

# Piattaforma ADO L'Osservatorio Alpino della Siccità Idrica: istruzioni per l'uso

A. Jacob, P.J. Zellner, L. Cattani, T. Iacopino, M. Claus,  
M. Alasawedah, Daniela Quintero, Bartolomeo Ventura,  
Andrea Vianello, Ziva Vlahovic, Konrad Mayer

Meeting finale Italiano, Torino, 27 Settembre 2022



# Outline

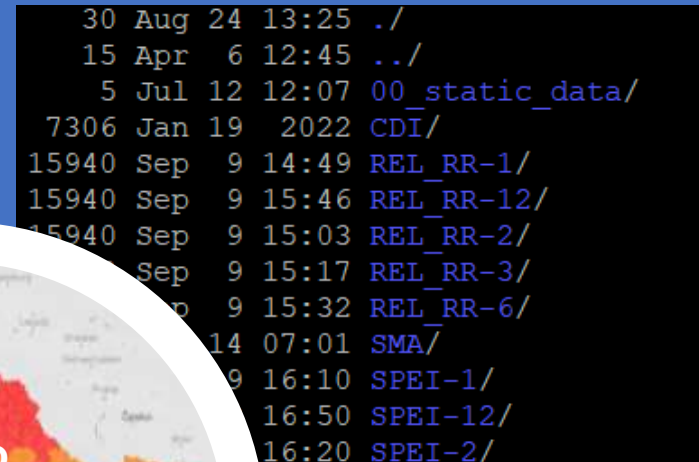
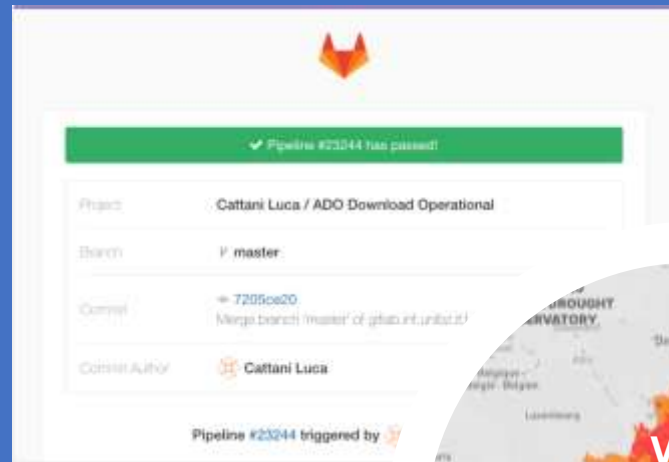


- Design goals of the Web Portal and Data Access Tools
  - Infrastructure
  - Operational Processing
  - Web Portal
  - OpenEO
- Available Data
    - Drought Indices
    - Hydrological Stations
    - Impacts
    - Vulnerability
  - Metadata & Citation

# The ADO Platform

## Production

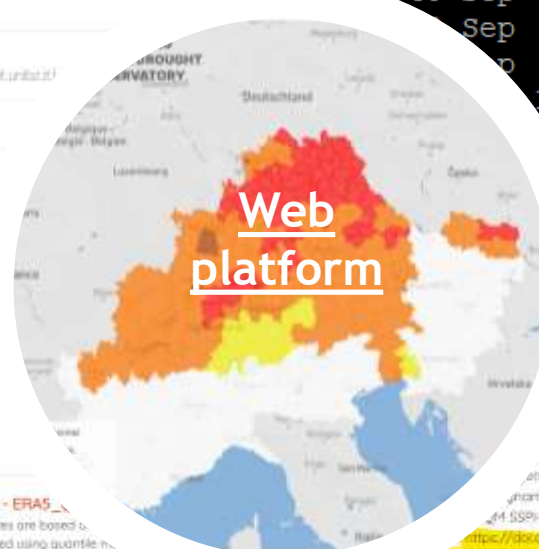
Docker  
GitLab  
Kubernetes



## Data

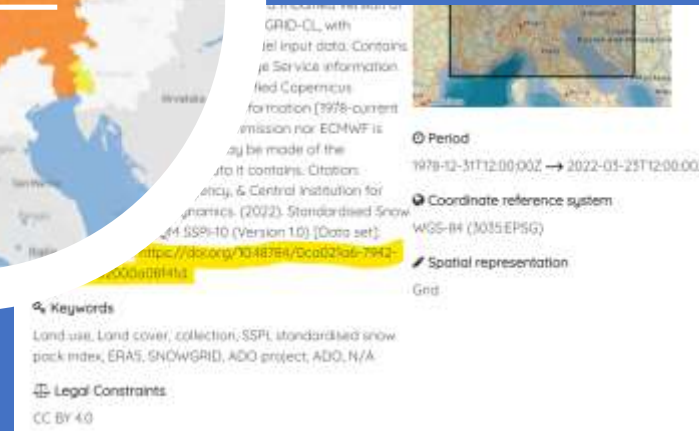
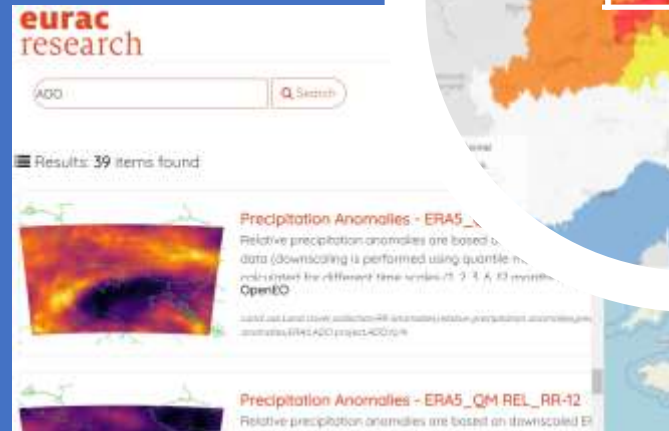
Drought Indices  
Hydro Stations  
Impacts  
Vulnerability

