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research







Eurac Research





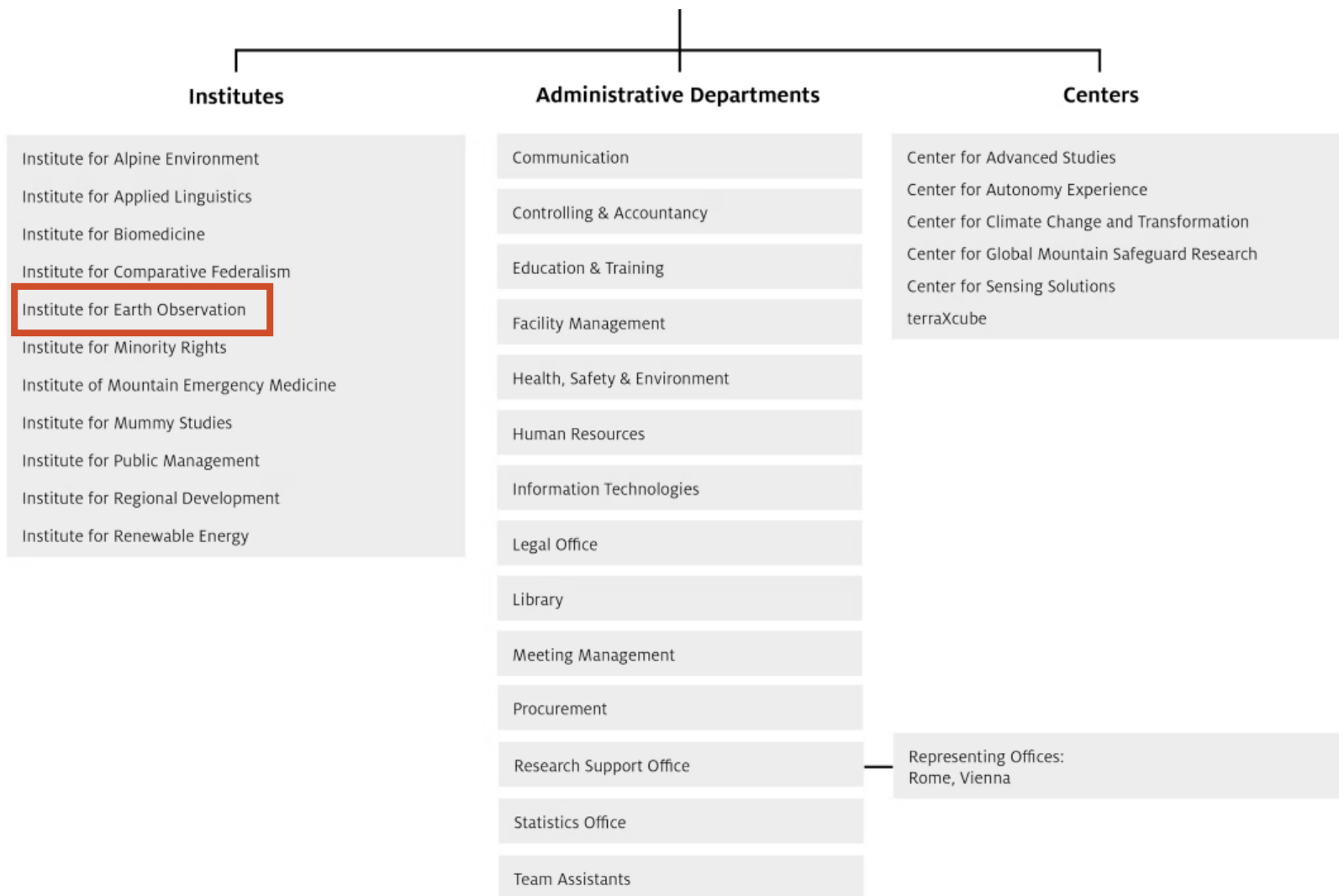
Viale Druso 1, 39100, Bolzano, Italy



- Private non-profit research institution
- Founded 1992
- Ca. 700 employees
- 11 research institutes and 6 research centres

<https://www.eurac.edu>

## Overview





### Biosphere & Hydrosphere

Integrated monitoring of land surfaces for mountain environments and its dynamics

- [Terrestrial water cycle](#)
- [Vegetation and Land-Use Dynamics](#)



### Mountain Cryosphere

Monitoring and modelling of the mountain cryosphere

- [Snow dynamics](#)
- [Glaciers and permafrost dynamics](#)



