



20th NKG General Assembly, Vilnius 2026
Geodesy in a Challenged Environment

Poster Pitch

2 min per poster



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Geodesy in a Challenged Environment

Five years of InSAR displacement time series from a field test of compact active transponders

- Test period: 2020-2025
- Location: At GNSS station HABY – in northwestern Zealand, Denmark
- Two CATs produced by MetaSensing tested
- CAT1 fixed, CAT2 manually displaced six times
- Ground truth established by levelling
- InSAR displacement time series from Sentinel-1

Conclusions:

- Phase stability approx. 0.1-0.2 mm/yr (over a five year period)
- A vertical displacement can be resolved with an accuracy of a few mm





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Geodesy in a Challenged Environment



Sweden's SAR Fiducial Infrastructure

Faramarz Nilfouroushan, Nureldin Gido, Chrishan Puwakpitiya Gedara, Per-Anders Olsson



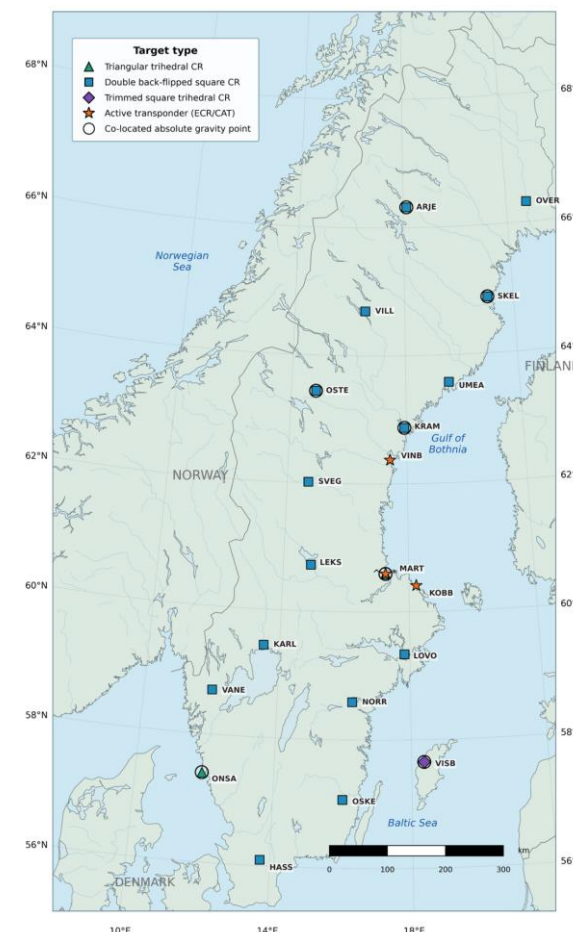
20 Corner reflectors



3 Transponders (CATs)

Supporting InSAR calibration,
validation and geodetic
applications

SAR fiducial network

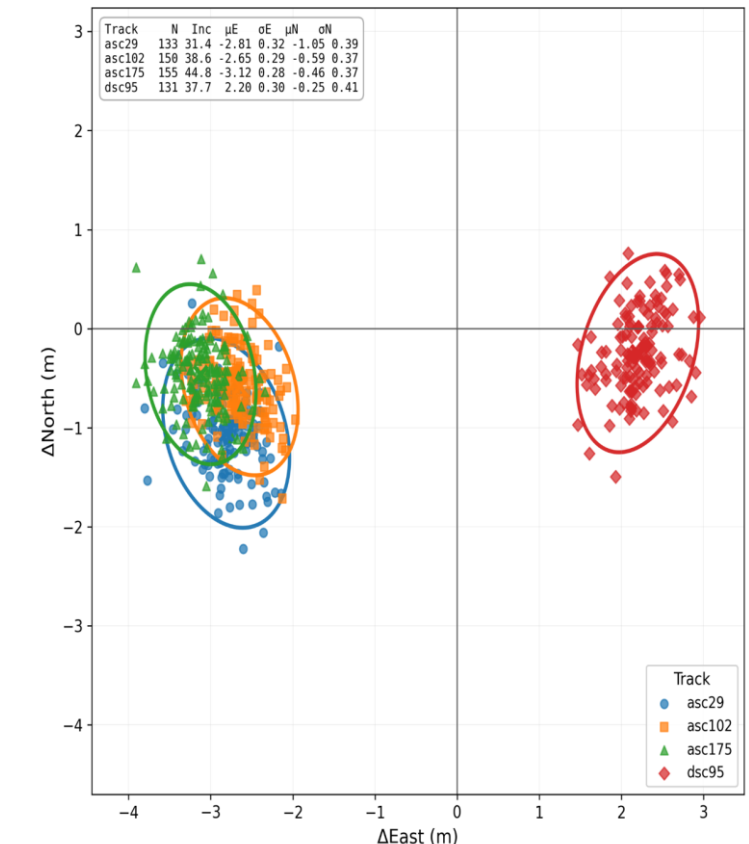


Six years with Transponders



- Operation and maintenance
- Time delays
- Positioning biases

Mårtsbo CAT Δ East and Δ North offsets



COME TO THE POSTER → Data analysis • CR and CAT comparisons • Six years of practical experience!

