Land Monitoring

Copernicus Land Monitoring Service& Copernicus Polar Roadmap

Andrus Meiner, EEA

with contributions from Nadine Gobron (JRC) and Lorenzo Solari (EEA)

3 September 2024, Copenhagen

PROGRAMME OF THE EUROPEAN UNION

Copernicus Europe's eyes on Earth

Implemented by European Environment Agency

European Commission

Copernicus Land Monitoring Service

Land Monitoring

- **Geographical** information on **land cover and its changes, land use, vegetation** state, **water cycle** and Earth's **surface energy variables** on European and global levels for environmental applications
- Implemented by **JRC** and **EEA**
- Website: https://land.copernicus.eu/

- Land cover and land use mapping
- Priority area monitoring
- Bio-geophysical parameters
- Ground motion monitoring
- Reference and validation data
- Satellite data

CLMS – Global overview

Land Monitoring

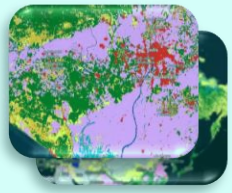
Global Land components

- Biophysical Variables systematic monitoring
- Land Cover and Forest Mapping and Monitoring
- Ground Based Observations for Validation
- Hot Spot Monitoring - Biodiversity and Agriculture
- Sentinel-2 Global Mosaics

CLMS – Global Products

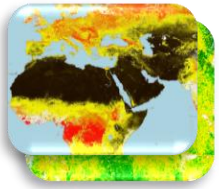
Land Monitoring

Global Land Cover
2015-16-17-18-19-24



Global Image Mosaic
S2GM 2017-present

Vegetation



FAPAR 2016 - present
NDVI 2020 - present
LAI 2014 – present
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Energy

Soil Water Index 2007 - present
Surface Soil Moisture 2014-present
Land Surface Temperature
2021 - present
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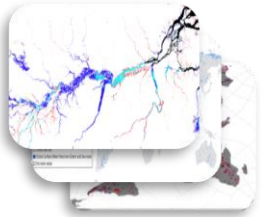
Water



Water Bodies 2020 - present
Lake turbidity 2019 - present
Lake surface water temperature
2016 - present
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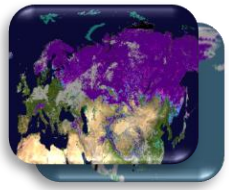
Cryosphere



Snow Cover Extent 2018 - present
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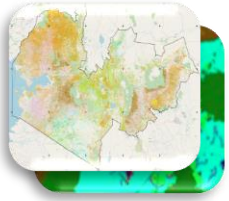
Hot Spot Monitoring



Copernicus4GEOGLAM - agriculture
HSM – biodiversity

Reference & Validation

GBOV 2013 - present

Land Monitoring

High resolution is coming!

Land Cover and Forest mapping and Monitoring (LCFM)

LCC-10	LSC-10	LCM-10	LCCM-10	LCM-100	LCCM-100	LCC-10 Annual
Land Cover Characteristics	**Land Surface Categories**	**Land Cover Map**	**Land Cover Change Map**	**Land Cover Map**	**Land Cover Change Map**	**Land Cover Characteristics**
Sub-annual	Sub-annual	Annual	Annual	Annual	Annual	Annual
10m	10m	10m	10m	100m	100m	10m
2020-2026	2020-2026	2020-2026	2021-2026	2020-2026	2021-2026	2020-2026
Per pixel based feature extractions	Categories of direct observable surface properties	Land cover map minimum of 11 land cover classes	Annual land cover changes	Land cover map, cover fraction layers	Annual land cover changes	Per pixel based yearly statistics

- Ramp up phase in 2024

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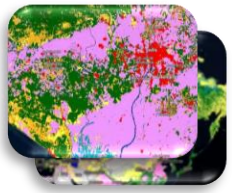

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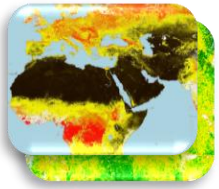

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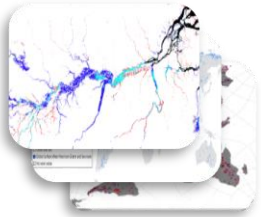