## Web platform



## Access

Rasdaman/ODC  
openEO  
Env. Data Platform

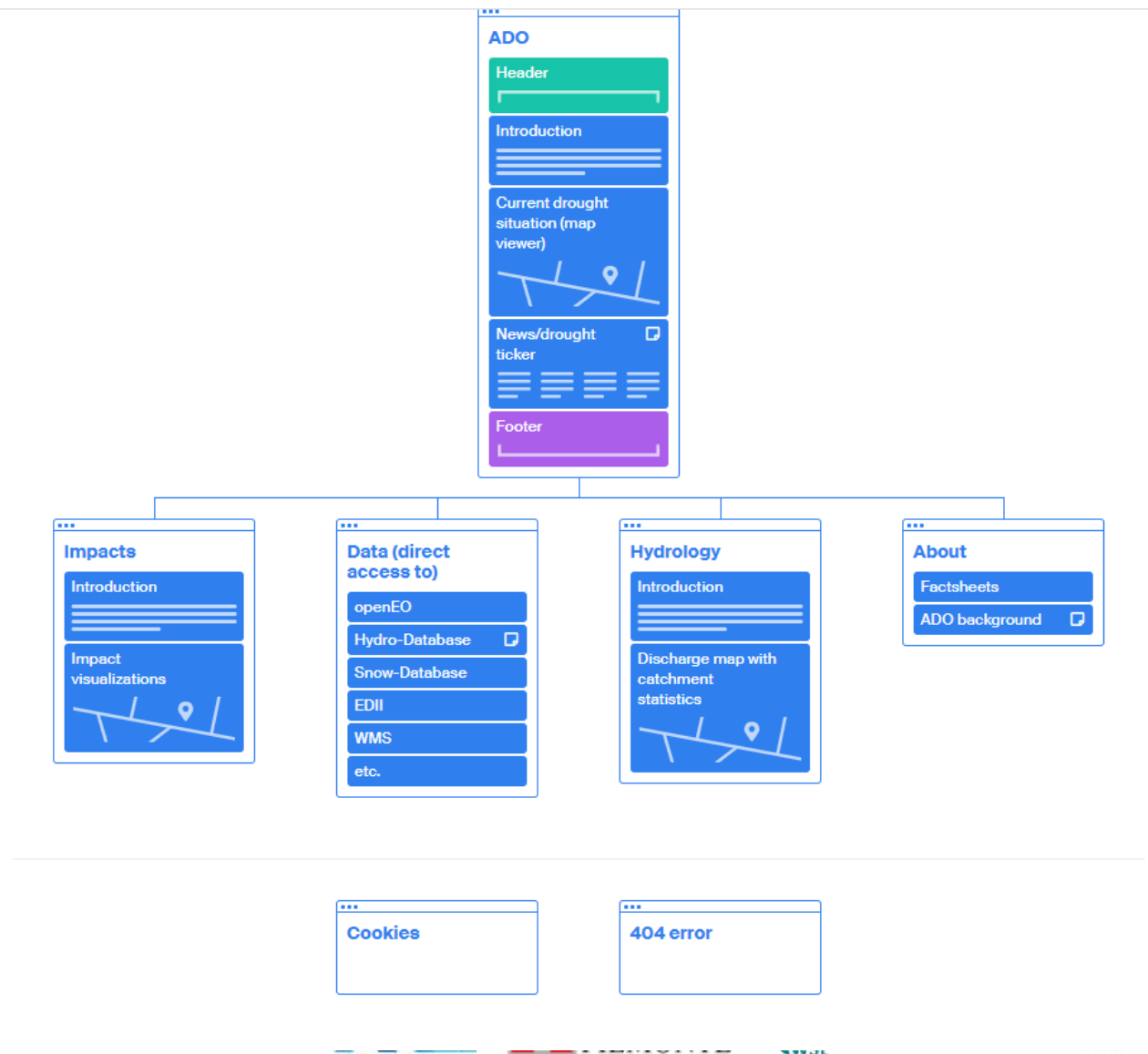


## Metadata

Fact Sheets  
STAC  
DOI  
FAIR

# Design Phase - Thinking about users...

Title	Description
Local/regional public authorities in the field of agriculture, water, and meteorology	Fabio Rossi is a member of the local government in the Alpine region. His experience in the assessment of the drought conditions and the impact of drought helps him to interpret the local situation.
Policy Maker, e.g. Alpine Convention, EUSALP	Sebastian Wagner is employed by the Alpine Convention. He has published at the ADO website several articles on management decisions for the Alpine region.
Scientist	Camille Bernard is a researcher at the University of Burgundy. She is studying the wine harvest of the following years and its impact for her study.
PhD, Expert in drought risk	Ramona Muhr is a PhD student at the University of Vienna. She is working on hazard and impact data to develop a drought risk assessment model.
Advisor for agriculture	Lara Schmidt is an advisor for farmers in the Alpine region. She provides information on the current drought situation and its impact on agriculture.
Private person impacted by drought	Karl Mueller is currently impacted by the drought. He is looking for more information about the current drought situation and the possibility to search for water resources.
Forester in an Alpine area	Lina Rahm is a forest manager in the Alpine region. She needs more information about the drought situation and its impact on the forest.
Journalist for environmental topics	Peter F. is a Journalist for environmental topics. He is looking for information about the drought situation and its impact on the environment to write an article.
Content manager	
Official at Administration for Civil Protection and Disaster Relief	Ana V. is an official at ACPD. She is responsible for the preparation of the platform to prepare an overview of the conditions over a region.



<https://openeo.org/>

**eurac**  
research



OpenEO  
Clients



Python



R



Web based  
Javascript

Process Graph



8 Cores  
16 GB RAM

Keycloak  
Authentication and  
Authorization (OIDC)

OpenEO  
Driver



4 Cores  
8 GB RAM

EURAC  
OpenEO  
REST

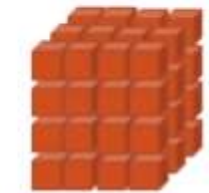


Python & R  
UDFs

Databases

RASDAMAN  
WCPS

**rasdaman**  
raster data manager



**DASK**

ODC  
DASK

16 Cores  
128 GB RAM



32 Cores  
150 GB RAM



VMs for ADO  
partners



20 Cores  
96 GB RAM

Pre-processing EO



16 Cores  
128 GB  
RAM



# ADO on git



ADO

A

**ADO**

Group ID: 1379
[Leave group](#)

New subgroup
New project

<https://gitlab.inf.unibz.it/ado>

ADO > openEO4ADO

O

**openEO4ADO**

Project ID: 3759

57 Commits 1 Branch 0 Tags 2.7 MB Files 2.7 MB Storage

Tutorial and snippets on how to use openEO in the ADO project

master
openeo4ado /
+

History
Find file
Web IDE
Clone

Update README.md  
Zellner Peter James authored 17 hours ago

a4fbc5e3

README
 Auto DevOps enabled
 Add LICENSE
 Add CHANGELOG
 Add CONTRIBUTING

Name	Last commit	Last update
python	Update ADO_Python_Tutorial.ipynb	1 month ago
r	updated login procedure	1 week ago
register_and_login_guide	Update README.md	17 hours ago
README.md	fixed my name	1 day ago

README.md

openEO4ADO

Tutorial and snippets on how to use openEO in the ADO project

vhi

scripts for downloading mod11a1 and mod09, calculation of land surface temperature, ...