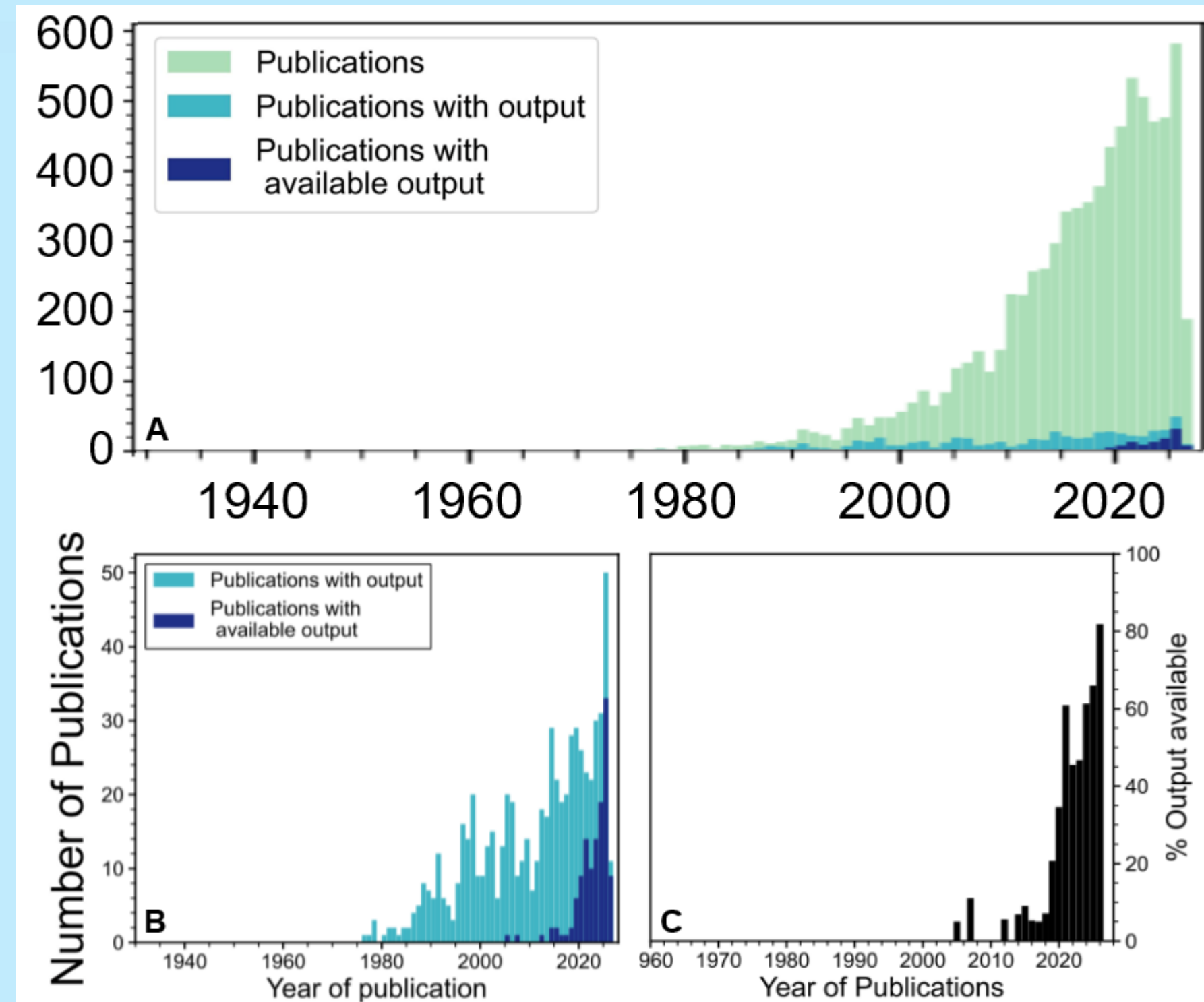


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***GIAmachine*: A community-driven rescue and recovery initiative for legacy sea level and glacial isostatic adjustment modeling data**

Roger Creel et al.



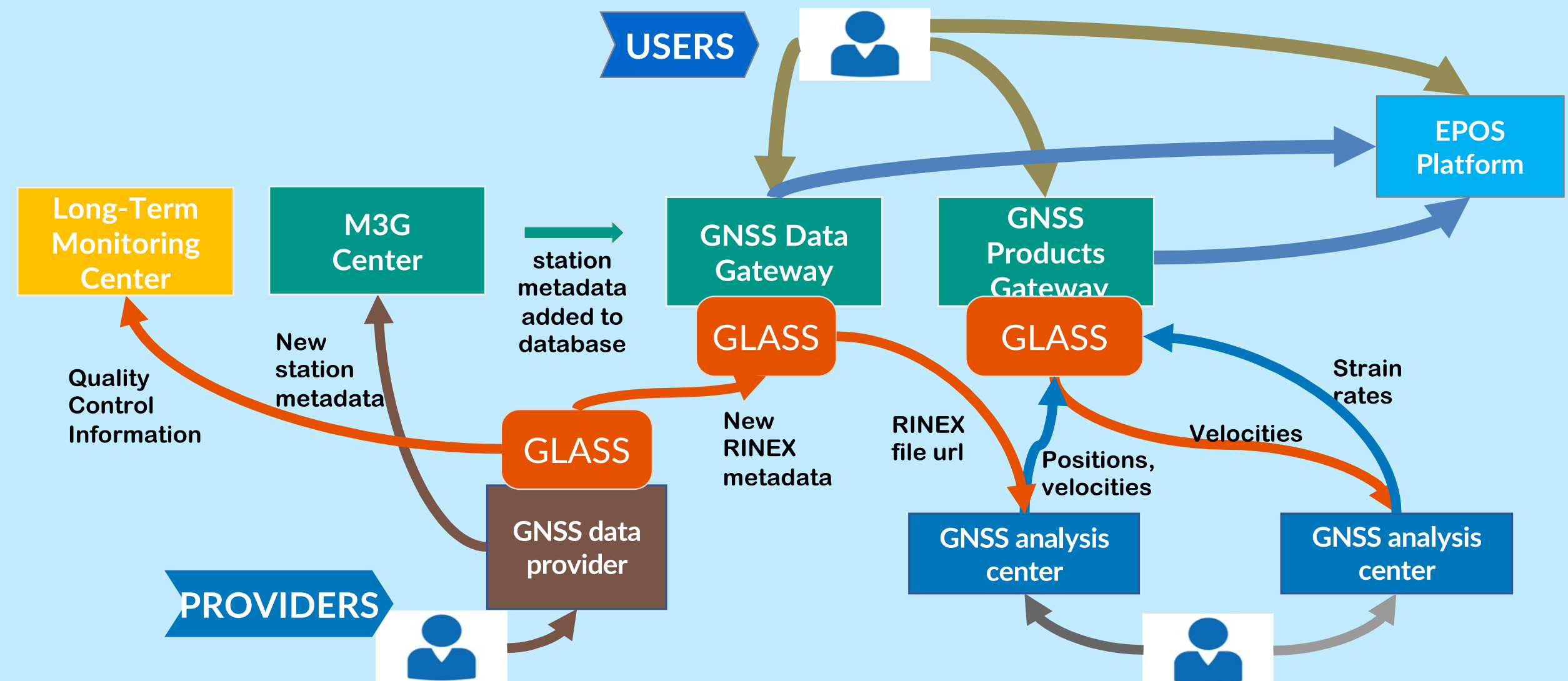


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EPOS-GNSS Data and Products - Integrating GNSS Data Across Europe for Advancing Geodetic Research and Applications

Holger Steffen et al.