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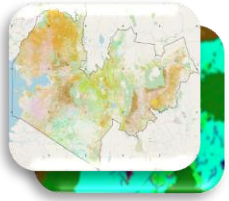

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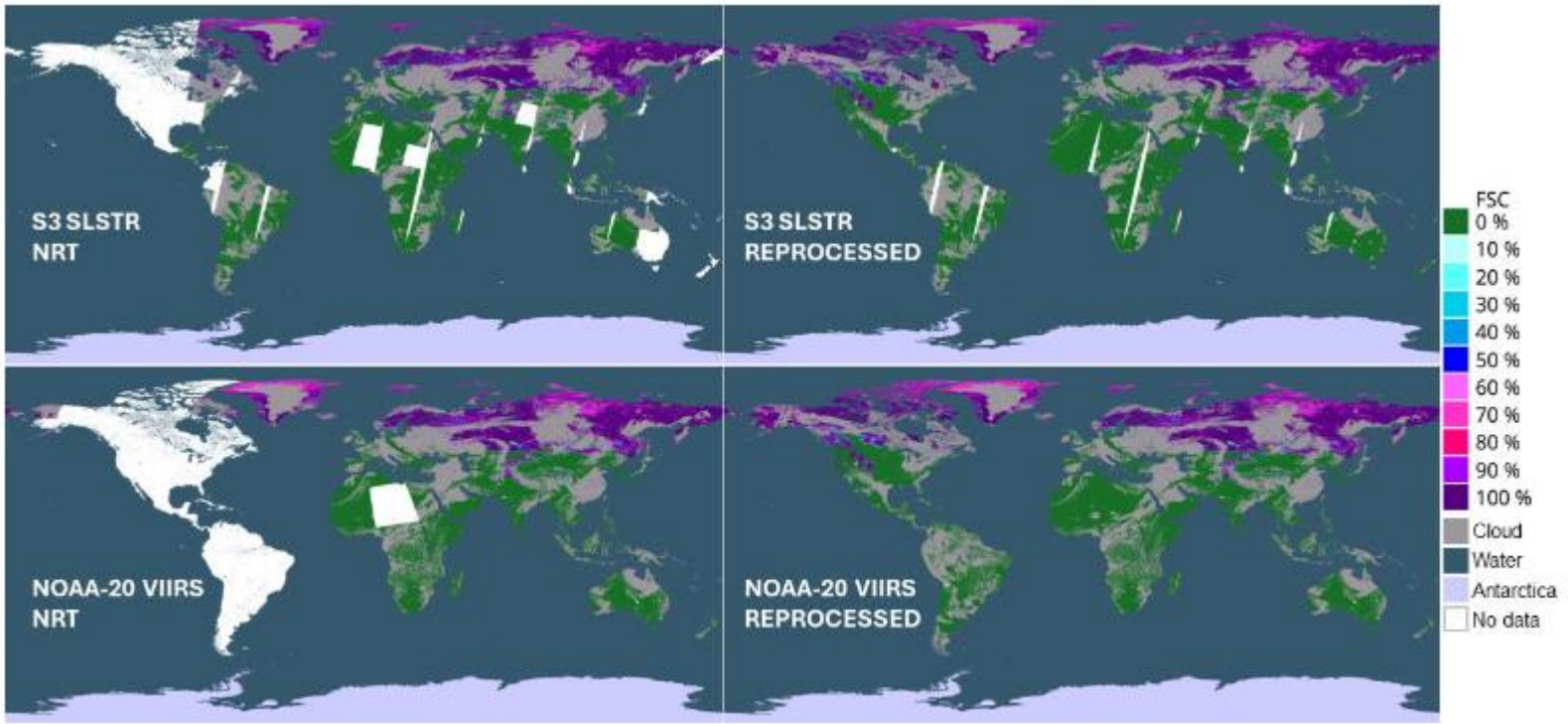
Land Monitoring

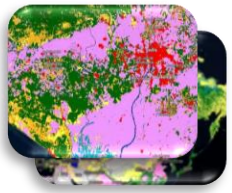
Cryosphere: towards global products (on going)



Land Monitoring

CLMS – Global Products

Global Land Cover
2015-16-17-18-19-24



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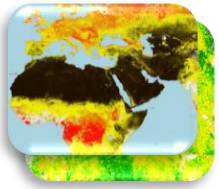