★ 0

ogram.

dated d

1

1

23 hours

1 day

3 days

1 month

1 month

1 month

2 months

2 months

4 months ago

ADO > openEO4ADO

master
openeo4ado / python /
+

History
Find file
Web IDE
Clone

Update ADO\_Python\_Tutorial.ipynb  
Claus Michele authored 1 month ago

e1ad4d89

Name	Last commit	Last update
.		
.gitkeep	Update .gitkeep	1 month ago
ADO_Python_Tutorial.ipynb	Update ADO_Python_Tutorial.ipynb	1 month ago
README.md	Update README.md	1 month ago
environment.yml	added openeo conda environment	1 month ago
eo_utils.py	added eo_utils.py	1 month ago

README.md

### Accessing and Analyzing ADO Datasets with openEO

Author [michele.claus@eurac.edu](mailto:michele.claus@eurac.edu)

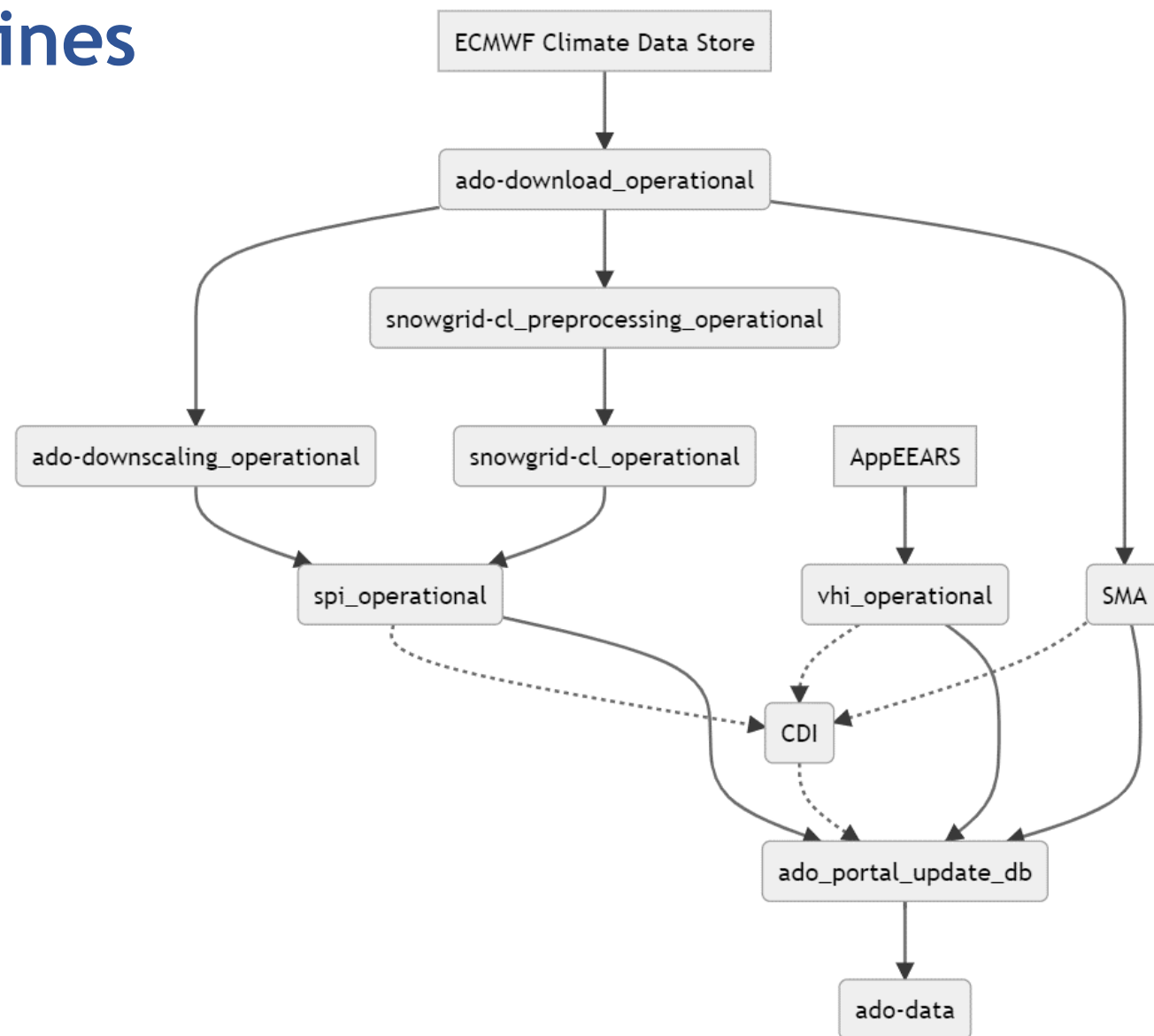
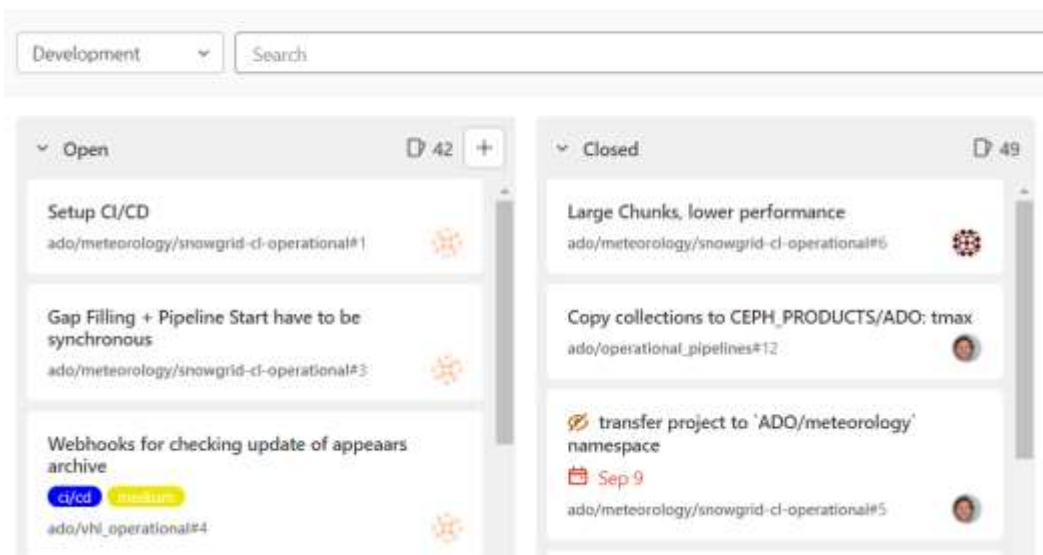
Date: 2021/04/15

Useful links:

OpenEO Python Client documentation: <https://open-eo.github.io/openeo-python-client/index.html>

# ADO Pipelines

ADO > Issue Boards



# Current List of Production Indices



## ATMOSPHERE



1. Precipitation Anomalies (%)



2. Standardised Precipitation Index (SPI)



## TOP-SOIL



3. Standardised Precipitation-  
Evapotranspiration Index (SPEI)



4. Soil Moisture Anomalies



## VEGETATION HEALTH



5. Normalized Difference Vegetation Index (NDVI)



6. Vegetation Health Index (VHI)



## SURFACE WATER GROUNDWATER



7. Standardised Snowpack Index (SSPI)



8. Hydrological Indices (SDI, SGI, ...)

...