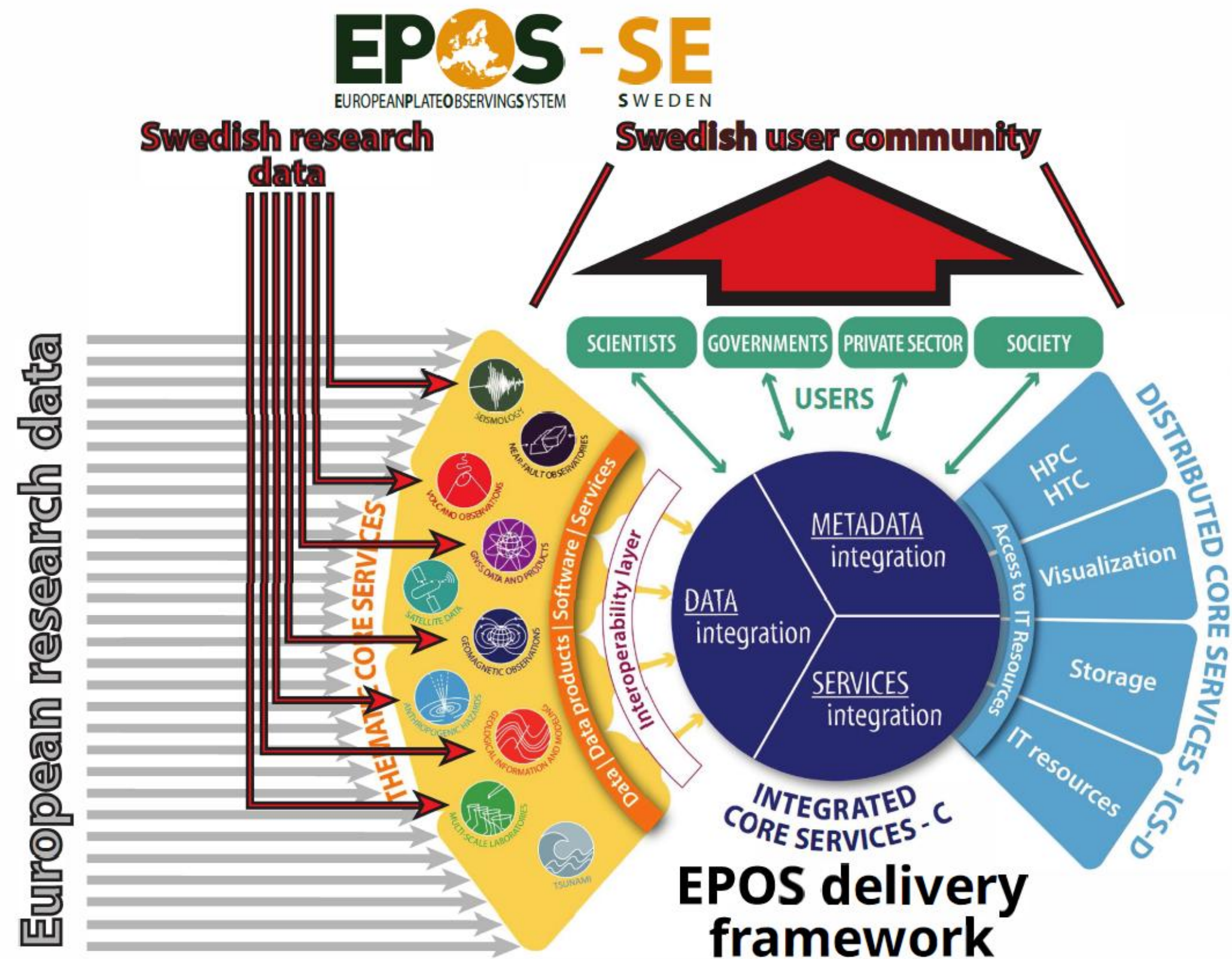


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EPOS Sweden: The Swedish contribution to the European Plate Observing System

The EPOS Sweden consortium





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Towards an Integrated Land Uplift Model for Fennoscandia Using Multi-Observation Data

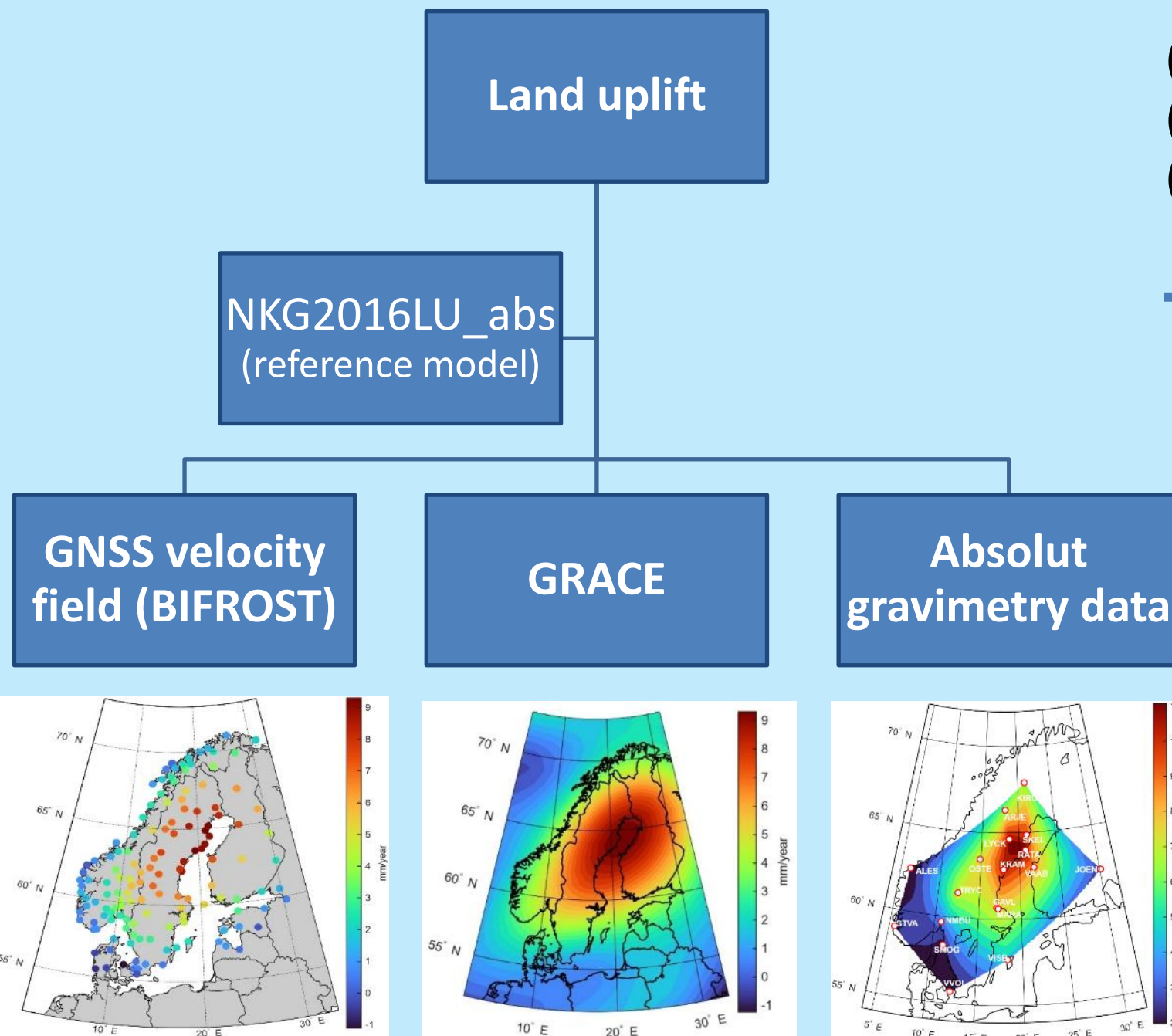
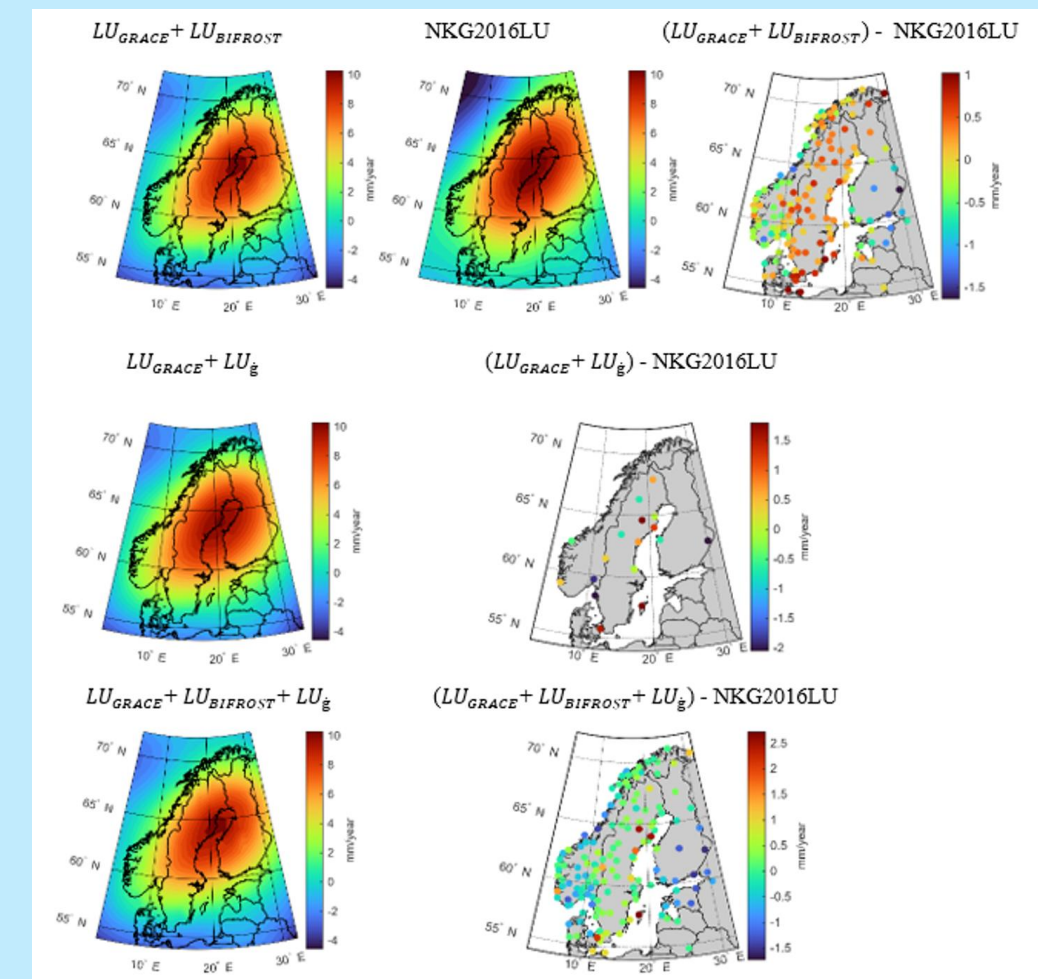
Mohammad Bagherbandi

