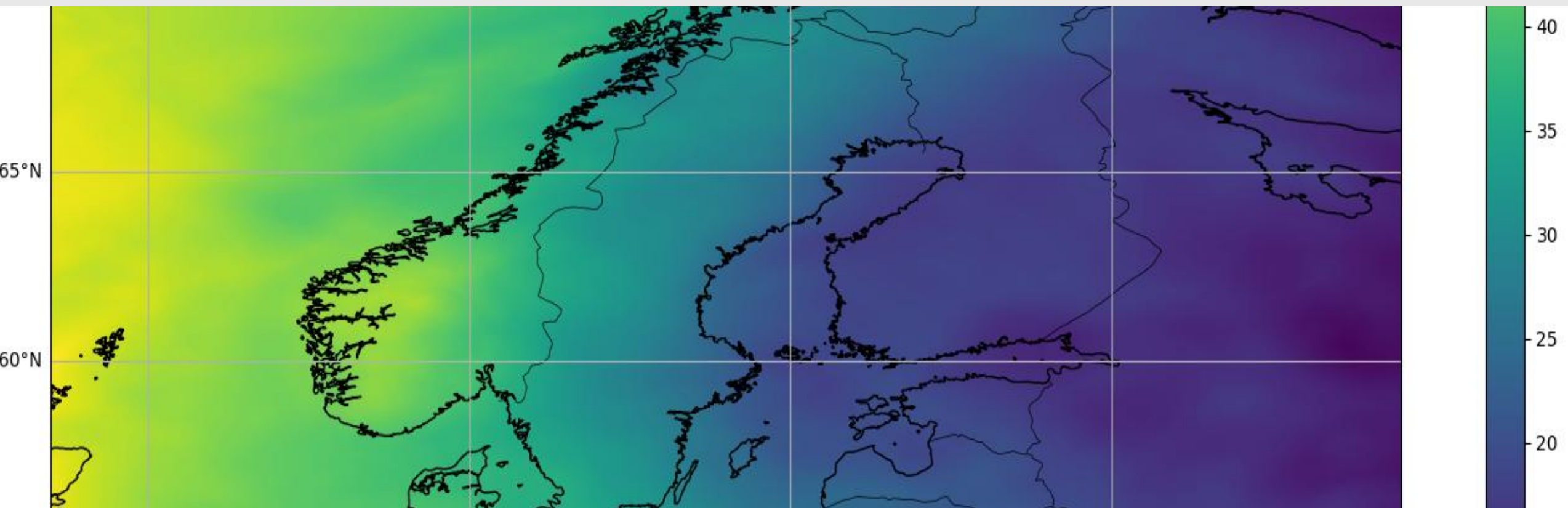


NKGWG - Height and Geoid

Status Report 2022 - 2026



Kartverket

Ove Christian Dahl Omang

20TH NKG General Assembly, 14 - 17 September 2026, Vilnius, Lithuania

17.09.2026

Vision and goals

2022 - 2026

- We have methods for effective use of our Nordic/Baltic realizations of EVRS in parallel to IHRS and its first realizations through IHRF, both on land and for maritime applications.
- We are continuously well aware of the progress on “the Global Height System” and are involved in its development. Thereby we are well prepared for its first use and for possible adoption in the future.
- We study and develop theory and methods to maintain, upgrade or create a modern height system in the Nordic area that is up-to-date w.r.t. the land uplift.
- We investigate different alternatives for a future unified Nordic height system/frame, taking European and International developments into account (EVRS/EVRF and IHRS/IHRF, respectively).
- We collect and keep our gravity data up to date, and we share data within the NKG for geoid purposes.
- We develop and improve our geoid models, especially the NKG geoid model. The long term objective is a common Nordic geoid model with relative uncertainty better than approx. 5 mm (1 sigma, for the gravimetric geoid model), which makes it possible to determine accurate heights by GNSS and to realize high quality vertical reference systems in the future.
- We study and develop new techniques for height determination and practical use of height systems, with and without traditional levelling, but without losing the accuracy of levelling.

Keywords

Height systems, gravity, levelling, height determination, chart datums, EVRS, BSCD2000, IHRF/IHRF, 5-mm geoid, geoid uncertainty, relative gravimetry, gravity database, GNSS/levelling database, methodology for geoid determination, chronometric levelling, optical lattice clocks, satellite altimetry, tide gauges, empirical land uplift modelling, InSAR

Milestones 2022-2026

- NKG202XGEOID: new geoid estimated based on updated gravity data from both NKG and FAMOS data base.
- Coordination on InSAR corner reflector in the NKG area
- Develop a common Nordic realization of IHRF (International Height Reference Frame) and derive relations to the existing national height systems and BSCD2000 (realizations of EVRS with land uplift epoch 2000.0)
- Maintain and update the NKG gravity and GNSS/levelling databases.
- Research on how the present geoid can be improved assuming already collected data.

2022 – 2026 in a nutshell

Speakers: Joanna Balasis-Levinsen, Anders Alfredsson, Gabriel Strykowski, Rene Forsberg, H Teitsson, A Kasenda, Jussi Hedemäki, Kristian Keller, Joachim Schwabe, Mirjam Bilker-Koivula, Timo Saari, Jussi Hedemäki, Pasi Häkli, Olav Vestøl, Vents Zuševics, Monika Wilde-Piórko, Bjørnar Dale, Mohammad Bagherbandi, Ove Christian Dahl Omang, Karin Kollo, Guðmundur Valsson, Jānis Sakne, Darius, Holger Steffen, Faramarz Nilfouroushan, Aleksei Kupavõh:, K. Pyrchla, G. Strykowski, K. Lapinski, Jonathan F. Kirby, J. Pyrchla:, Małgorzata Szelachowska, Silja Märdla, Luciana Fenoglio, Vegard, Andreas Engfeldt, Hugo Lecomte, Matea Tomic, Tim Jensen, Sander Varbla, Jonas Ågren, ...