+ combined drought index - **COMBINING 2 OR MORE TOPICS**

+ integration of impacts



# Current List of Production Indices



OGC Web Coverage Service (WCS)

OGC Web Map Service (WMS)

Admin

GetCapabilities

DescribeCoverage

GetCoverage

ProcessCoverages

DeleteCoverage

InsertCoverage

WCS service endpoint: 

Get Capabilities

119 coverages available, total volume 8.94 TB

Coverage ID	Coverage subtype	Coverage size	Display footprints
ADO			
ADO_SM_anomalies_ERA5_QM	RectifiedGridCoverage	16.1 GB	<input type="checkbox"/>
ADO_SPEI_12_ERA5_QM	ReferenceableGridCoverage	1.97 GB	<input type="checkbox"/>
ADO_SPEI_1_ERA5_QM	ReferenceableGridCoverage	1.97 GB	<input type="checkbox"/>
ADO_SPEI_2_ERA5_QM	ReferenceableGridCoverage	1.97 GB	<input type="checkbox"/>
ADO_SPEI_3_ERA5_QM	ReferenceableGridCoverage	1.97 GB	<input type="checkbox"/>
ADO_SPEI_6_ERA5_QM	ReferenceableGridCoverage	1.97 GB	<input type="checkbox"/>
ADO_SPI_12_ERA5_QM	ReferenceableGridCoverage	1.97 GB	<input type="checkbox"/>
ADO_SPI_1_ERA5_QM	ReferenceableGridCoverage	1.97 GB	<input type="checkbox"/>
ADO_SPI_2_ERA5_QM	ReferenceableGridCoverage	1.97 GB	<input type="checkbox"/>
ADO_SPI_3_ERA5_QM	ReferenceableGridCoverage	1.97 GB	<input type="checkbox"/>

First

Previous

1

2

3

Next

Last

<http://saocompute.eurac.edu/rasdaman/ows#/services>

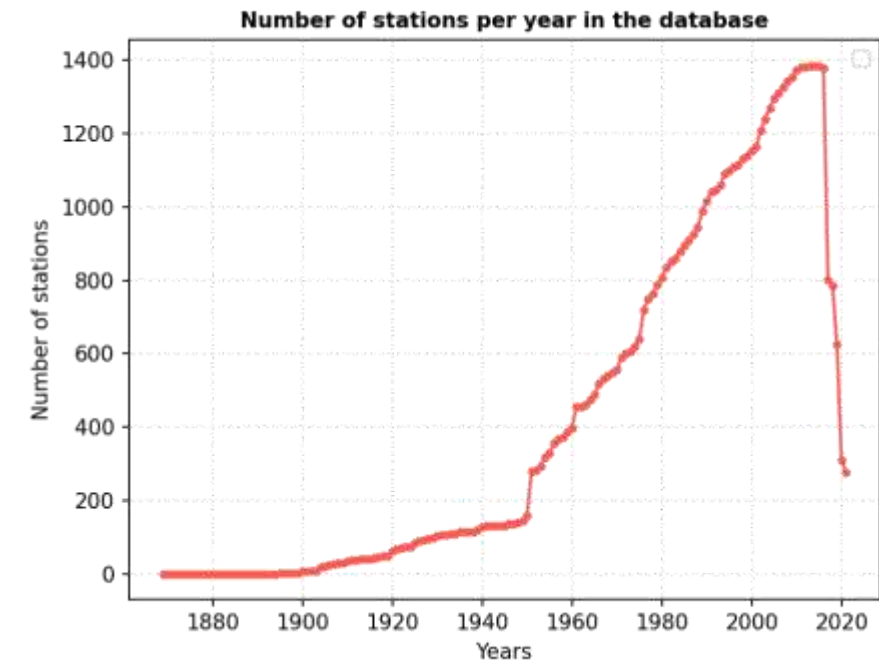
# Hydrological Data

**Alpine-wide dataset:** discharge, water level, groundwater level, metadata  
Problems: **different data providers**, real time data availability

[https://edp-portal.eurac.edu/cdb\\_doc/ado/](https://edp-portal.eurac.edu/cdb_doc/ado/)



Country	Runoff stations
Austria	567
Italy	242
Switzerland	235
Slovenia	185
Germany	129
France	65
<b>TOTAL</b>	<b>1423</b>



# Drought Impacts

- Substantial update of EDII database

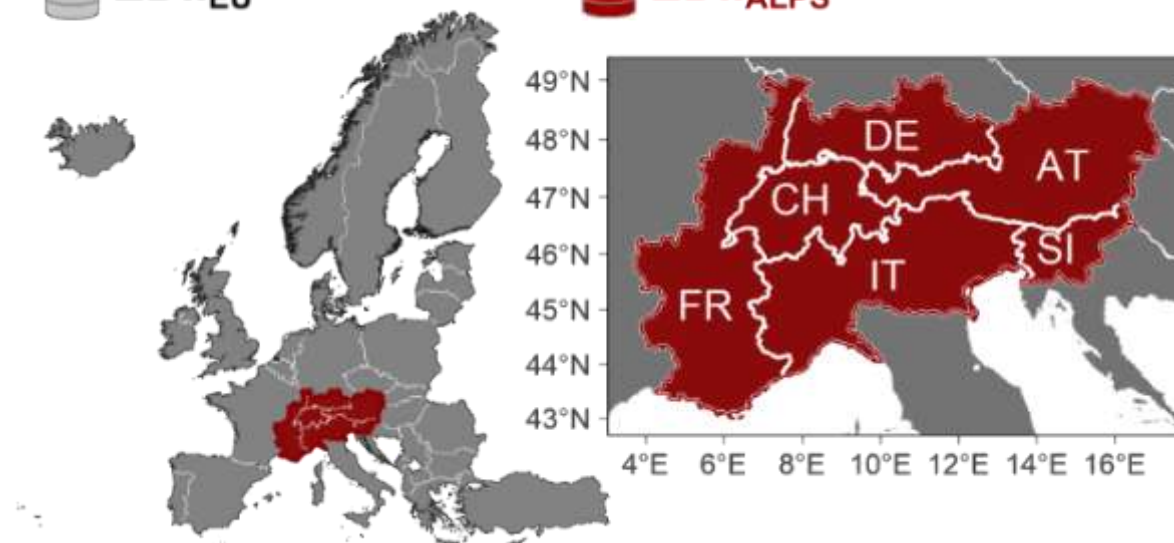
- Various German and Italian text-reports
- Unwetterchronik ZAMG
- Drought.ch
- DMCSEE
- Propluvia.fr