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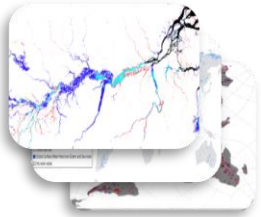

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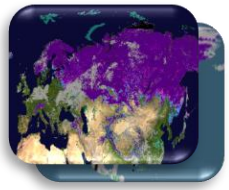

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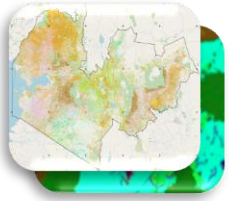

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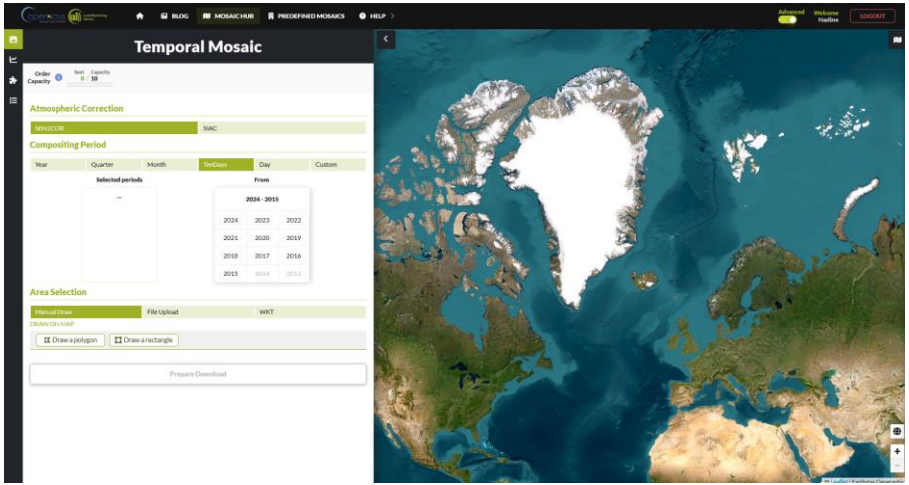
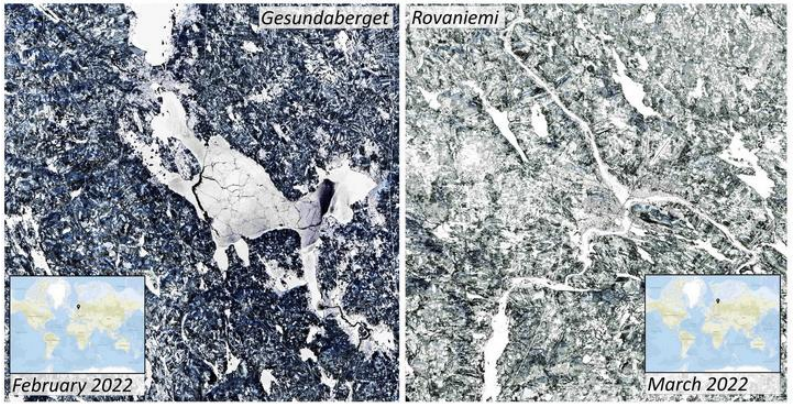
On-fly regional and temporal mosaic