Topics: geoid, gravity, levelling, insar, IHRs, marine gravity, FAMOS/BSCD2000 geoid, heights, BalMarGrav, strapdown gravimetry, imu, grace, uplift models, SWOT, quantum, gnss/levelling, nkg gravity database



2022 – 2026 in a nutshell

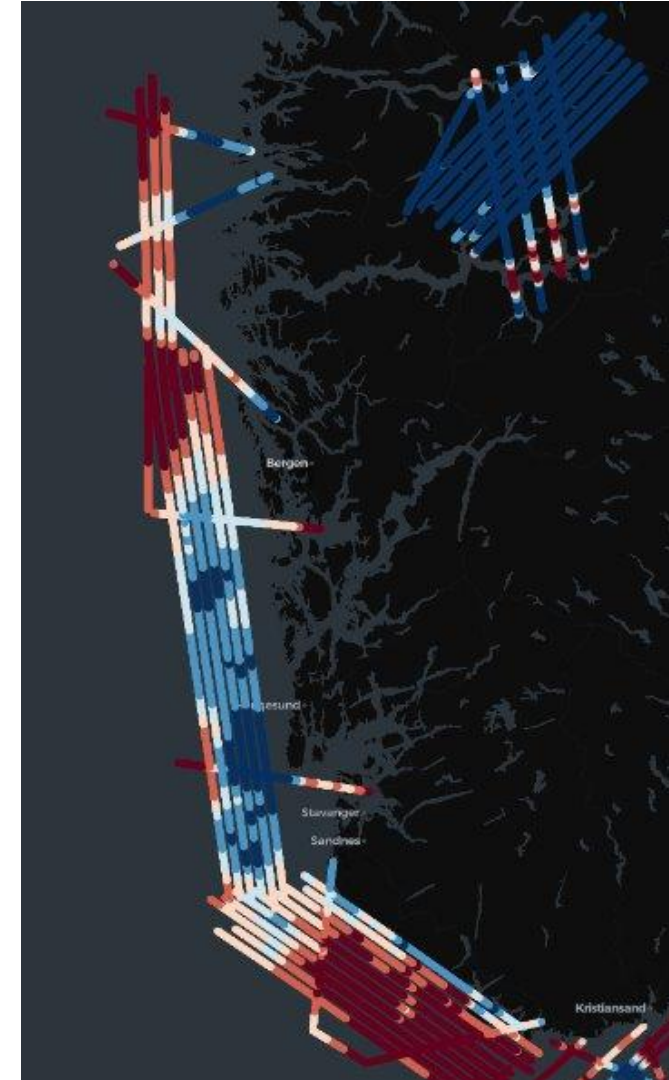
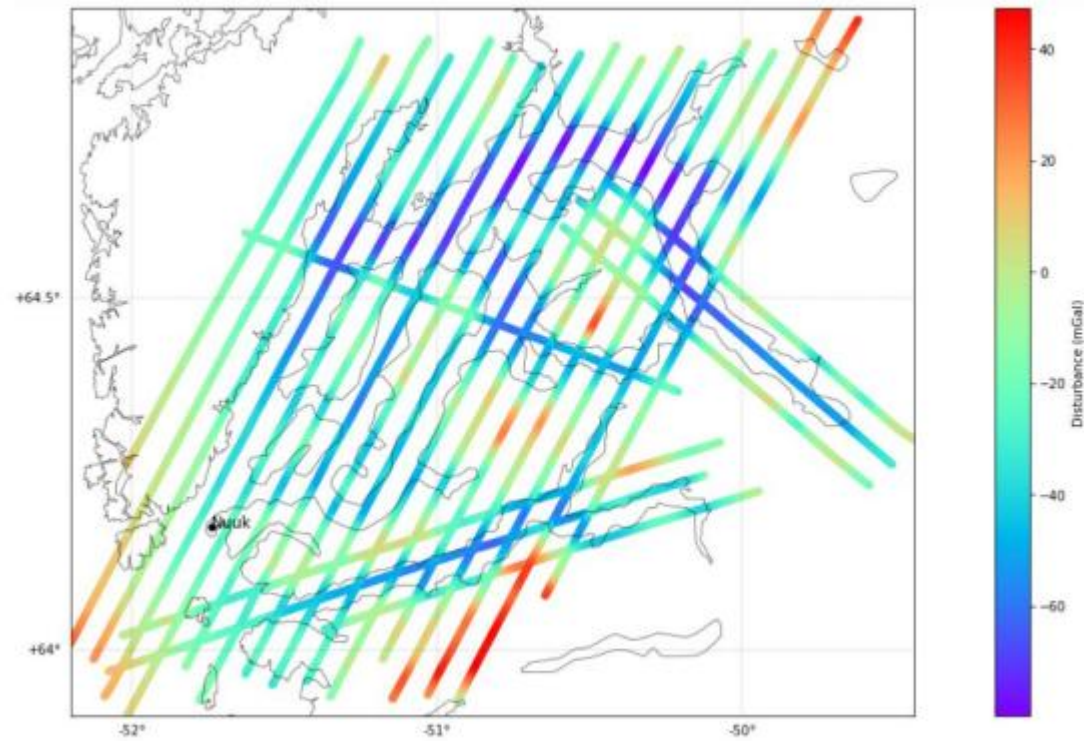
Location:

- Finland
- Iceland
- Norway
- Estonia



2022 – 2026 in a nutshell

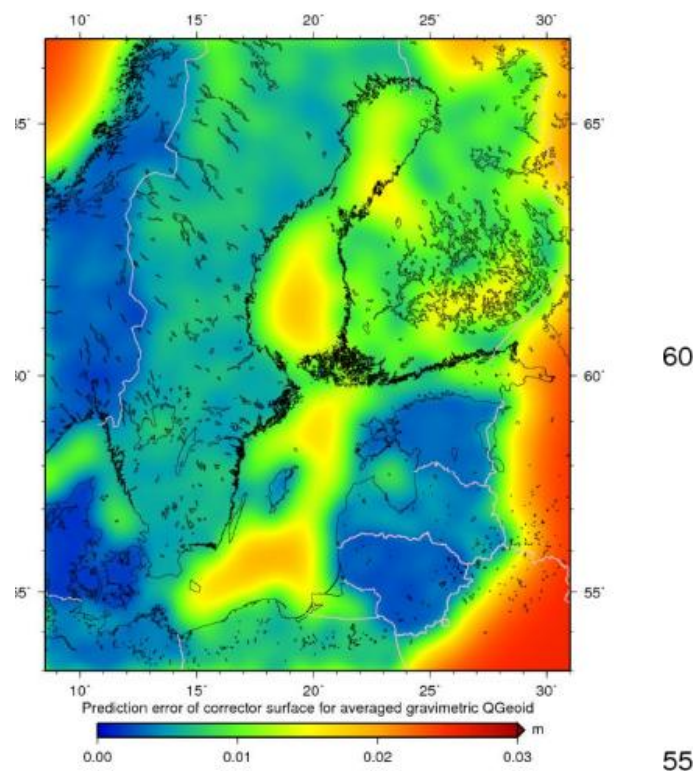
Gravity measurements



2022 – 2026 in a nutshell

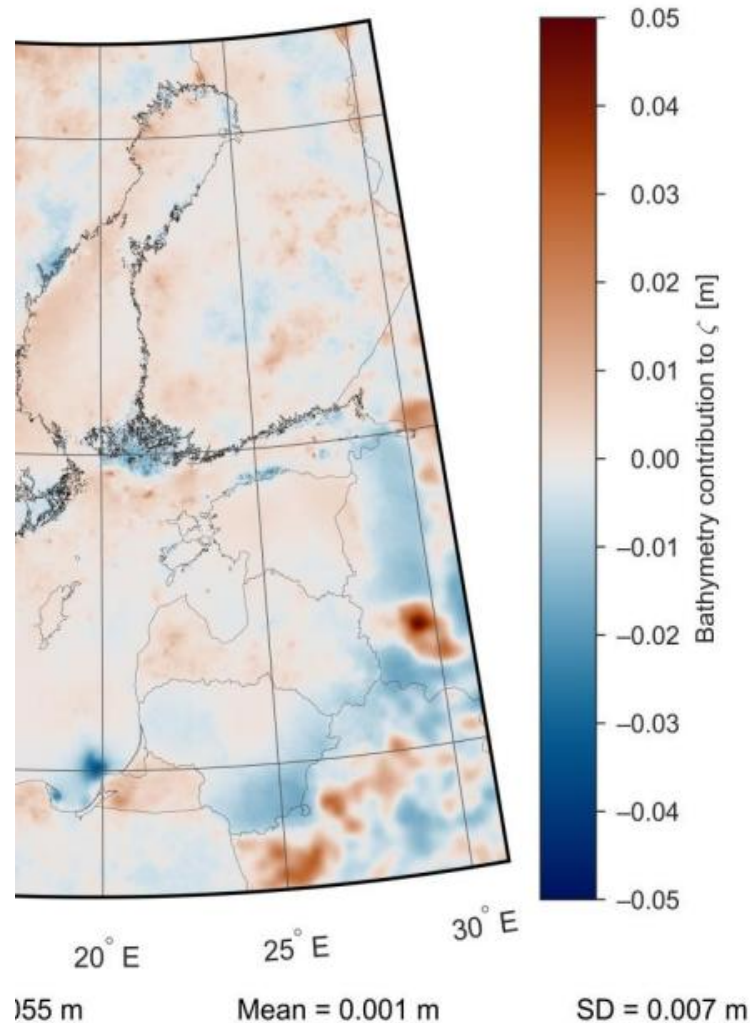
geoids

BSCD2000