Three scenarios:

- (1) integration of AG and GRACE data,
- (2) integration of GNSS and GRACE data,
- (3) integration of AG, GNSS, and GRACE data, applying least-squares collocation method.

Density models:

- UNB laterally varying topography density model (Sheng et al. 2019).
- Seismic-derived CRUST1.0 model (Laske et al. 2013).
- An isostatic model for $\Delta\rho$ (Bagherbandi (2011)).



$$\dot{h}(P) = \frac{\dot{g}(P)}{-0.3086 + 0.1119 \left(1 + \frac{\Delta\rho}{\rho_{crust}} \right)}$$

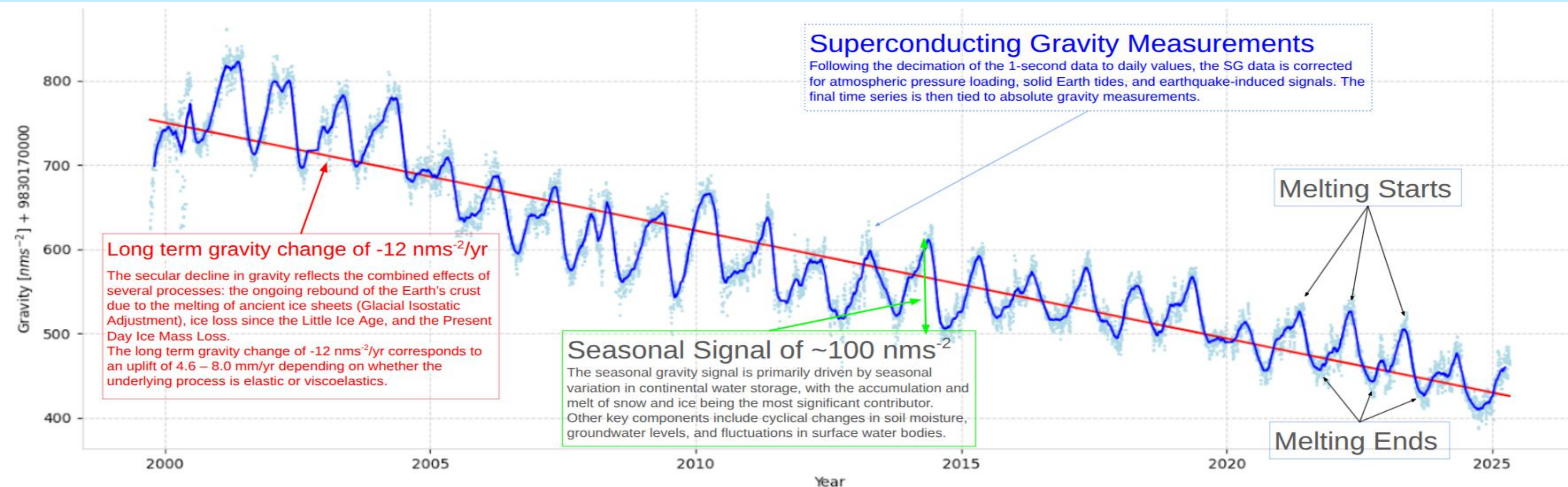


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Monitoring Svalbard's Changing Cryosphere

Insights from Superconducting Gravimetry





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Geodesy in a Challenged Environment