- Filtered to the Alpine Space

→ First version of EDII<sub>ALPS</sub>  
allows various analyses

 EDII<sub>EU</sub>

 EDII<sub>ALPS</sub>

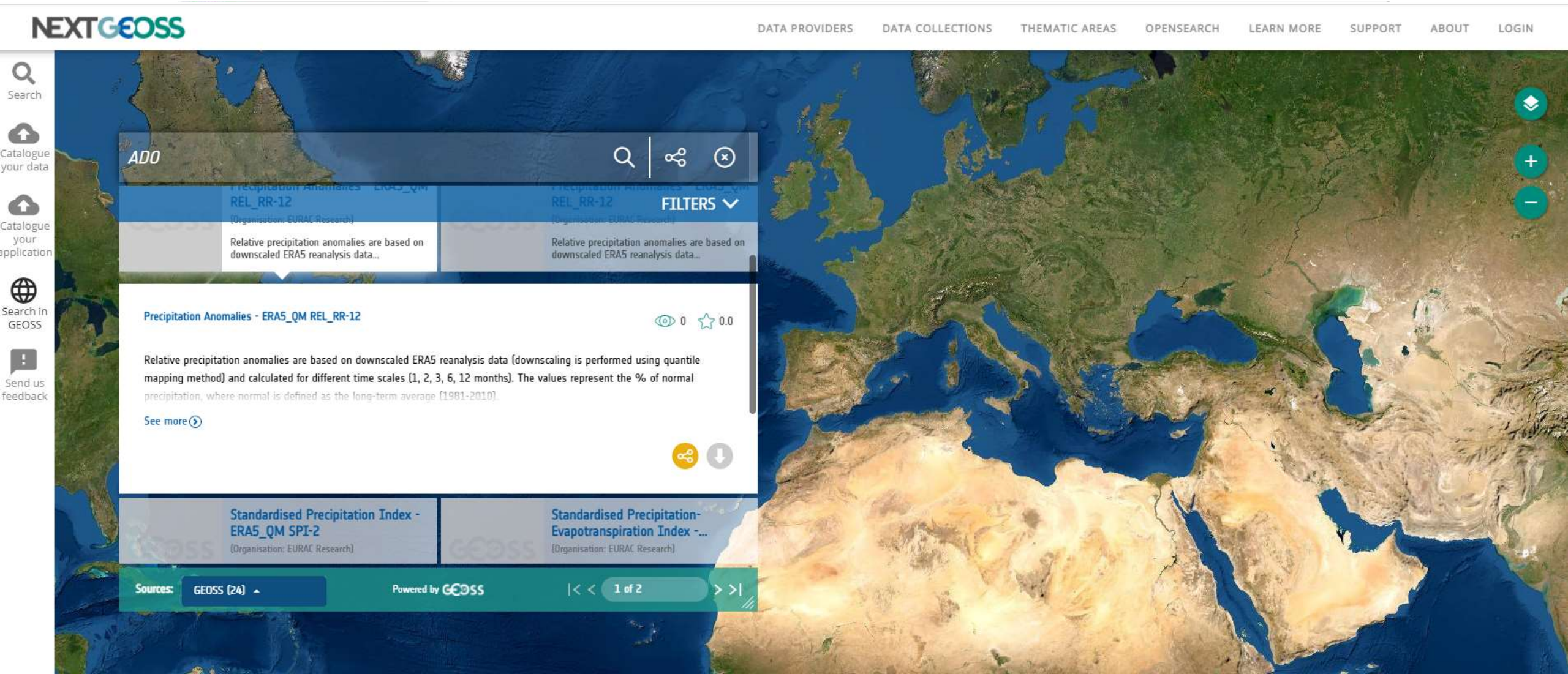


Stephan, R. *et al.* An inventory of Alpine drought impact reports to explore past droughts in a mountain region. *Nat Hazard Earth Sys* 21, 2485-2501 (2021). <https://nhess.copernicus.org/articles/21/2485/2021/>



# Meta Data

<https://edp-portal.eurac.edu/geonetwork/>



The screenshot displays the NEXTGEOSS web application. The top navigation bar includes the NEXTGEOSS logo and links for DATA PROVIDERS, DATA COLLECTIONS, THEMATIC AREAS, OPENSEARCH, LEARN MORE, SUPPORT, ABOUT, and LOGIN. On the left, a sidebar contains icons for Search, Catalogue your data, Catalogue your application, Search in GEOSS, and Send us feedback. The main area features a map of Europe with a data catalog overlay. The catalog shows a search for 'Precipitation Anomalies - ERA5\_QM REL\_RR-12' by EURAC Research. The description states: 'Relative precipitation anomalies are based on downscaled ERA5 reanalysis data (downscaling is performed using quantile mapping method) and calculated for different time scales (1, 2, 3, 6, 12 months). The values represent the % of normal precipitation, where normal is defined as the long-term average (1981-2010)'. Below this, there are links for 'See more' and 'Standardised Precipitation Index - ERA5\_QM SPI-2' by EURAC Research. The bottom of the catalog shows 'Sources: GEOSS (24)' and 'Powered by GEOSS'.

**NEXTGEOSS**

DATA PROVIDERS DATA COLLECTIONS THEMATIC AREAS OPENSEARCH LEARN MORE SUPPORT ABOUT LOGIN

**ADO**

**Precipitation Anomalies - ERA5\_QM REL\_RR-12**  
(Organisation: EURAC Research)

Relative precipitation anomalies are based on downscaled ERA5 reanalysis data...

**Precipitation Anomalies - ERA5\_QM REL\_RR-12**  
(Organisation: EURAC Research)

Relative precipitation anomalies are based on downscaled ERA5 reanalysis data...

**Precipitation Anomalies - ERA5\_QM REL\_RR-12**

0 0.0

Relative precipitation anomalies are based on downscaled ERA5 reanalysis data (downscaling is performed using quantile mapping method) and calculated for different time scales (1, 2, 3, 6, 12 months). The values represent the % of normal precipitation, where normal is defined as the long-term average (1981-2010).