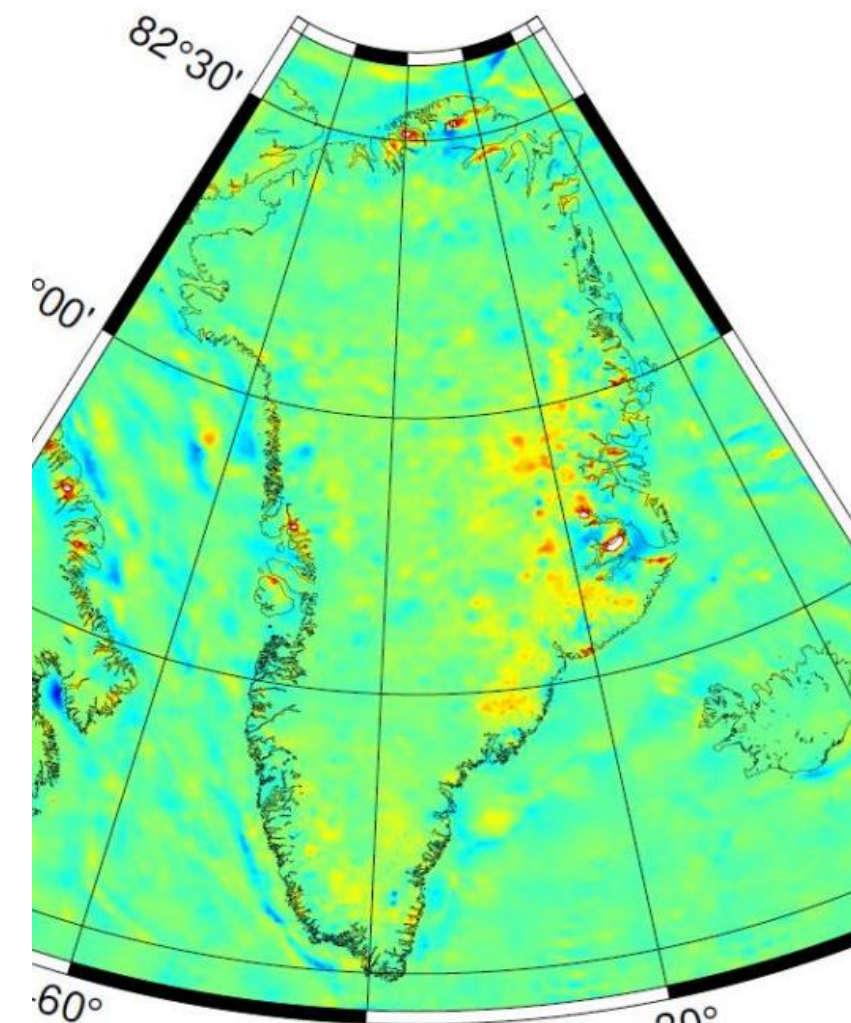


Schwabe: Status FAMOS/BSCD2000 geoid, 14

Bathymetry

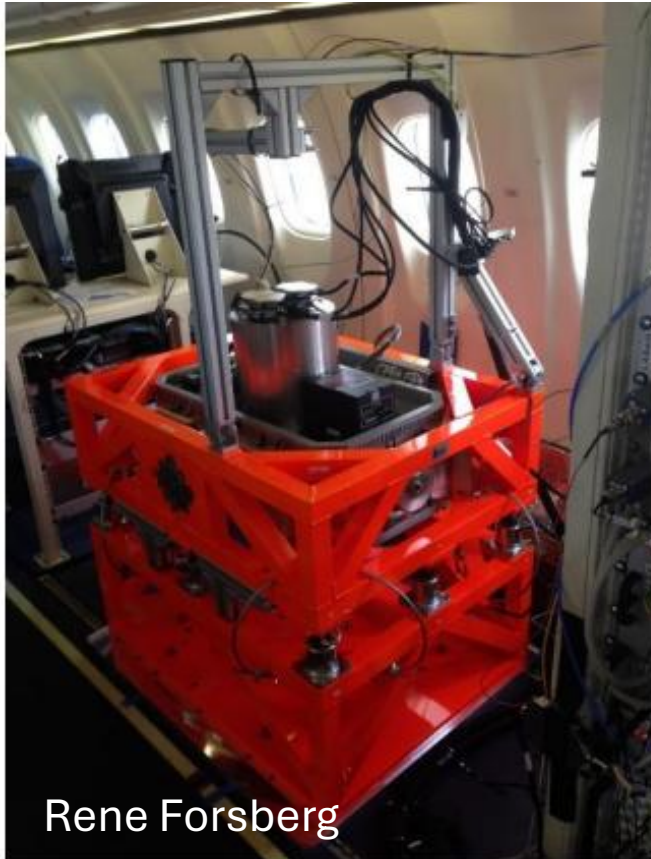


GGEOID23 ζ - GGEOID16 ζ

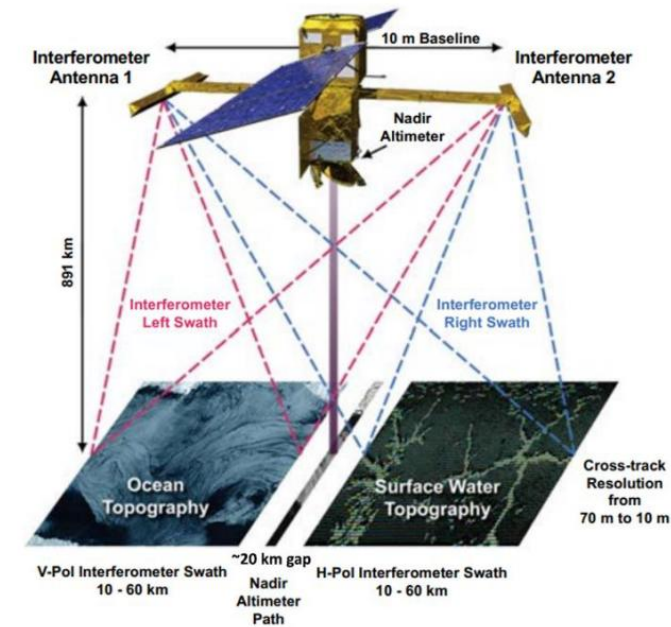
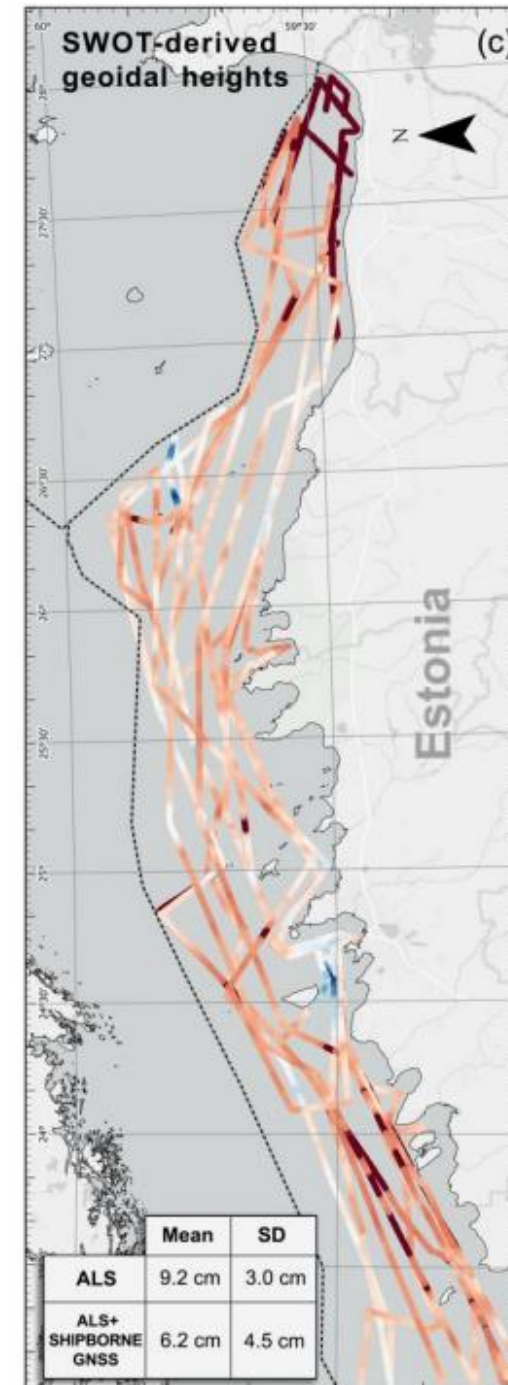