### Advanced Computing

Research and implementation of innovative solutions for simple EO data access and processing

- [Earth Observation Data Science](#)
- [Scientific Data Management and Processing](#)

# Our Mission

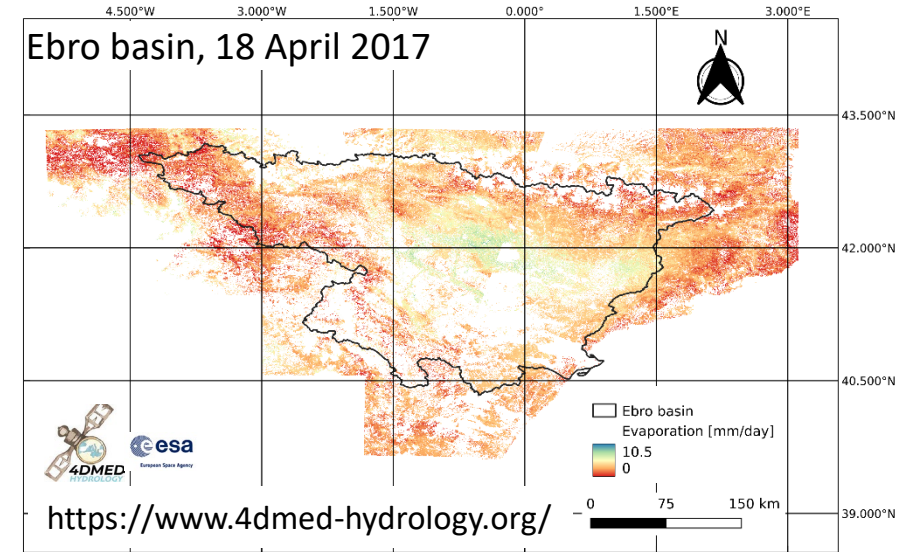
- *Monitor and **understand** key environmental dynamics in mountain regions*
- *Providing openly accessible knowledge and scientific support to local, regional and international institutions and stakeholders*
- *Developing and using a wide range of scientific methods in areas such as remote sensing, geo-informatics, bio-physical modelling and data science*

# Group Biosphere & Hydrosphere

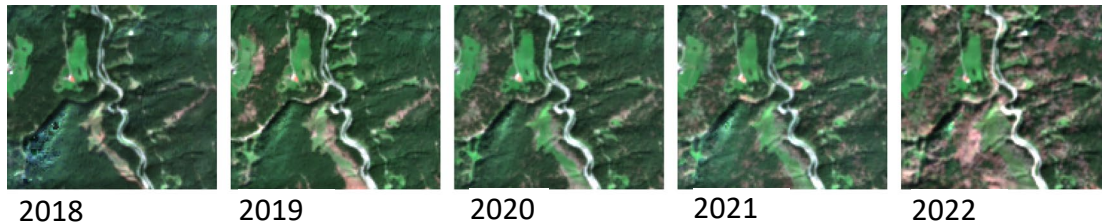
We develop new methods based on satellite data:

- 1 to monitor the components of the **water balance** for hydrological and agricultural applications;
- 2 to estimate the biophysical parameters and the health conditions of **vegetation**;
- 3 to study the dynamics of **land use** and land cover.