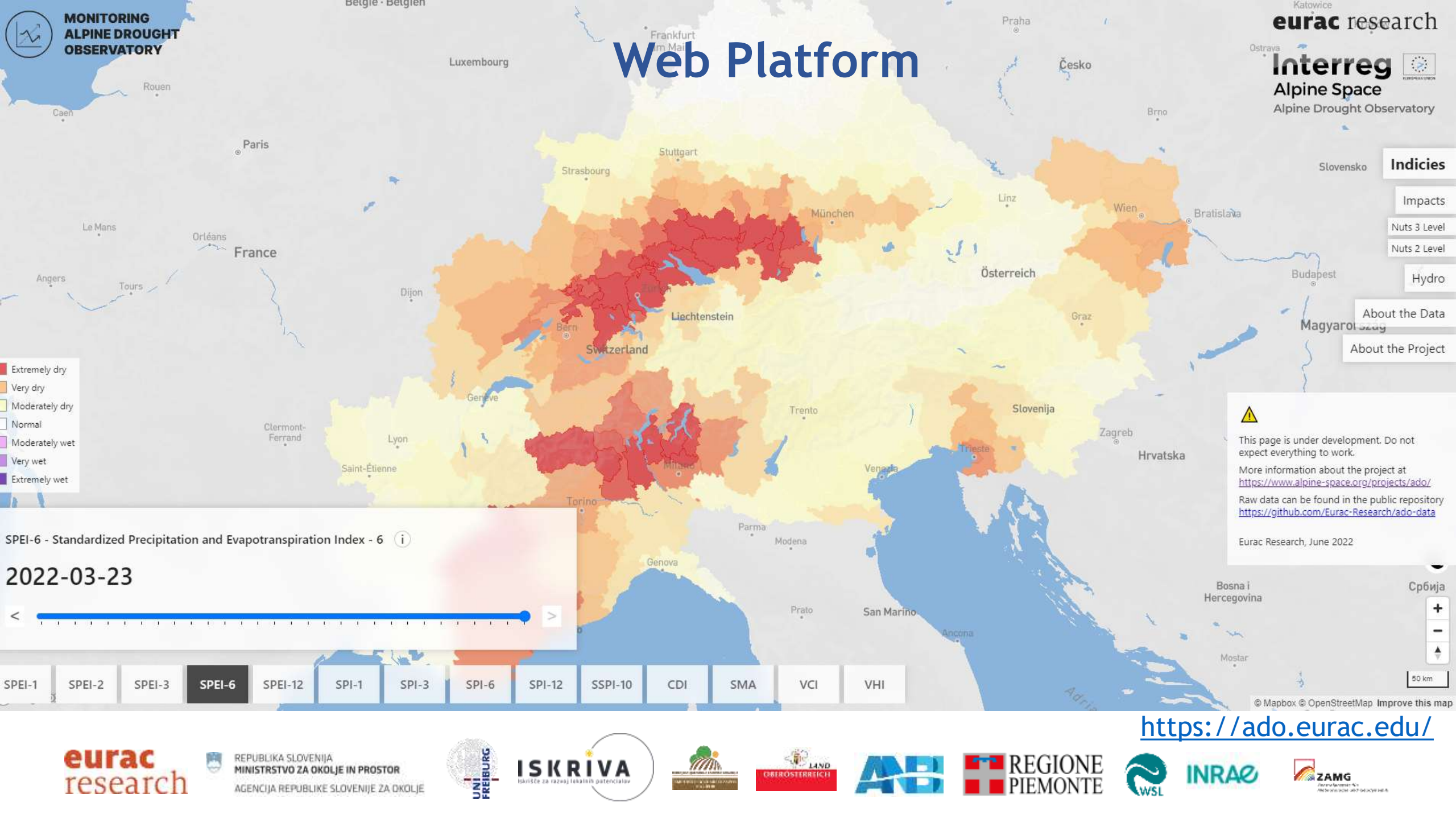
[See more](#)

**Standardised Precipitation Index - ERA5\_QM SPI-2**  
(Organisation: EURAC Research)

**Standardised Precipitation-Evapotranspiration Index - ...**  
(Organisation: EURAC Research)

Sources: **GEOSS (24)** Powered by **GEOSS** |<< 1 of 2 >>|



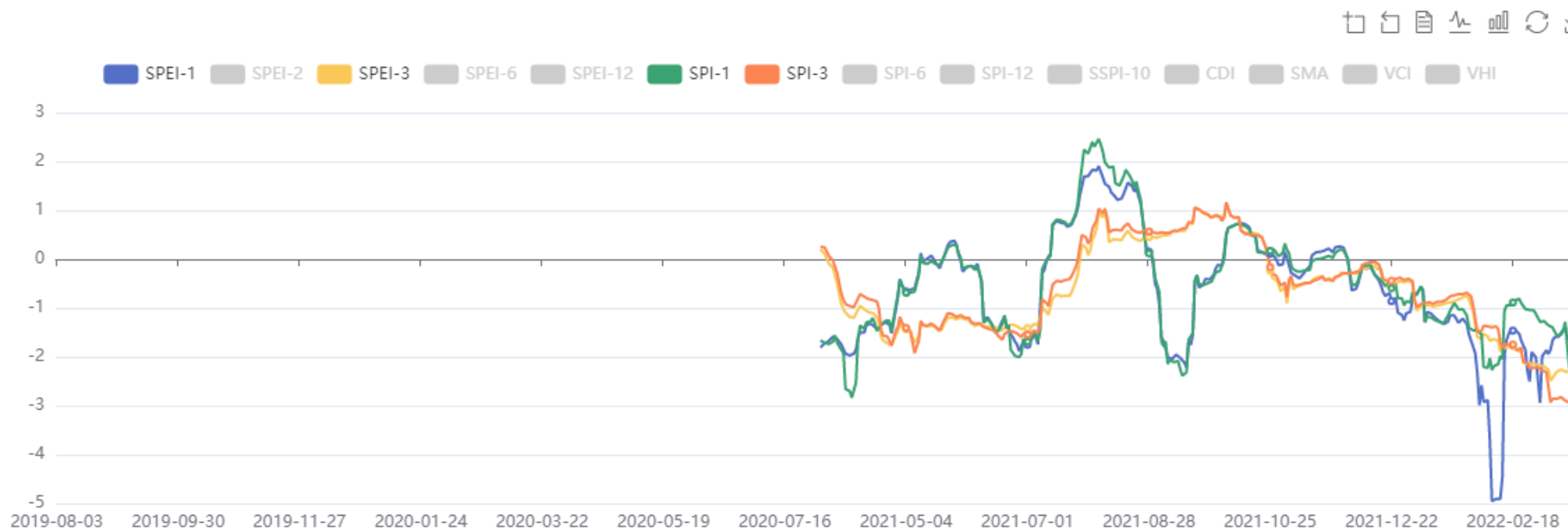






SPEI-1 - Standardized Precipitation and Evapotranspiration Index - 1  
Varese (nuts id: ITC41)

close X



SPEI-6 - Standard

2022-03

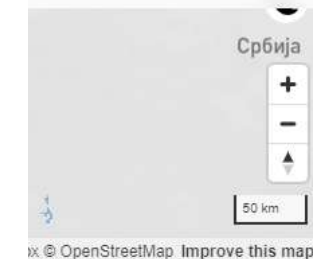
< [Timeline bar]

SPEI-1 SPEI

- Indicies
- Impacts
- Nuts 3 Level
- Nuts 2 Level
- Hydro
- About the Data
- About the Project

under development. Do not  
anything to work.  
nation about the project at  
[alpine-space.org/projects/ado/](http://alpine-space.org/projects/ado/)  
in be found in the public repository  
[ub.com/Eurac-Research/ado-data](https://github.com/Eurac-Research/ado-data)