2022 – 2026 in a nutshell

Quantum and SWOT

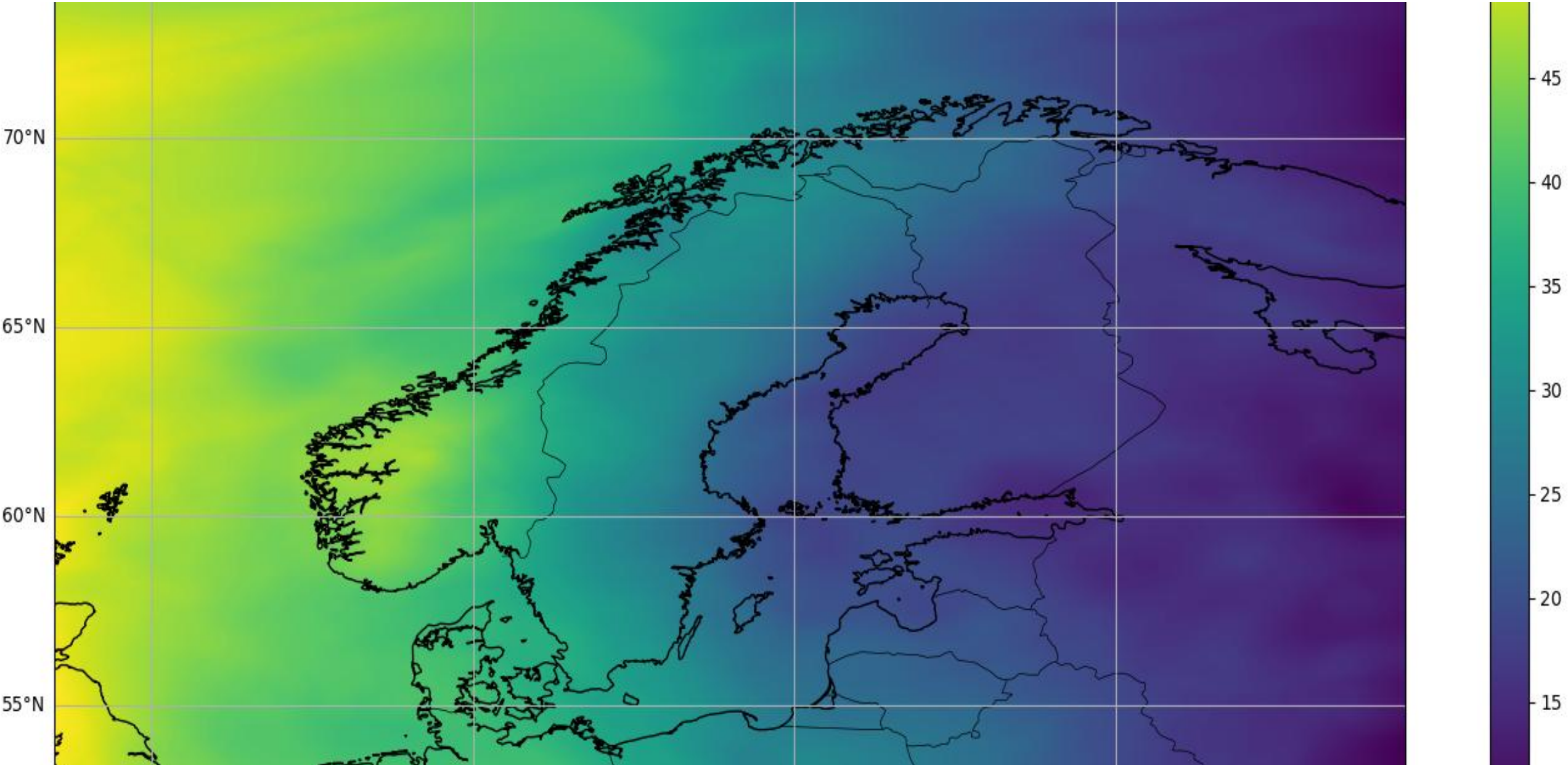


Rene Forsberg



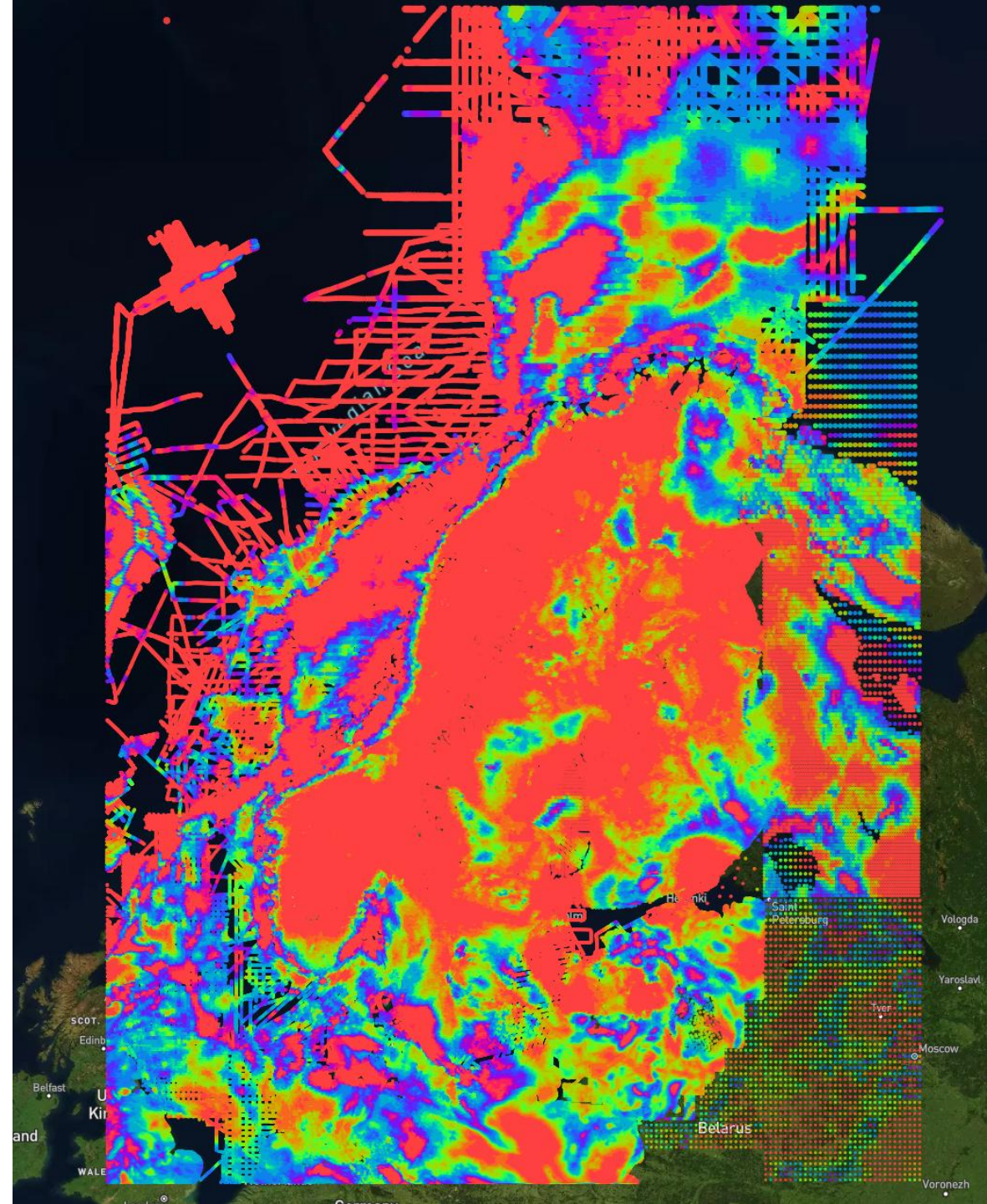
Kupavõh, A.