## 1 Daily evaporation from Sentinel-2 and -3

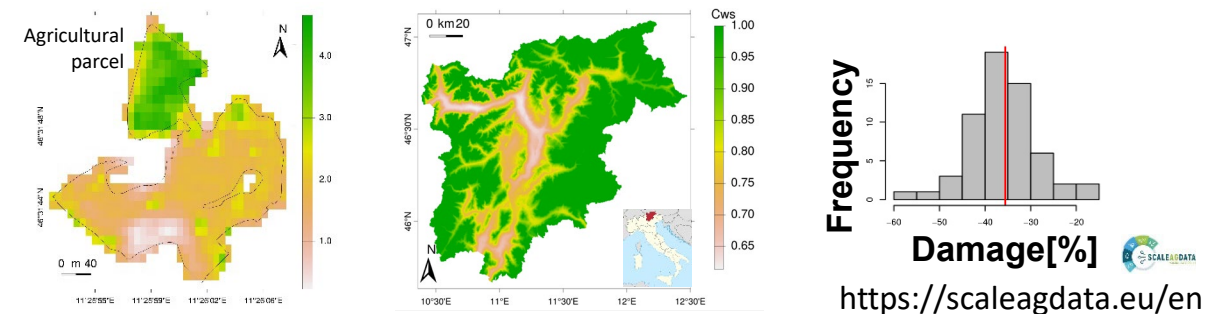


## 3 Forest monitoring by Sentinel-2



## 2 Grassland drought insurance by Sentinel-1 and -2

Sentinel-2 LAI + Meteo water stress → Grassland yield losses

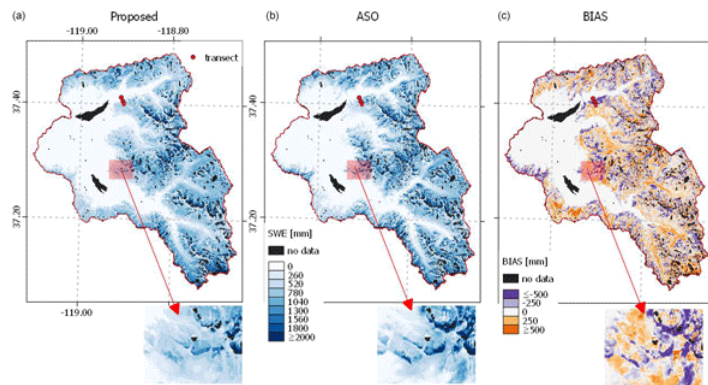




# Group Mountain Cryosphere

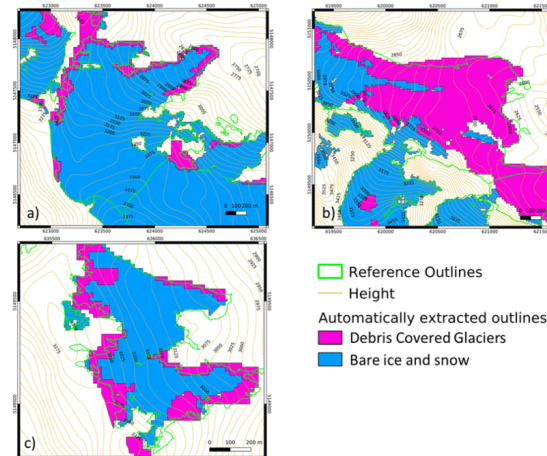
- *Monitor and understand* snow, glaciers and permafrost in mountain regions.
- *Developing new methods* that exploits both *multi-source and multi-temporal* satellites images together with *physical models* to improve the estimation of important *cryosphere variables*.

Exploring the use of multi-source high-resolution satellite data for snow water equivalent reconstruction over mountainous catchments



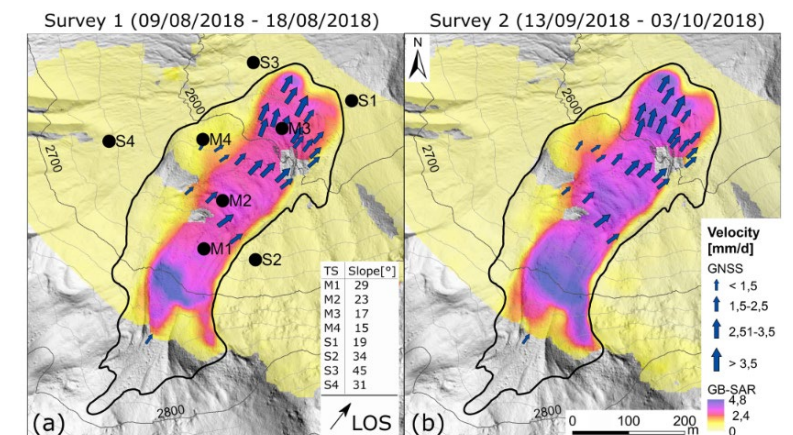
The Cryosphere, 17, 2387–2407, <https://doi.org/10.5194/tc-17-2387-2023>, 2023.