Land Monitoring

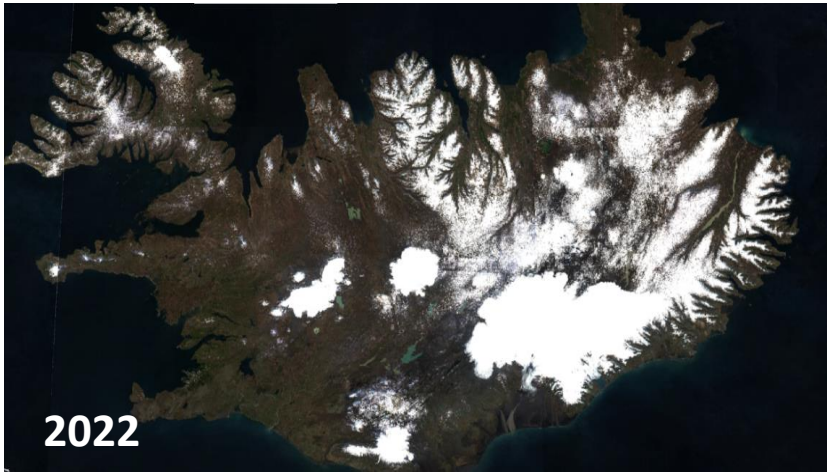


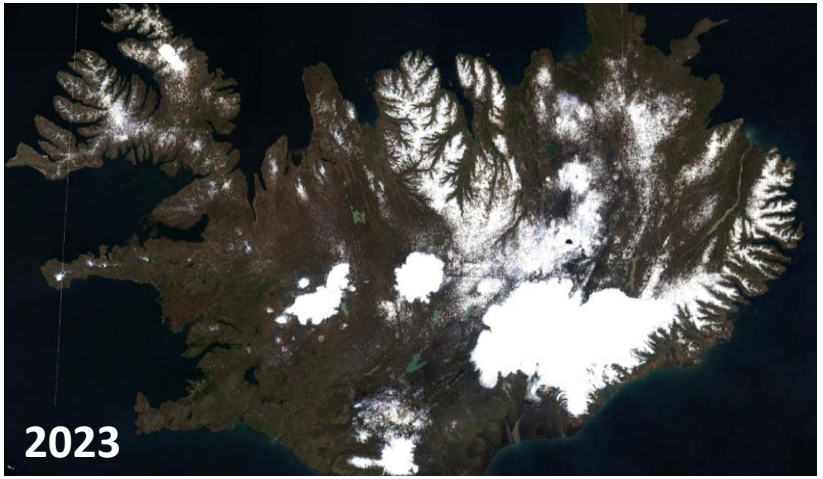


https://s2gm.land.copernicus.eu/

Land Monitoring

Predefined countries mosaic





https://s2gm.land.copernicus.eu/predefined-mosaics

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Land Monitoring

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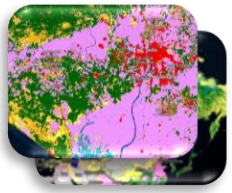

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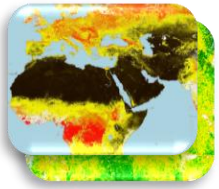

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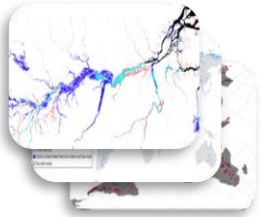

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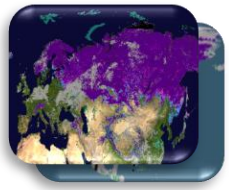

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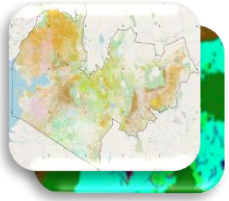