The new Norwegian gravity reference frame: NGRF2000

Kristian Breili & Ove Christian Dahl Omang





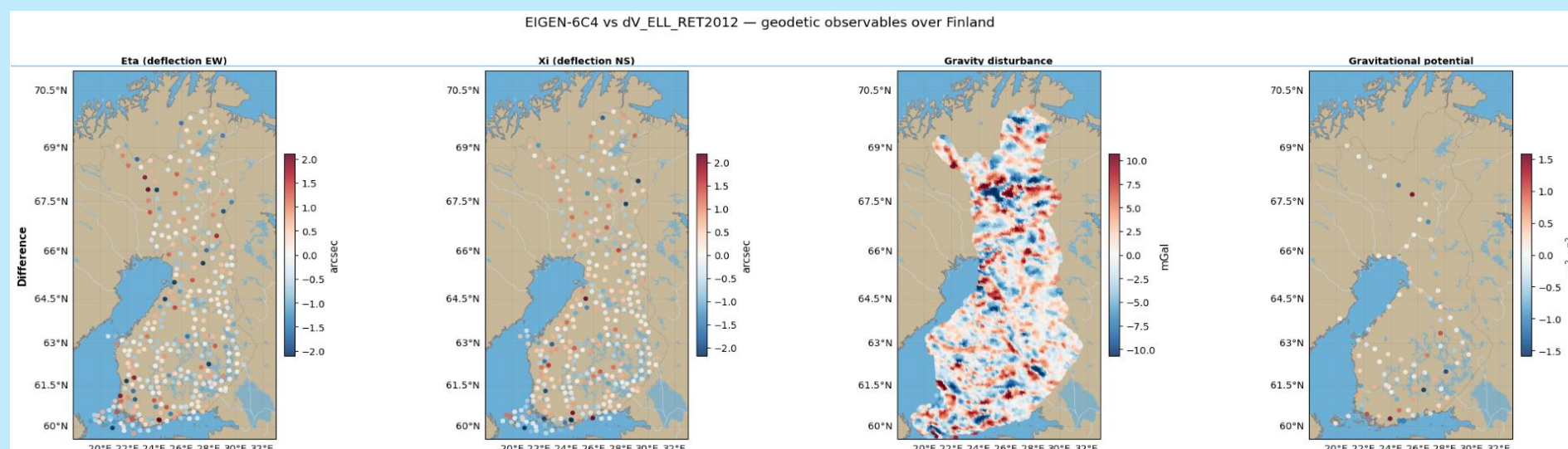
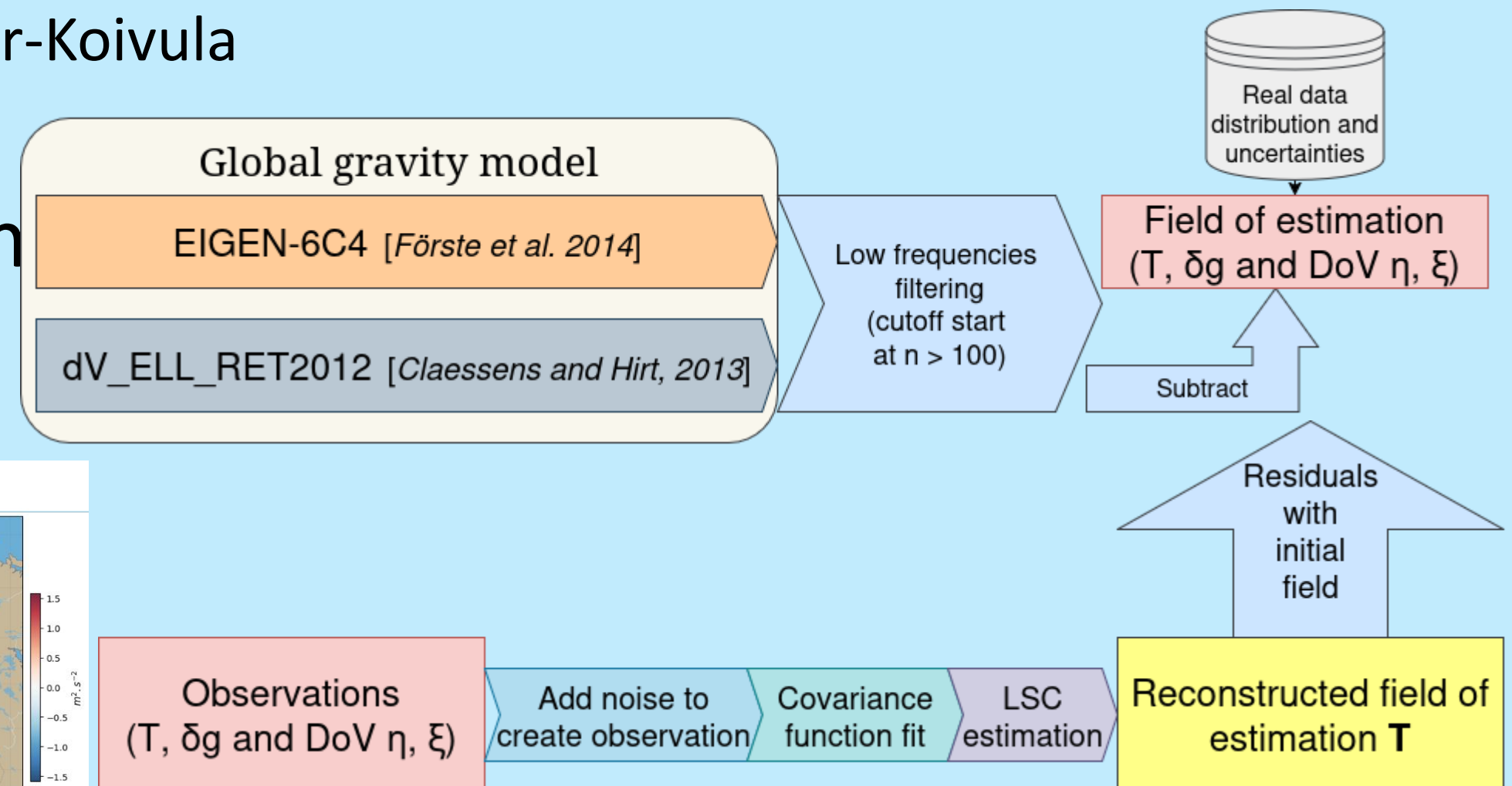
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Regional Covariance Model and Chrono-Geoid Determination Using Least-Squares Collocation in Finland