Combined Use of Sentinel-1 and Sentinel-2 for Glacier Mapping: An Application Over Central East Alps



IEEE JSTAR, 2022, doi: 10.1109/JSTARS.2022.3179050

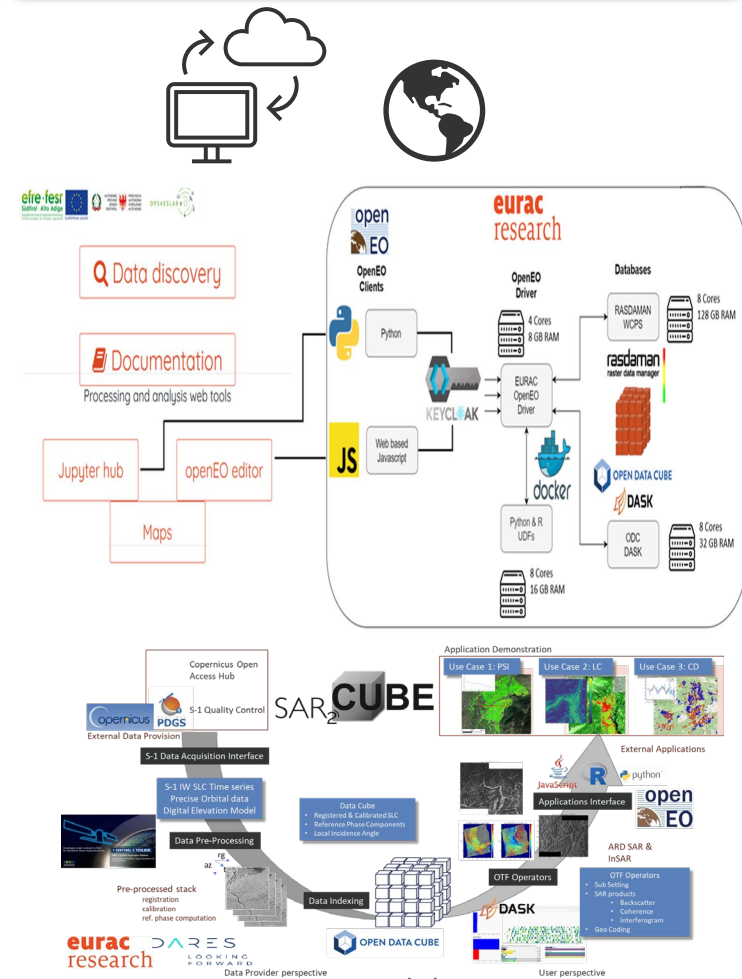
Unprecedented observation of hourly rock glacier velocity with ground-based SAR



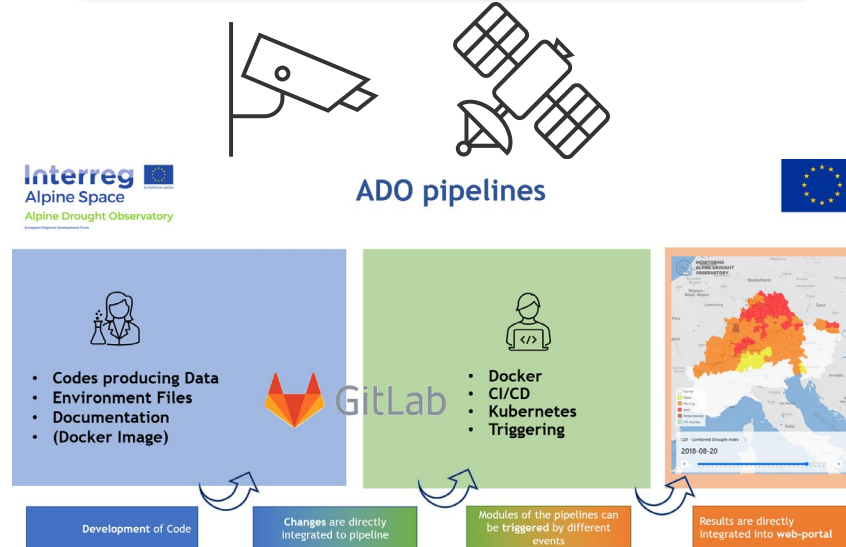
Geophysical Research Letters, 50, <https://doi.org/10.1029/2023GL102796>