NKG2026QGeoid ... preliminary

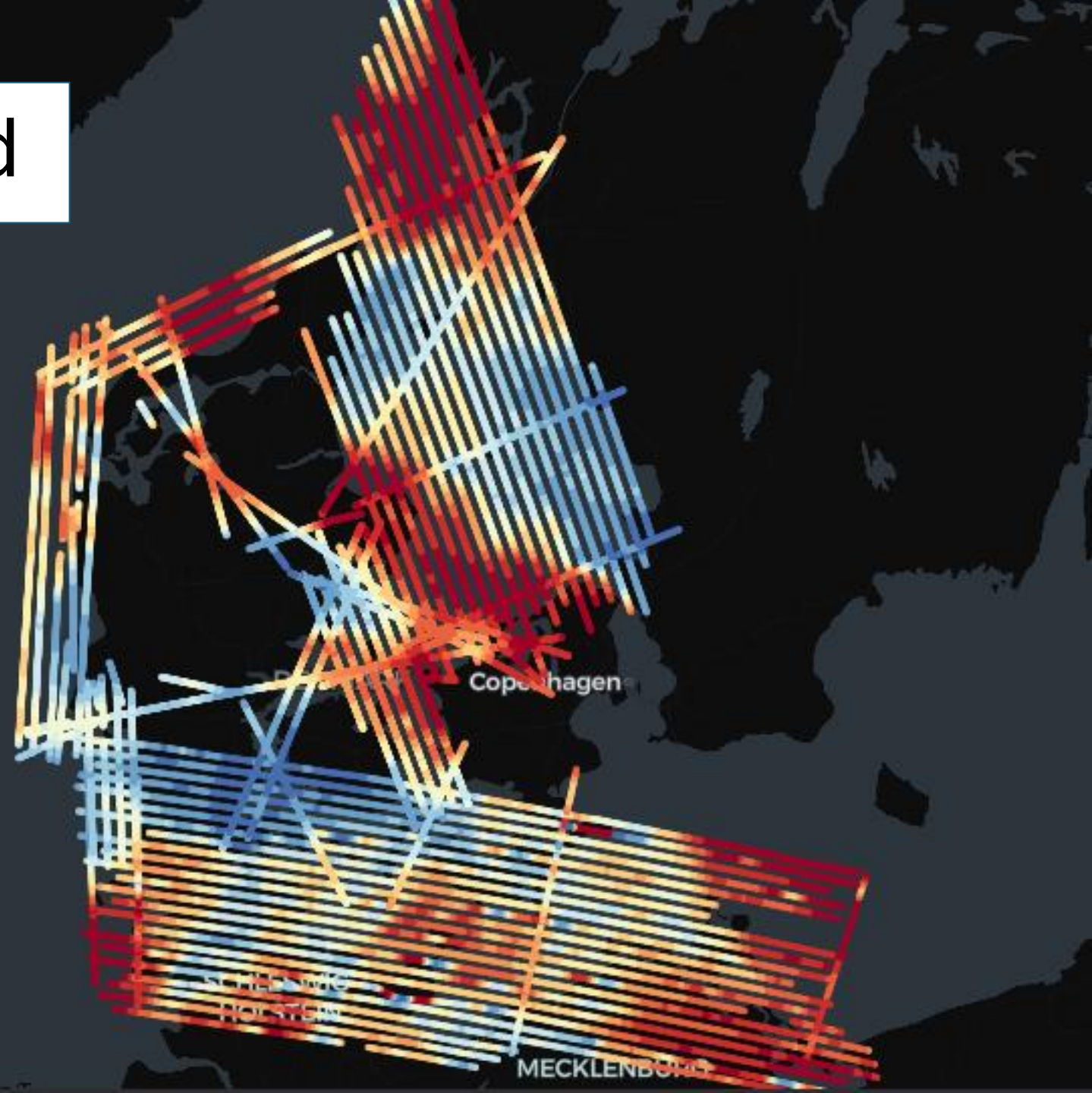


NKGDB: ~ 7 600 000 pts

DTU21: ~ 400 000 pts



Airborne data not used



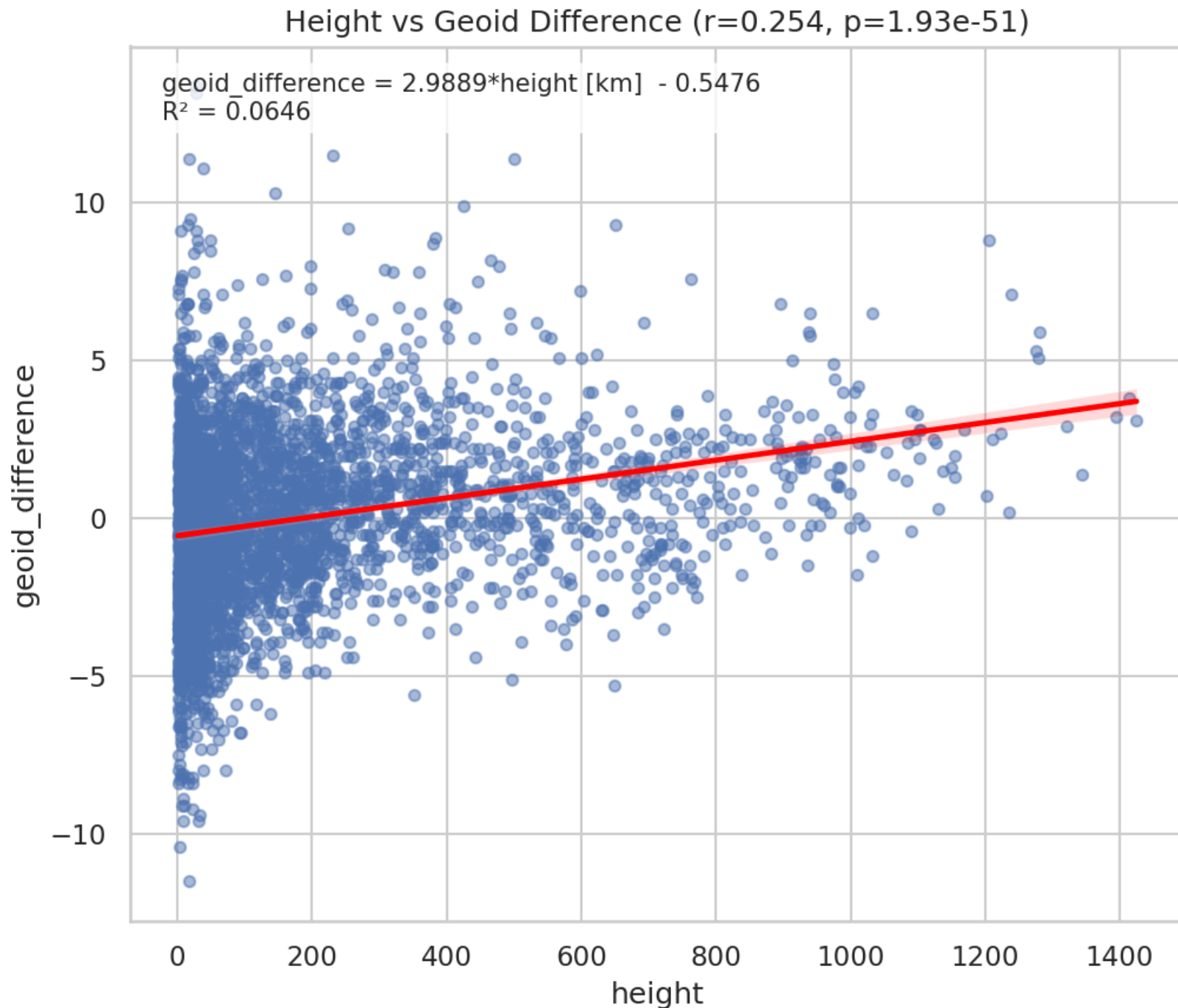
NKG2015QGeoid vs NKG2026QGeoid_pre

StdDev [mm]	DK	EE	FI	LT	LV	NO	SE	
# stations	153	131	74	250	140	3412	275	Comment
NKG2015	15	14	19	23	17	35	20	NKG2015
NKG2026	19	15	23	24	20	29	26	Vättern wrong, 180-230
NKG2026	19	15	23	24	20	29	22	Corrected, 180-230
NKG2026	17	15	19	20	16	29	19	150 - 200
NKG2026	23	11	18	19	12	32	20	100 - 150
NKG2026	18	9	17	17	12	30	19	100 - 200