Hugo Lecomte, Guillaume Lion, Mirjam Bilker-Koivula

Synthetic atomic clock simulation

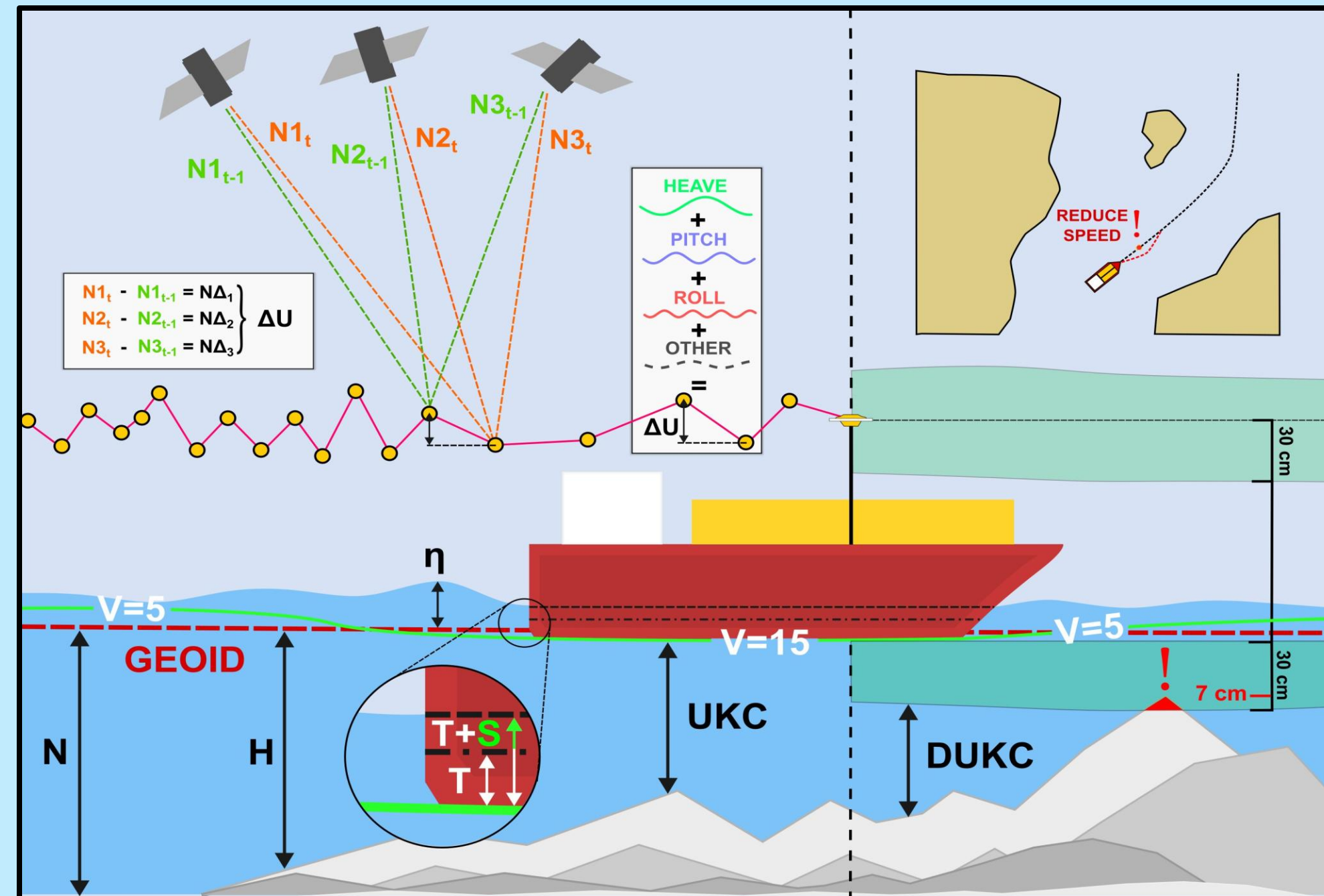
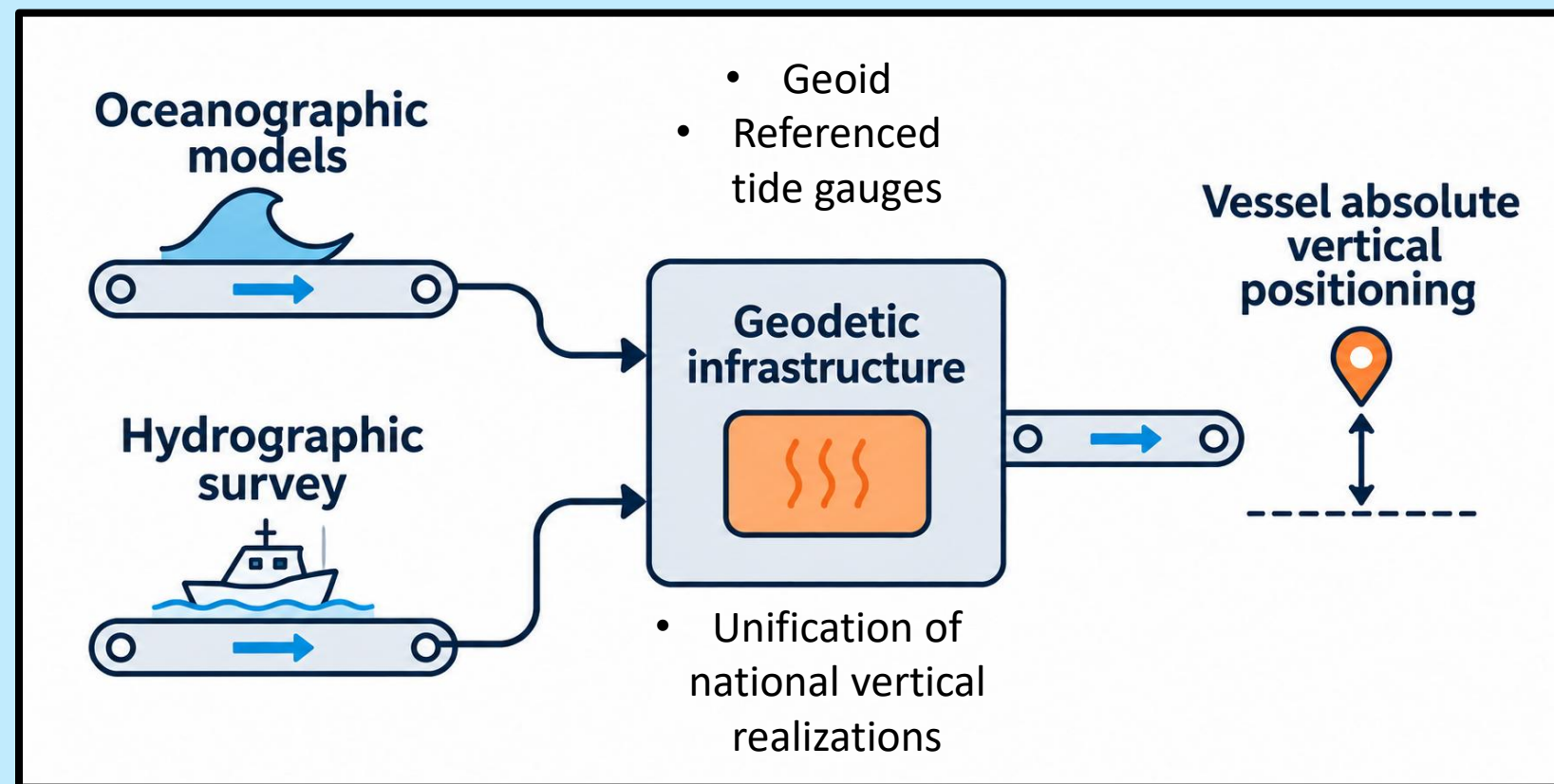




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A Geoid-Referenced Framework for Real-Time Maritime Vertical Positioning and Under-Keel Clearance Assessment