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HSM – biodiversity

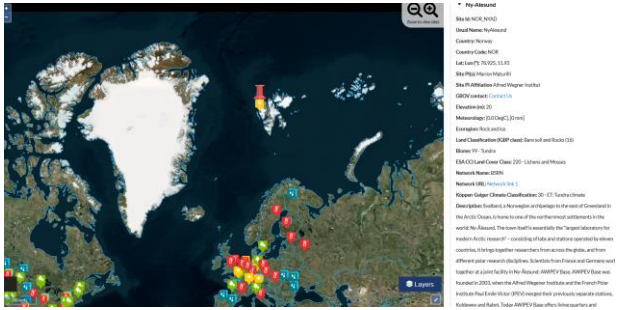
Reference & Validation

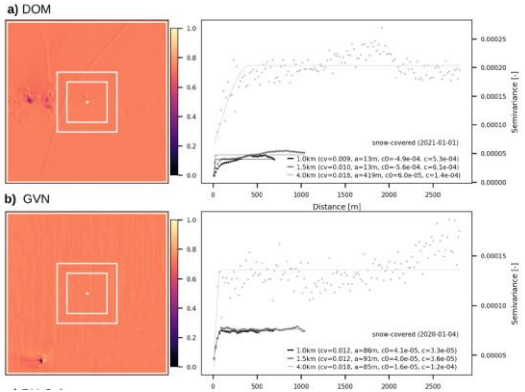
GBOV 2013 - present

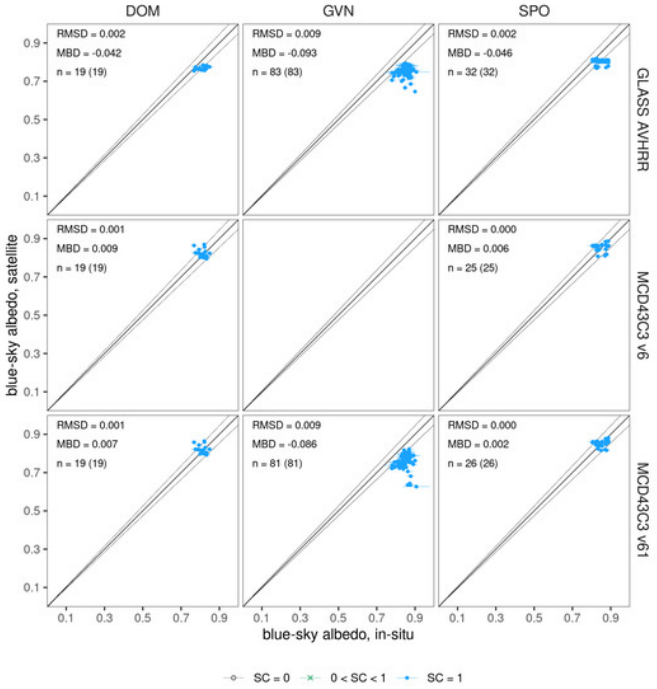
GBOV – Validation Data over Polar regions

Land Monitoring

https://gbov.land.copernicus.eu/







Urraca, R.; Lanconelli, C.; Cappucci, F.; Gobron, N. Comparison of Long-Term Albedo Products against Spatially Representative Stations over Snow. *Remote Sens.* **2022**, *14*, 3745. https://doi.org/10.3390/rs14153745

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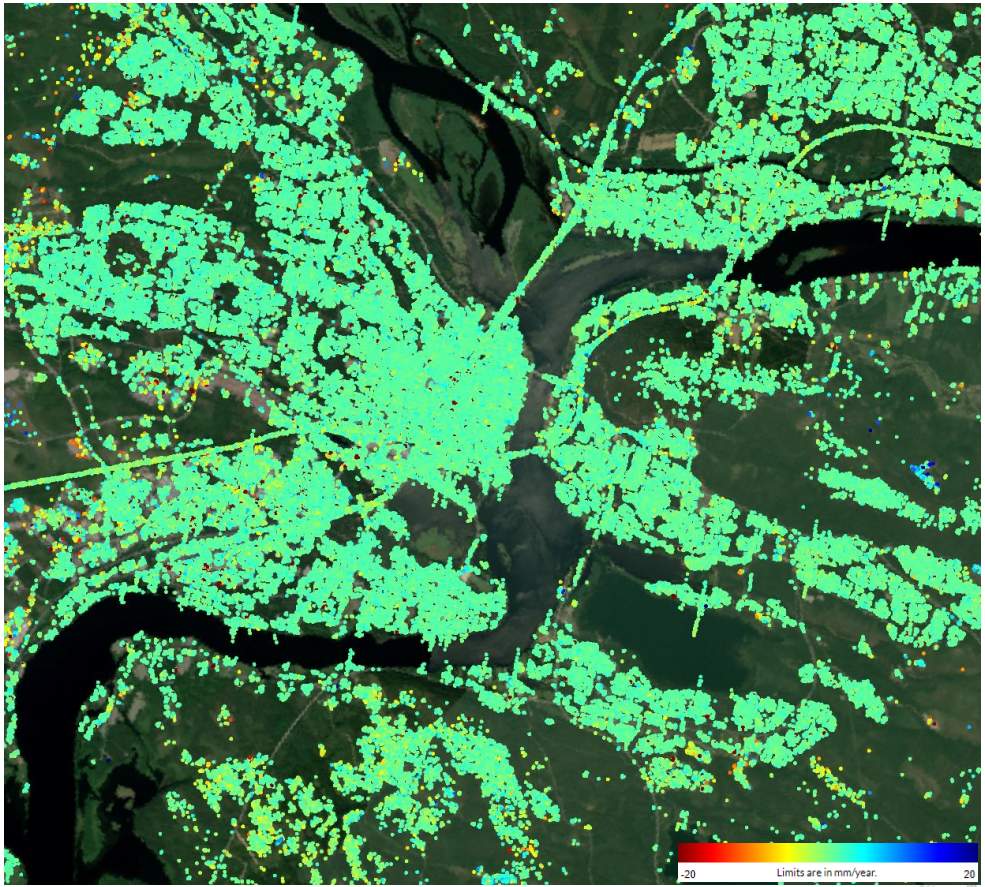
Copernicus Europe's eyes on Earth