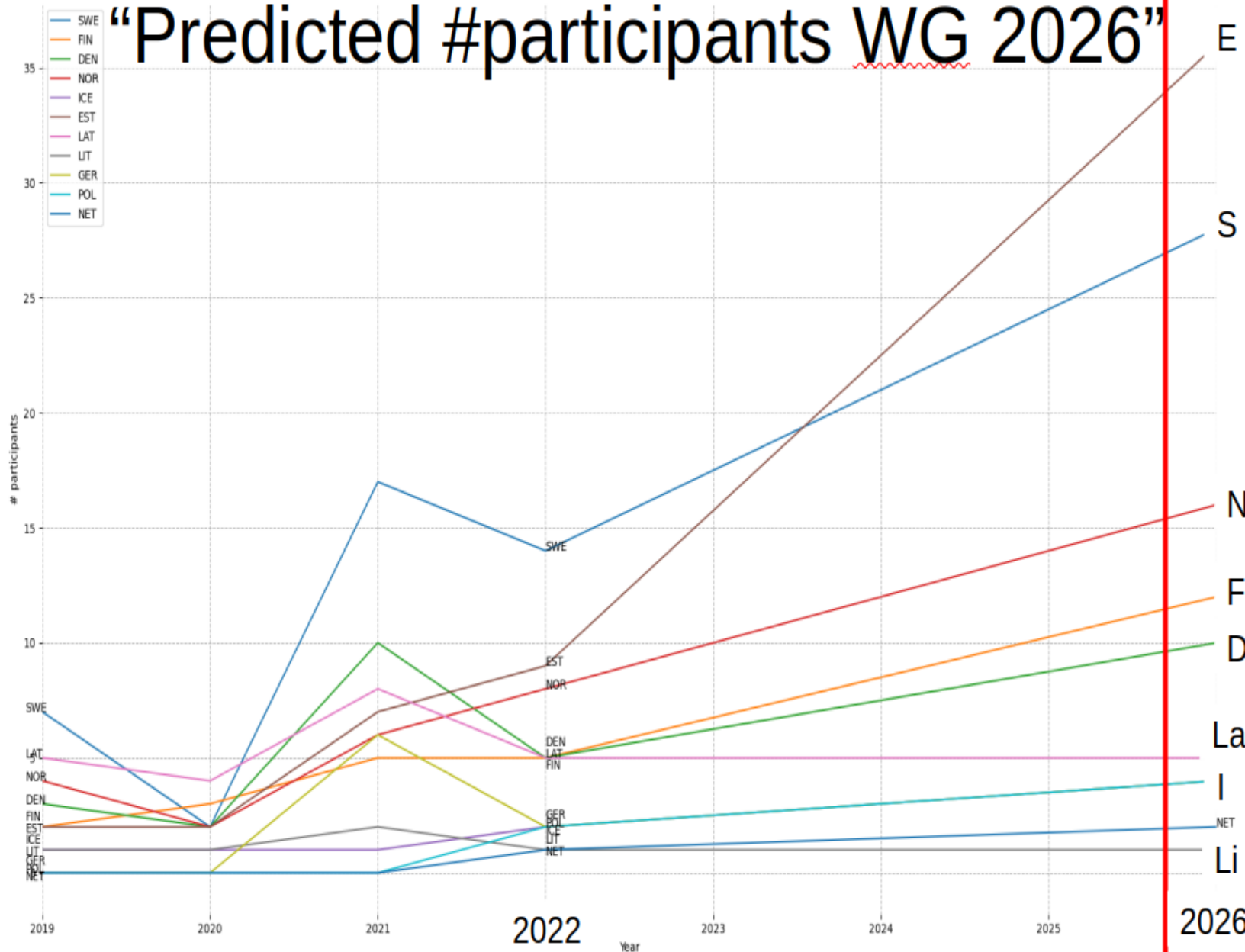
NKG2026

- All data except
 - o Marine: 001 – 010, 338,383
 - o Airborne: 052, 053, 054, 055, 904
- RTM method, kernel modification
- TC: 100 m, out to 167 km.
- DEM: Fine: 200 m, Ref: 10 km
- GGM: GO_CONS_GCF_2_TIM_R6e

A small
correlation
between
height and
geoid
difference



"Predicted #participants WG 2026"



Participants

2019	2022	2026
25	54	116

Countries

2019	2022	2026
8	11	15

2026
55

14

The most important thing is you!

Joanna Balasis-Levinsen, Bjørnar Dale, Tim E. Jensen, Kristian Keller, Jonathan F. Kirby, Stefan Krebs Lange-Willman, Aslak Meister, Rene Forsberg, Gabriel Strykowski
Artu Ellmann, Nicole Delpeche-Ellmann, Gert Jõgiste, Saeed Rajabi Kiasari, Karin Kollo, Aleksei Kupavõh, Silja Märdla, Jaanus Metsar, Tõnis Oja, Andres Rüdja, Sander Varbla, Tarmo Kall
Hergeir Teitsson
Mirjam Bilker-Koivula, Veikko Saaranen, Pasi Häkli, Hugo Lecomte, Jaakko Mäkinen, Maaria Nordman, Timo Saari, Aino Schulz, Matea Tomic, Markku Poutanen, Jussi Hedemäki, Joachim Schwabe, Ludwig Schröder, Thomas Gruber, Guðmundur Valsson
Ivars Liepins, Jānis Sakne, Madara Znotiņa, Vents Zuševics
Kristian Breili, Clinton Conrad, John Dehls, Halfdan Pascal Kierulf, Ove Christian Dahl Omang, Matthew Simpson, Vegard Ophaug, Olav Vestøl
Przemysław Dykowski, Małgorzata Szelachowska
Jonas Ågren, Anders Alfredsson, Mohammad Bagherbandi, Andreas Engfeldt, Luciana Fenoglio, Nureldin Gido, Lotti Jivall, Faramarz Nilfouroushan, Tobias Nilsson, Tong Ning, Per-Anders Olsson, Chrishan Puwakpitiya Gedara, Holger Steffen, Rebekka Steffen
Nigel Penna, Victoria Smith, Ken Stewart
Petar Marinkovic, Saeed Rajabi Kiasari, Arrtu Raja-Halli, Nicolaj Hansen, Majid Mostafavi, Maxime Mouyen





Spørsmål?

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