

Global Near-Real-Time Monitoring of Snow and Lake Ice within CLMS

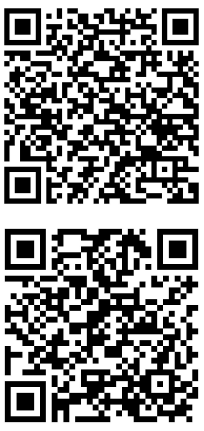
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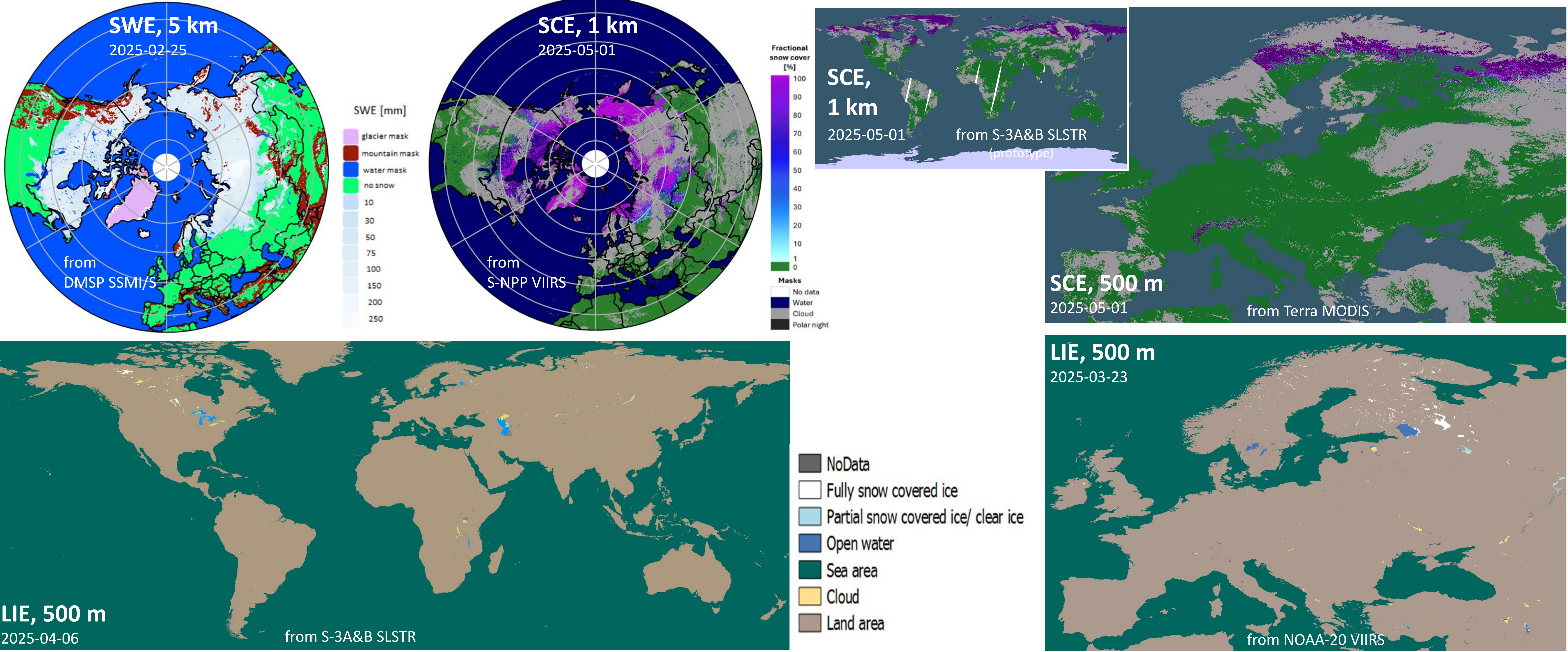


The Cryosphere Theme Variables

The Cryosphere Theme of the Global Land Component of the Copernicus Land Monitoring Service covers three variables, generated and delivered **daily** in **near-real-time** all around the year from satellite data, with **Pan-European** to **Global coverage**:

1. **Snow Cover Extent (SCE)**: representing the fraction of snow-covered area per pixel.
2. **Snow Water Equivalent (SWE)**: indicating the amount of water stored in the snowpack.
3. **Lake Ice Extent (LIE)**: differentiating frozen lake surfaces from open water.

Service	Snow Cover Extent	Snow Water Equivalent	Lake Ice Extent
Thematic information	- Fractional snow cover on ground per pixel in percent - Masks: clouds, water bodies, polar night, and unobserved areas	- Snow Water Equivalent in mm w. e. - Masks: water bodies, mountains, ice/unmapped areas	- Lake surface classification, separating open water, partially snow-covered/snow-free ice and fully snow-covered - Masks: clouds, sea areas and land areas
Spatial & temporal service characteristics	- European domain, ca. 500 m (2000 – present) - Northern Hemisphere, ca. 1 km (2018 – 2025) - Global (excl. Antarctica), ca. 1 km (2025 – present) - Daily, near-real time (<24 h)	- Northern Hemisphere, ca. 5 km (2006 – present) - Daily, near-real time (<24 h)	- Baltic/European domain, ca. 250 m (2017 – present) - Northern Hemisphere (NH), ca. 500 m (2021 – present) - Global (excl. Antarctica), ca. 500 m (Launching July 2025) - Daily, near-real time (<24 h)
Data base	Optical satellite data: - NH: Suomi-NPP VIIRS (2018 – 2025), Sentinel-3 SLSTR (2020 – 2025) - Europe: Terra MODIS (2000 – 2025), NOAA-20 VIIRS (2025 – present) - Global: Sentinel-3 SLSTR (2025 – onwards), NOAA-20 VIIRS (2025 – onwards) 	Passive microwave radiometer satellite data: DMSP SSMI/S (2006 – present) Ground-based synoptic snow observations 	Optical satellite data: - Baltic: Terra MODIS (2017 – 2024) - Europe: NOAA-20 VIIRS (2024 – present) - NH/Global: Sentinel-3 SLSTR (2021 – present) 



Potential applications and use cases

- Water resources management
- Numerical weather prediction and reanalysis
- Hydrological and runoff modelling and forecasting
- Agriculture
- Flood forecasting (including emergency scenarios)
- Drought forecasting
- Hydropower generation
- Methane emission modelling
- Geotechnical engineering
- Transportation, Safety
- Tourism
- Reindeer herders
- Ecological and biological processes
- Water quality and limnological processes in lakes
- Earth energy balance
- Snow and ice as climate indicators
- and many more....



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