# LIQUIDICE

## LinkIng and QUantifying the Impacts of climate change on inlanD ICE, snow cover, and permafrost on water resources and society in vulnerable regions

## GLOBAL CONTEXT

The accelerating retreat of glaciers, permafrost thaw, and snowpack loss in high-altitude and polar regions — including Greenland, the Himalayas, the Arctic, and the European Alps — is transforming the cryosphere's role in regulating freshwater availability and sea level rise. These changes disrupt regional hydrology, intensify climate extremes, and impact infrastructure, ecosystems, and livelihoods - from Arctic permafrost towns to Alpine and Himalayan communities.

In regions like Greenland and High Mountain Asia, altered snow and ice dynamics reshape water supplies for billions. In Svalbard, the local community relies on melting snow and glaciers for its water supply, whereas fresh water from glacial melt significantly changes the fjord ecosystems. In Norway, shifting permafrost and ice conditions threaten infrastructure and hydropower. In the Alps, snow and glacier-fed tourism and hydroelectricity are increasingly at risk. Yet current models often fail to capture the complex interactions between snow cover, glaciers, ice sheets, and permafrost across spatial and temporal scales.

The LIQUIDICE addresses this gap by integrating Earth observations, advanced climate and cryosphere modelling, and social vulnerability assessments to develop actionable climate services that connect inland ice dynamics to societal impacts across Europe and Asia's most fragile cold regions.

## FACTS

- Ice loss threatens mountain and Arctic water supplies, tourism, and energy.
- The Greenland Ice Sheet is the single largest contributor to global sea level rise.
- Himalayas provide water for over 1.65 billion people downstream.
- Most climate models under-represent ice–hydrology–socioeconomic linkages.
- Permafrost instability endangers housing, roads, and heritage sites.

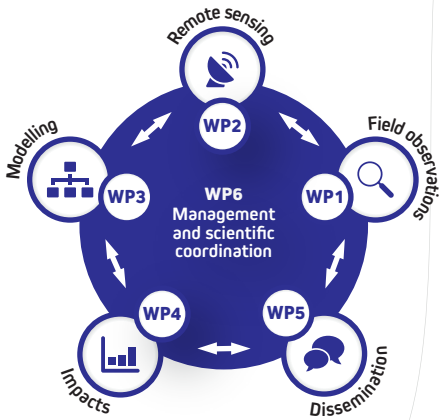
## KEYWORDS

- Ground-based and Earth Observations
- Cryosphere–Hydrosphere Interactions
- Glaciers, Snow, Ice Sheets
- Permafrost Thaw
- Coupled Climate Modelling
- Freshwater Availability
- Hydropower Resilience
- Socioeconomic Adaptation
- Global to Local Downscaling
- Climate Services

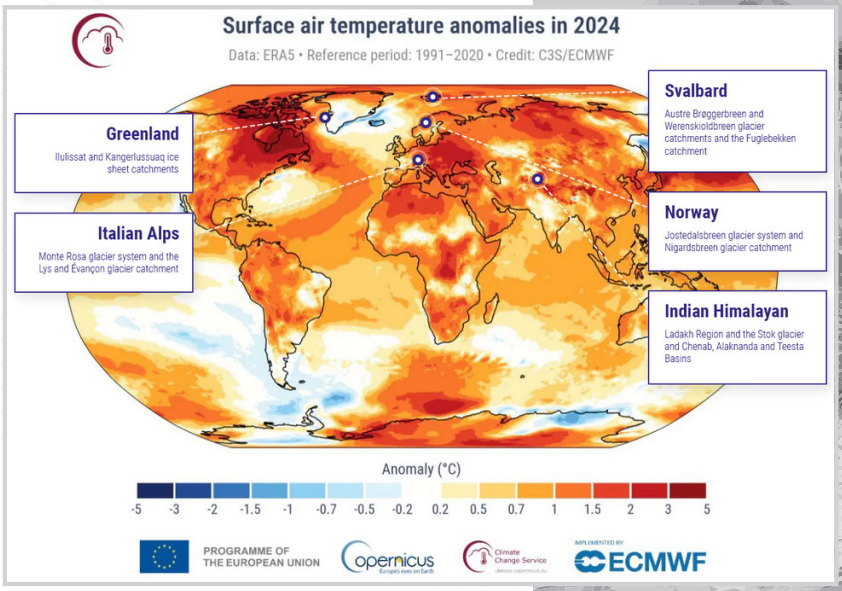
# PROJECT OVERVIEW

## ABOUT

LIQUIDICE explores the coupled glacier–snow–permafrost–hydrology–climate system across five climate-vulnerable cryosphere "super-sites": the Greenland Ice Sheet, Norwegian glaciers (Jostedalsbreen), the Italian Alps (Monte Rosa), Svalbard, and the Indian Himalayas. By integrating cutting-edge ground observations, remote sensing products, and high-resolution models, LIQUIDICE links ice evolution to freshwater availability, hydropower potential, and societal risks under climate change.




With 18 partners across 9 countries, LIQUIDICE develops advanced cryosphere–hydrology models, harmonized datasets (including 44-year SWE and albedo time series), and coupled Earth system simulations. These are used to co-design tailored decision-support tools and climate services for local stakeholders—hydropower managers, Arctic communities, tourism operators, and water authorities—aimed at improving resilience and informing adaptation.




## PARTNERS

**Coordinated by:**
Institute of Geophysics, Polish Academy of Sciences (IG PAS), Poland

**Consortium includes:**

- CNR, CMCC & UNESCO-ICTP (Italy)
- NORCE, UiO & SIOS (Norway)
- GEUS, DMI & UCPH (Denmark)
- AWI (Germany)
- UGOT (Sweden)
- UPM (Spain)
- UoB (UK)
- UoS (Poland)
- IISER Bhopal, IITB, IISc (India)

## IN NUMBERS

- EU Budget Contribution: **€7,499,965.25**
- Duration: **48 Months** (Feb 2025 – Jan 2029)
- Countries: **9**
- Partners: **18**

## STAY CONNECTED

*LIQUIDICE*

*eu-liquidice.bsky.social*

*LIQUIDICE*

*eu_liquidice*

*www.eu-liquidice.eu*

**Funded by the European Union**

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the European Union nor the granting authority can be held responsible for them.