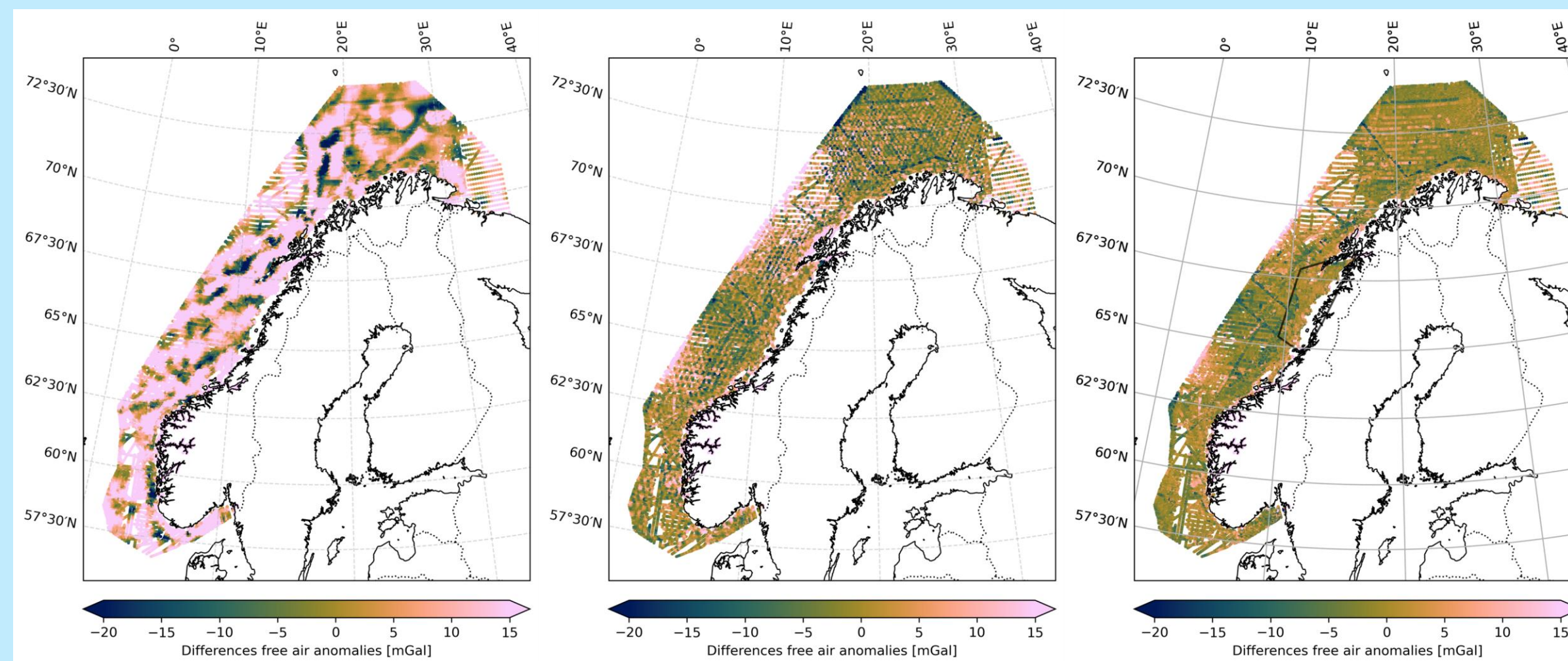


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Geodesy in a Challenged Environment

Evaluation of SWOT and Sentinel-3 altimetry for gravity anomaly estimation along the Norwegian coast using least squares prediction

Kristian Breili



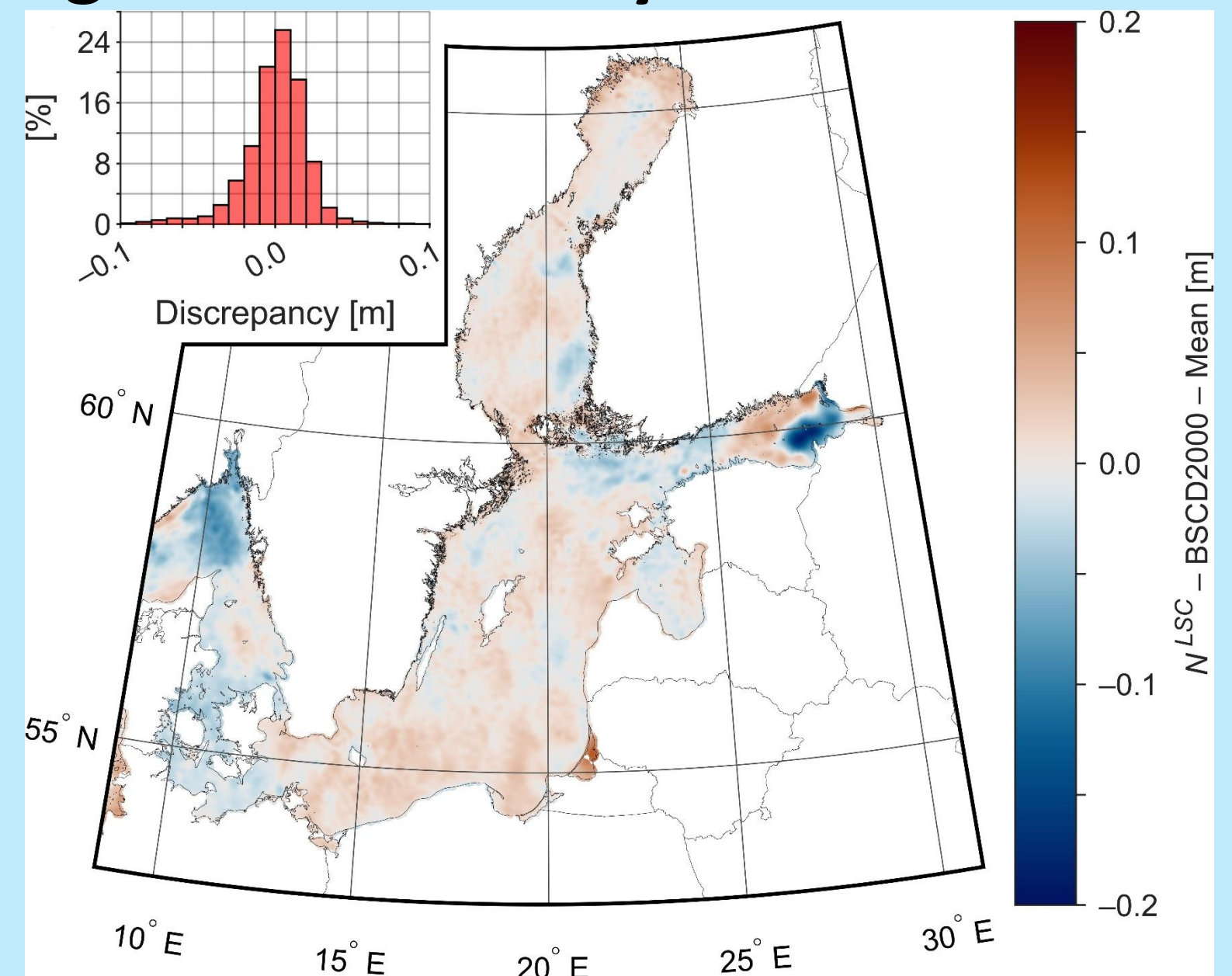


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An LSC-based framework for geoid-consistent geometric height reference surface determination in the Baltic Sea using SWOT altimetry

- Input: only open-access global datasets
 - The solution is constrained by internal consistency
- The method is globally applicable
- The method can achieve geometric accuracy that is comparable to gravimetric modelling in regions of good gravity data coverage