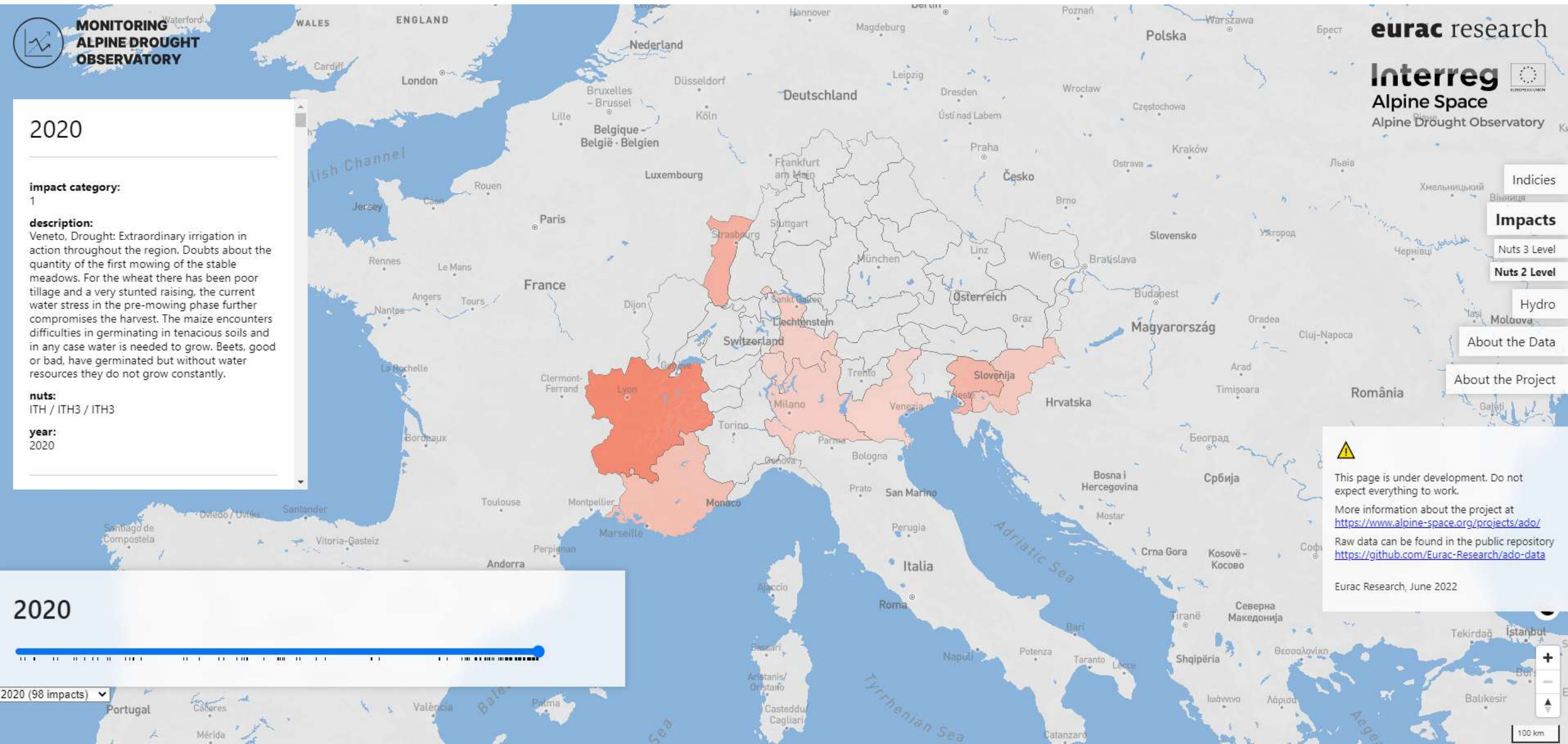
arch, June 2022



© OpenStreetMap. Improve this map

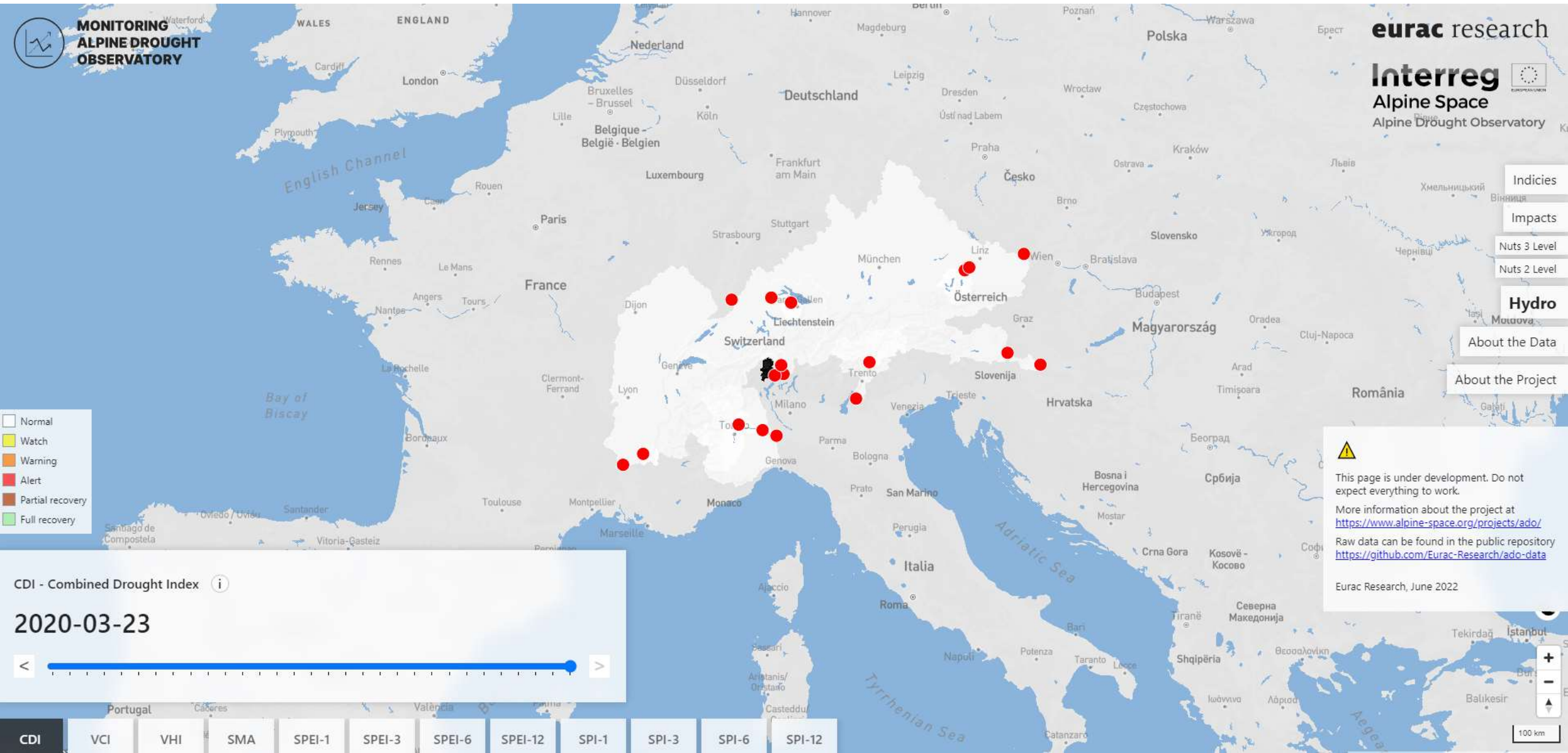
<https://ado.eurac.edu/>

# Drought Impacts on the Portal





# Hydrology on the Portal



# Hydrology on the Portal



## Quality check

Quality check and statistics for hydrological station from the ADO project database