European Commission

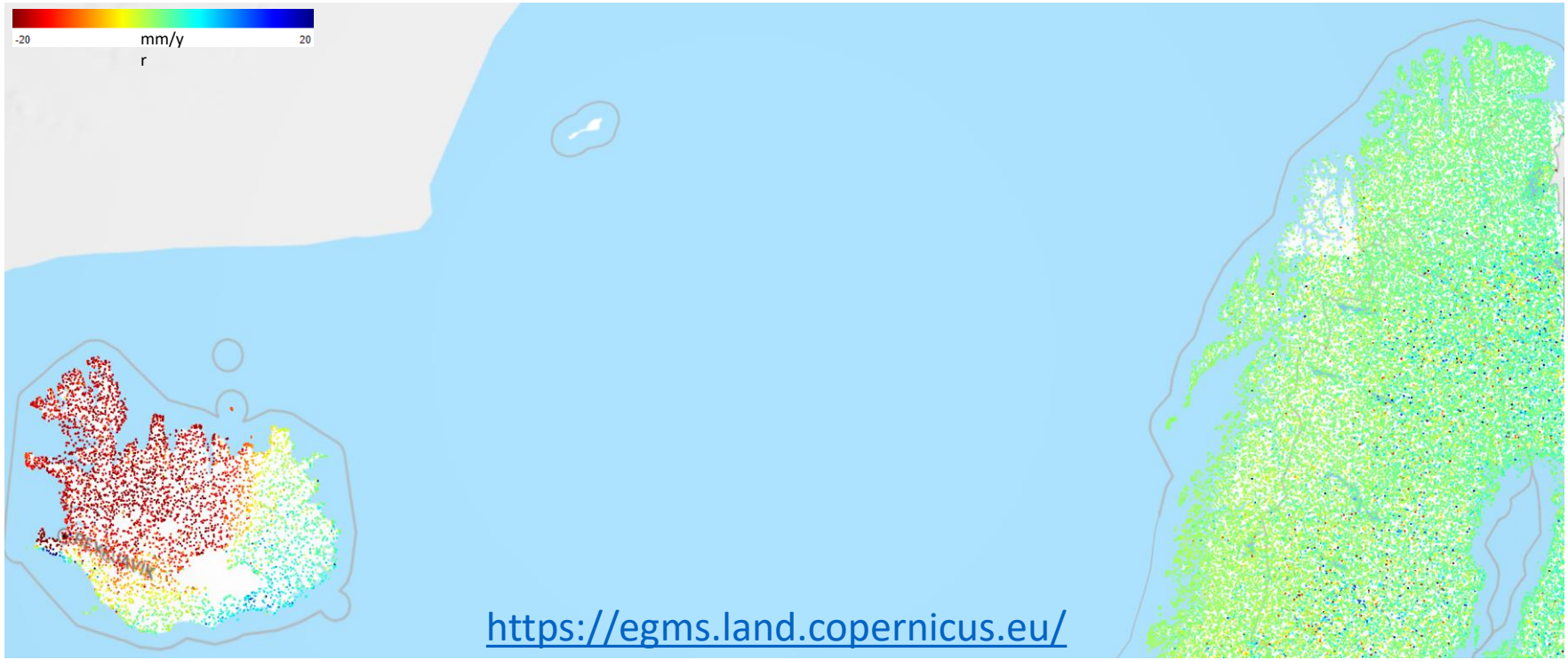
What is European Ground Motion Service (EGMS)?