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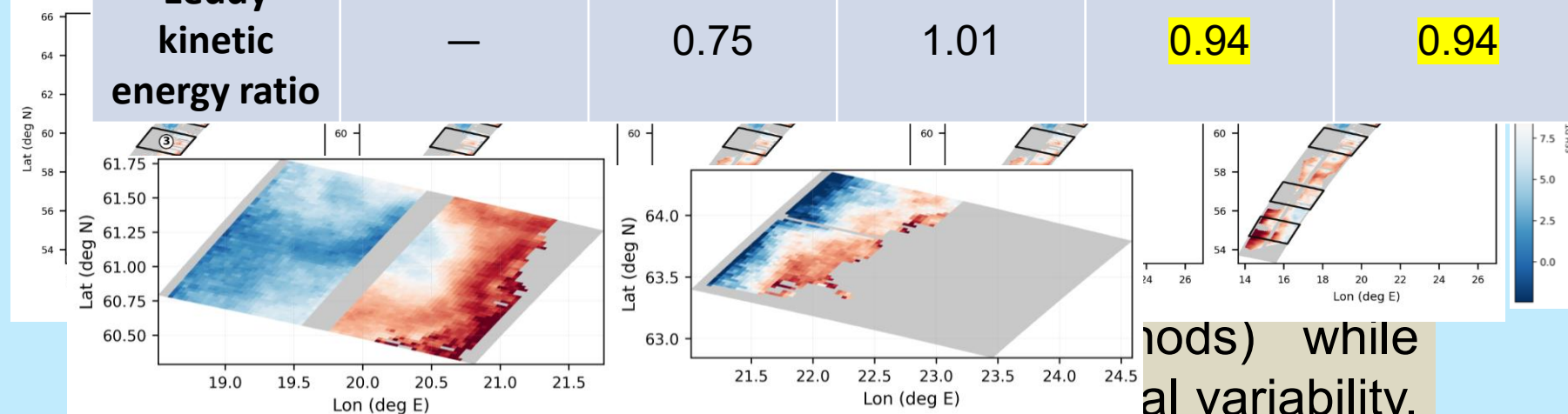
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Probabilistic Reconstruction of Fine-Scale Dynamic Topography using SWOT Satellite Altimetry and Deep Learning

Authors: Saeed Rajabi-Kiasari , Nicole Delpeche-Ellmann, Artu Ellmann

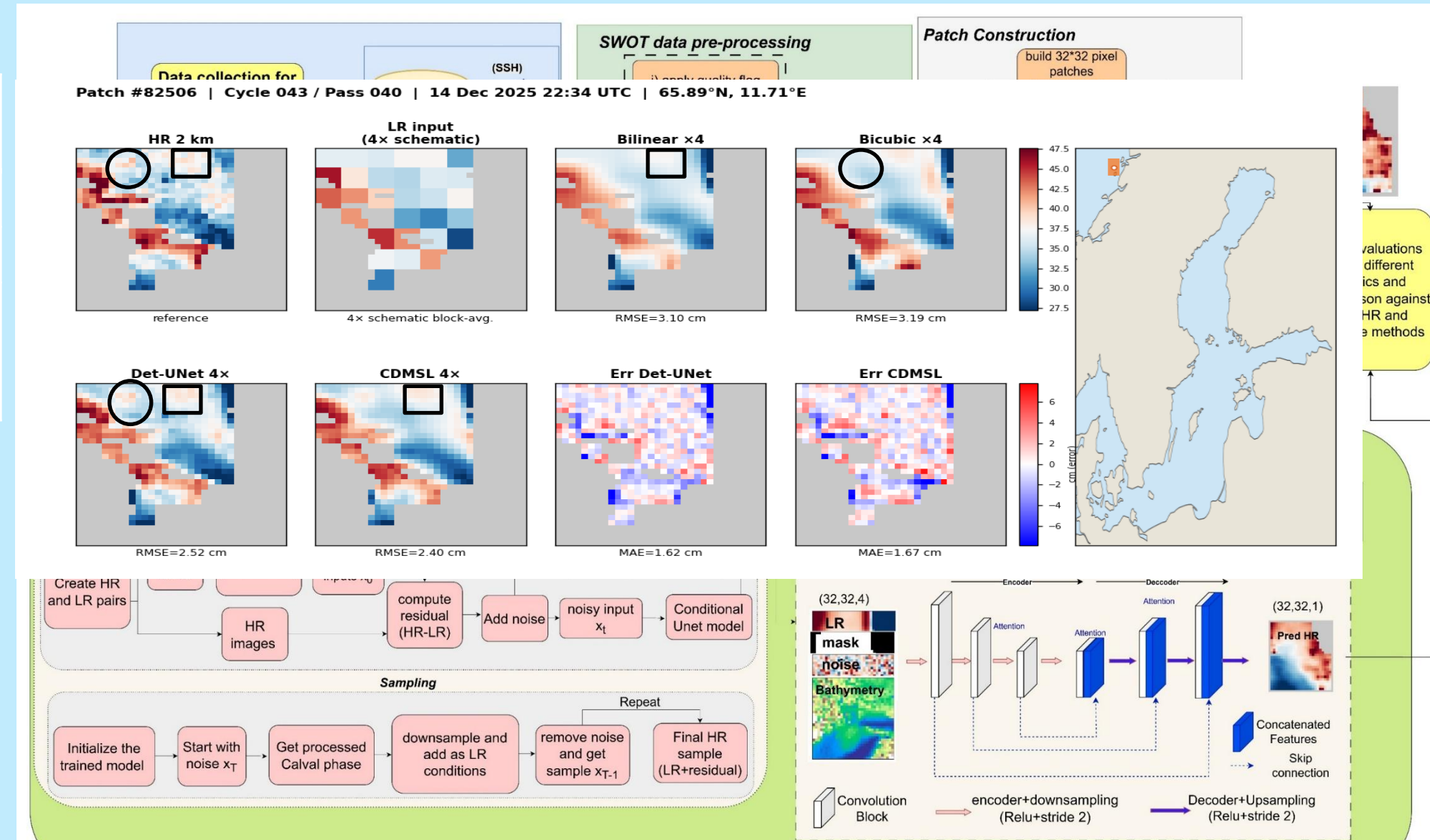
Deep learning models were developed to learn fine scale sea-level dynamics from SWOT satellite altimetry (known to resolve small scale details) in the Baltic Sea.

Region	HR (10,10)	Bilinear	Block	Det-UNet	CDMSL
R ²	—	0.91	0.71	0.94	0.93
PSNR (dB)	—	53.53	50.88	55.35	54.63
Eddy kinetic energy ratio	—	0.75	1.01	0.94	0.94



Errors are larger in complex coastal/archipelago regions.

Methods) while
al variability.



KEY FINDING Deterministic-UNet provides the highest pointwise accuracy, while CDMSL preserves ~94% of High resolution eddy kinetic energy and provides spatially informative probabilistic uncertainty.



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Geodesy in a Challenged Environment

2020–2024 review of the national boundary between Sweden and Norway





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Geodesy in a Challenged Environment

Maintenance of the national geodetic infrastructure in Sweden - Digital tools for planning and documentation of field work



Karl Tirén & Kent Ohlsson

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Geodesy in a Challenged Environment

Lantmäteriet's Strategy for Geodesy 2026–2035

Where is geodesy heading, and how can we prepare to meet future requirements?

Five strategic priorities concerning:

- SWEPOS positioning services
- National reference frames
- Geoid determination and gravity measurements
- A robust geodetic infrastructure
- The global geodetic supply chain





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Many thanks to authors!