Summary of Station **ADO\_DSC\_ITC1\_0037** in **Italy** in the region **Piemonte** in **Isola S. Antonio Po** with coordinates latitude: **45.036153** and longitude: **8.821928**

## Metadata information

Description of the dataset

country	region	location_site	lat	lon	start_date	end_date	water
Italy	Piemonte	Isola S. Antonio Po	45.036153	8.821928	1996-01-02 00:00:00	2019-12-31 00:00:00	Po

## Primary statistics

Statistic description of the dataset

	ADO_DSC_ITC1_0037
count	8322.000000
mean	441.090795
std	511.930453
min	30.200000
25%	202.000000
50%	294.000000
75%	495.000000
max	9780.000000

## Missing values

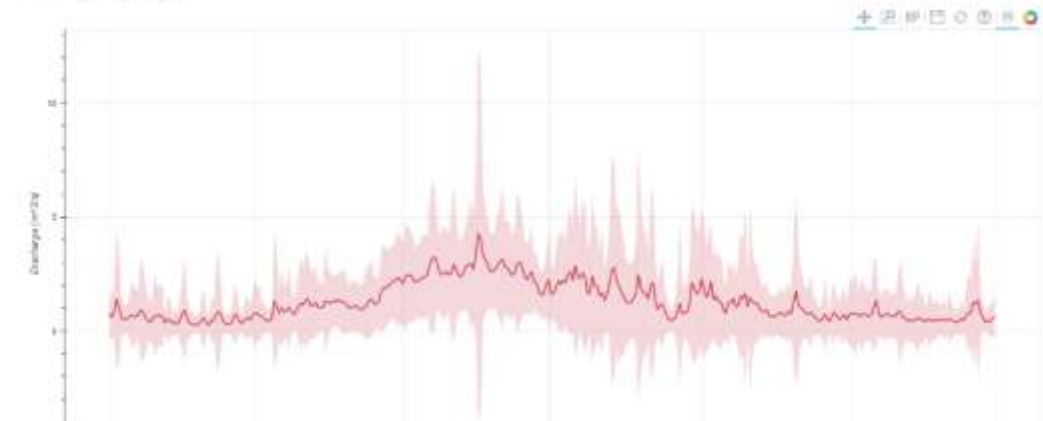
### Discharge time series

Station ADO\_DSC\_CH05\_0191 in Trento



### Mean annual cycle

Station ADO\_DSC\_CH05\_0191



# Conclusion & Outlook



- Web and Data Portal following FAIR data principles

- Combining data

- Catering to

- Portal aiming

- Framework

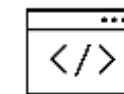
Observatory

- Open Source, deployable in other institutes/regions/countries!

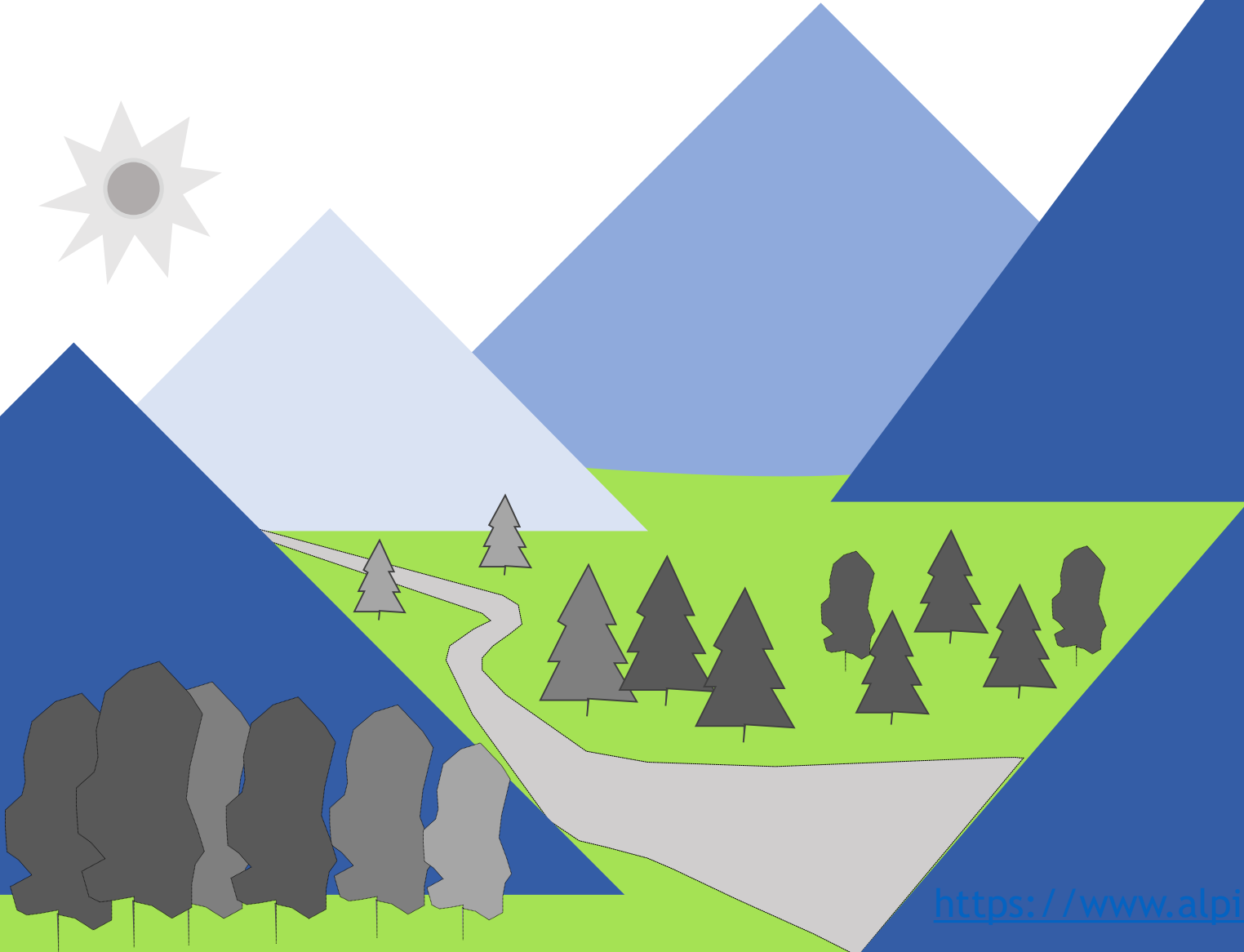
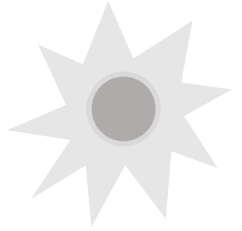
- Great Collaboration

A team effort, cooperation across fields,  
countries and institutes with dedication and  
responsibility.

Thank you for the collaboration.







Thank you for your kind attention!

[alexander.jacob@eurac.edu](mailto:alexander.jacob@eurac.edu)

<http://ado.eurac.edu>

<https://gitlab.inf.unibz.it/ado>

<https://www.alpine-space.eu/projects/ado/en/home>