- EGMS is an essential element of the CLMS portfolio.
- It is produced using data collected by the **Sentinel-1** radar satellite mission.
- The EGMS products provide a **high-density, continental-scale** map of ground motion.
- Each measurement point has a value of ground motion velocity and a time series covering the last five years

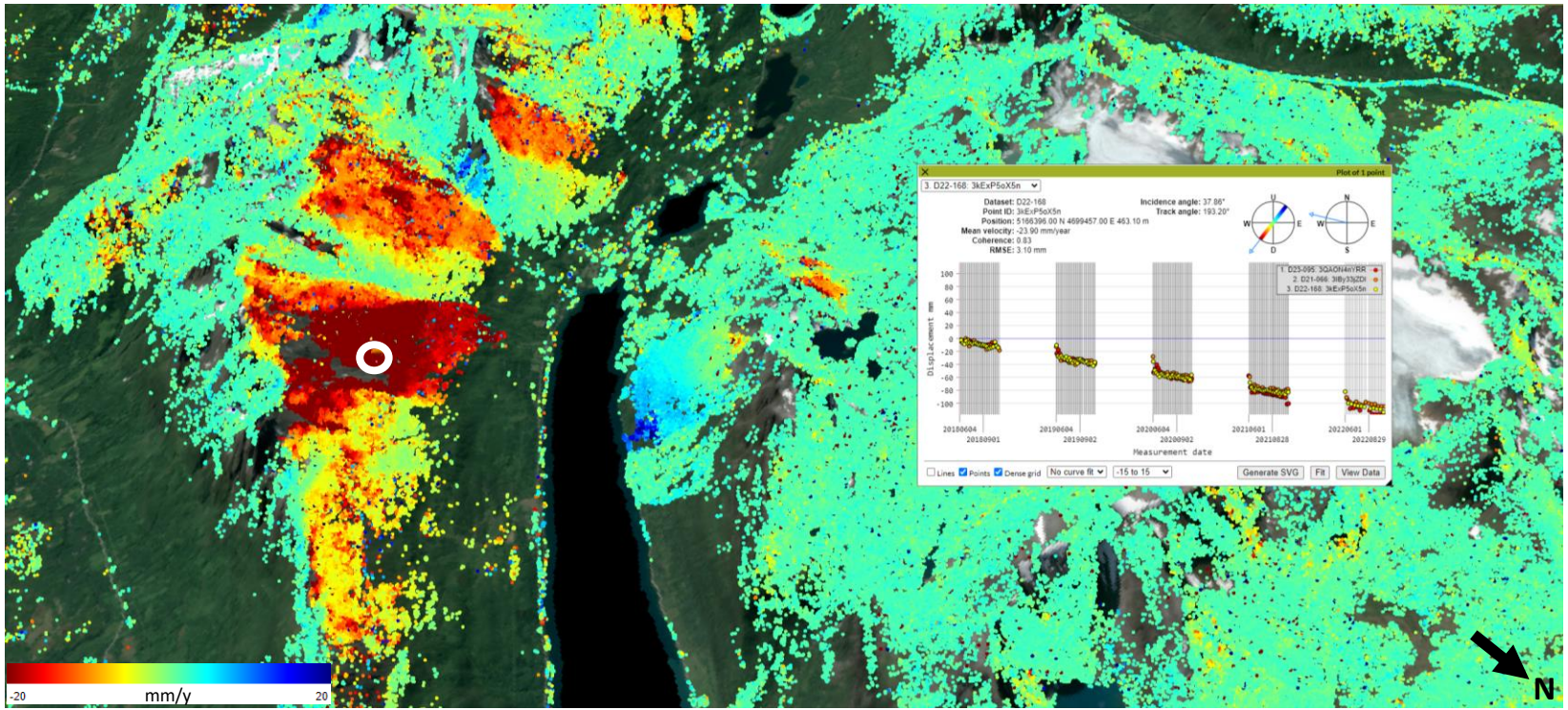


Rovaniemi, Finland

EGMS covers parts of the Arctic



An example from Norway



Recommendation from the roadmap

“the extension of the EGMS (European Ground Motion Service) to the Arctic and Antarctica is strongly recommended”

1. Need to adopt a “hot-spot” approach
2. Ad-hoc technical specifications
3. Collect new user requirements

Thank you!

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Implemented by

European Environment Agency

European Commission