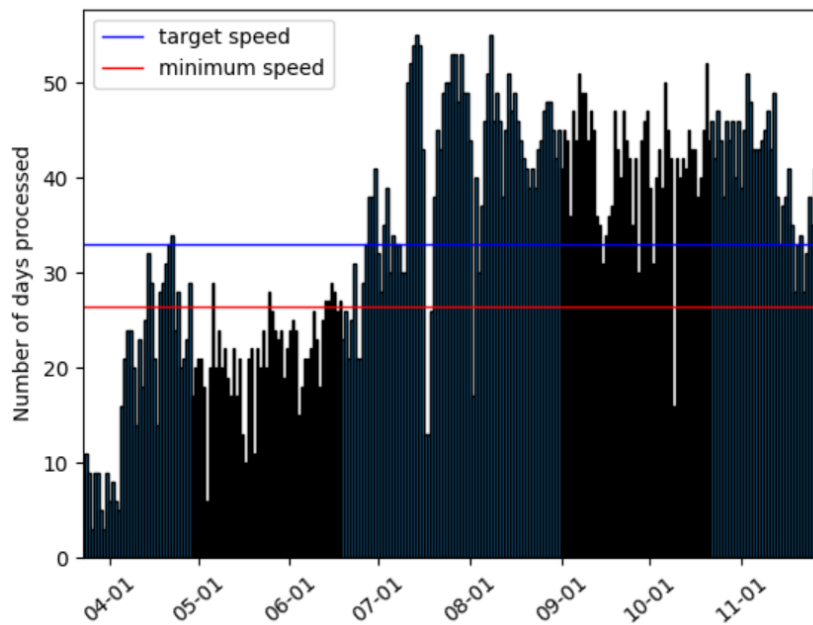
2009-

2013-

Resize



Daily throughput with CARRA production





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Sannprófanir

Observation Verification of Surface Parameters in CARRA

.. Prod
Surface

Stationlist
Iceland all stations

Year
2015

Month
03

Resize

Send

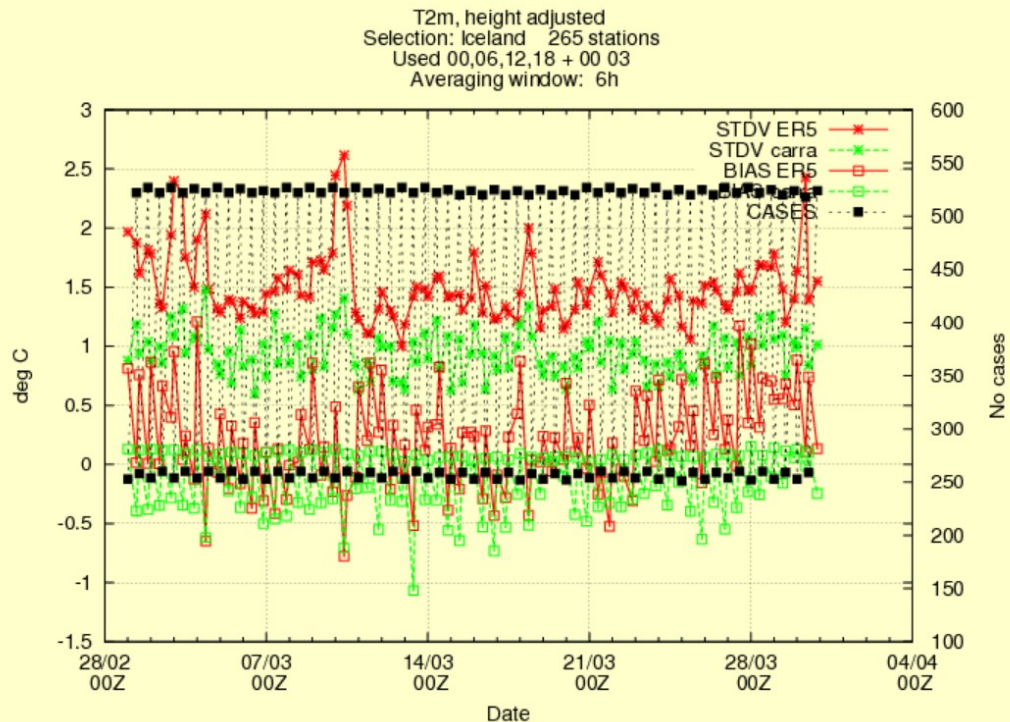
Statistics
Quality control

Plot type
Daily Error Evolution

Parameter
2m T, height corrected

Comparison
ER5_carra

All
Daily Error Evolut





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L o k a a f u r ě

CDS catalogue is having some technical problems. We are working on it. Sorry about inconveniences..

Welcome to the Climate Data Store

Dive into this wealth of information about the Earth's past, present and future climate.

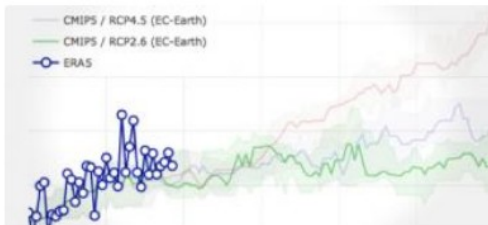
It is freely available and functions as a one-stop shop to explore climate data. [Register for free](#) to obtain access to the CDS and its Toolbox.

We are constantly improving the services and adding new datasets. For more information, please consult the [catalogue](#), our [FAQ](#) or the [C3S forum](#).

All



Search



Climate Data Store **Toolbox**

```
self.auth = tuple(self.key, self.secret)
self.info = {"Sending request to %s", url}
self.post = "POST %s %s", url, json.dumps(request)
self.post = self._robust(session.post)(url, self.post, self.info)
self._raise_for_status()
reply = result.json()
except:
    reply = None
    self._raise_for_status()
    reply = result.json()
    except:
        reply = None
```

Climate Data Store **API**



Access the **C3S Forum**



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Spurningar?