# Group Advanced Computing

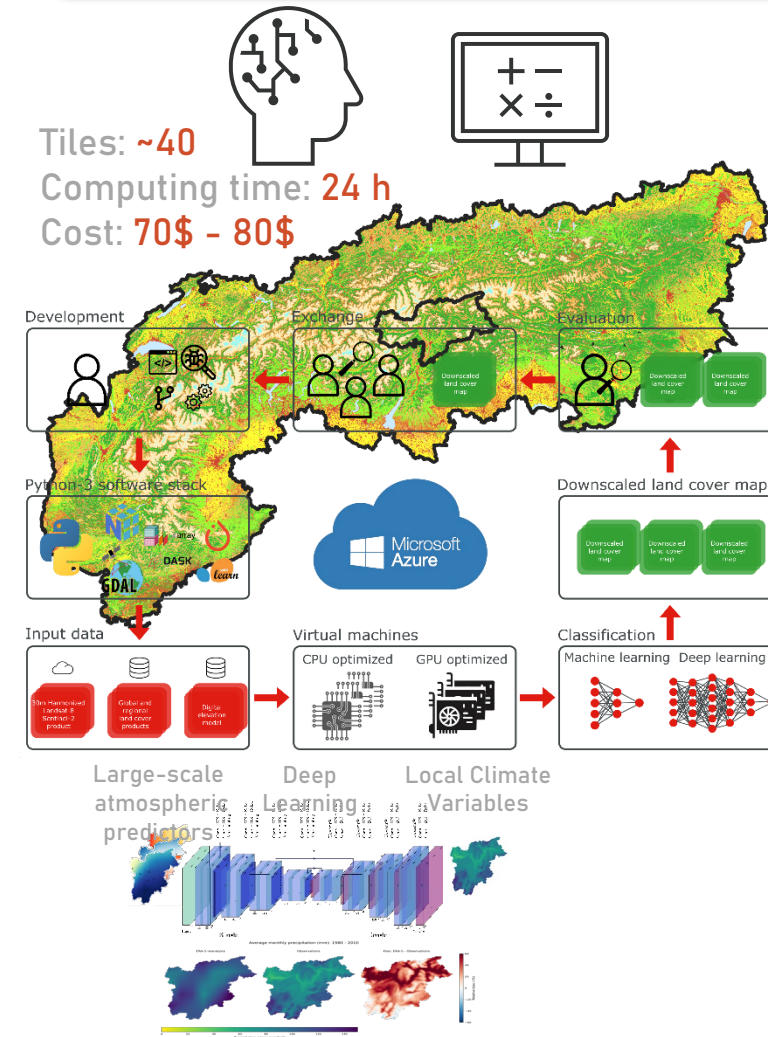
## Scalable EO Processing



## Data Integration



## Machine Learning



- **Scalable processing** is all about research and development of new software tools able to deal with EO data in all compute environments e.g., locally, cloud and HPC
- **Data integration** is about harmonization and integration of data streams from all source including in-situ, satellite observations and modelled data.
- **Machine Learning** deals with the research and implementation of EO workflows requiring data driven and hybrid modelling solutions.



# Credits

This material has been developed by my colleagues

- **Ruth Sonnenschein**, Senior Researcher, expert in forestry and agriculture applications, [ruth.sonnenschein@eurac.edu](mailto:ruth.sonnenschein@eurac.edu)
  - Lectures on land cover mapping
- **Mattia Callegari**, Senior Researcher, expert in glaciology and RADAR remote sensing, [mattia.calligari@eurac.edu](mailto:mattia.calligari@eurac.edu)
  - Lectures on radar remote sensing
- **Michele Claus**, Researcher, expert in software development and algorithm development, [michele.claus@eurac.edu](mailto:michele.claus@eurac.edu)



# Agenda

<b>Monday</b>				
	08:00	08:30	00:30	Registration
	08:30	08:45	00:15	Welcome
A. Jacob	08:45	10:15	01:30	Intro to land cover mapping and relevant data
	10:15	10:45	00:30	Coffee
A. Jacob + M. Phillipsen	10:45	12:00	01:15	Exercise data preparation
	12:00	13:30	01:30	Lunch
A. Jacob	13:30	15:00	01:30	Intro to RADAR remote Sensing
	15:00	15:30	00:30	Coffee
A. Jacob + M. Phillipsen	15:30	17:30	02:00	exercise SAR data products and masking
	17:30	19:00	01:30	Social Event
<b>Tuesday</b>				
A. Jacob	08:30	10:15	01:45	Land Cover Mapping and Accuracy Assessment
	10:15	10:45	00:30	Coffee
A. Jacob + M. Phillipsen	10:45	12:00	01:15	Exercise Land Cover Mapping
	12:00	13:30	01:30	Lunch



## **Eurac Research**

Viale Druso/Drususallee 1

39100 Bolzano/Bozen

T +39 0471 055 055

[info@eurac.edu](mailto:info@eurac.edu)

**[www.eurac.edu](http://www.eurac.edu)**