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How to get access to groundwater and geoscience data in the European Geological Data Infrastructure to support groundwater quantity and quality risk and status assessments

Funded by the European Union

EuroGeoSurveys European Geoscience for Society

The Geological Surveys of Europe

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EU Green Week 2024
Towards a water resilient Europe

EU GREEN WEEK PARTNER EVENTS

Exploring the pivotal role of open access data by the European Geological Data Infrastructure for groundwater quantity and quality

August 27, 9:00-12:00 CET
Online event

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Groundwater resources quantity assessment workflow

Activity i ii iii iv

Collection

Harmonization

Management

Standardization

Droughts

Trend

Temporal storage

Groundwater Resilience

Forecasting

Groundwater Conditions

D a t a | A n a l y s i s | M o d e l l i n g

EU GREEN WEEK PARTNER EVENTS

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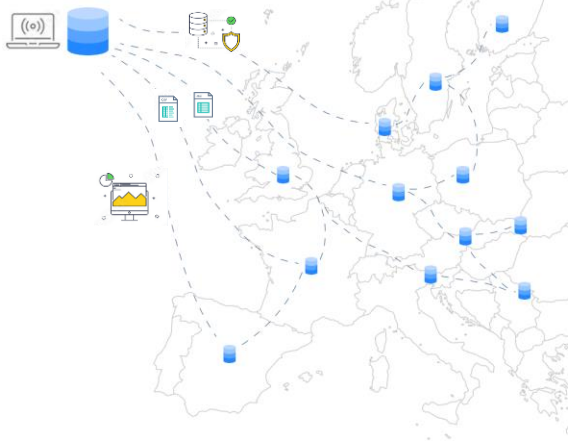
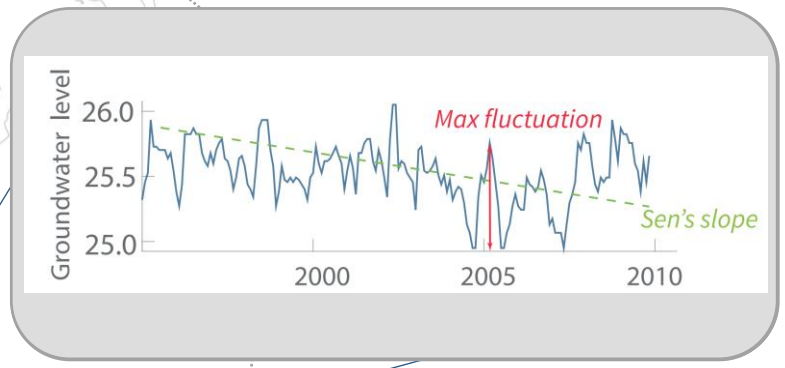
Transnational, Harmonised Data Gathering, Monitoring and Evaluation of Groundwater Dynamics in the Context of Climate Change

European Groundwater Monitoring Database (EUGM)





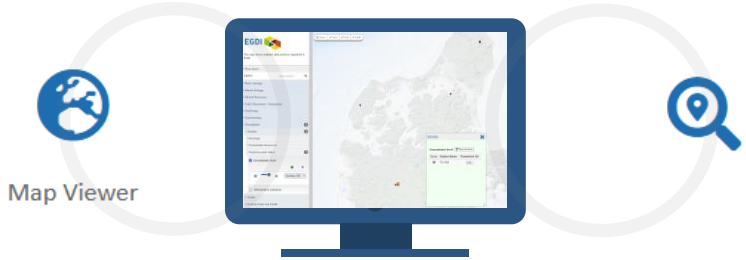
1 mo | 3 mo | 1 yr | 10 yr | 80 yr

Groundwater trend and drought analysis

Groundwater resilience

Short and long-term forecast

Integration into the EDGI platform



EU GREEN WEEK PARTNER EVENTS

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Data collection formats from the national geological surveys

Time series / datasets from web services (WS) / API/ batch script

Upgradeable

Yes

Each/some GS generate a WS

WS /API generation ?

No

Data center

EGDI

europe-geology.eu/

EuroGeoSurveys European Geoscience for Society The Geological Surveys of Europe

Time series Datasets Non upgradeable (CSV files)

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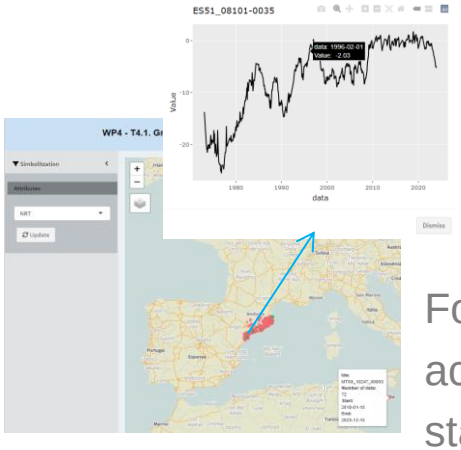
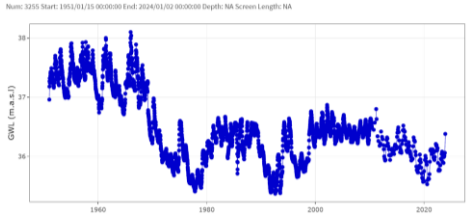
Data-driven approaches for preparing, processing, analyzing, and modeling groundwater level time series.

Data collection and harmonization

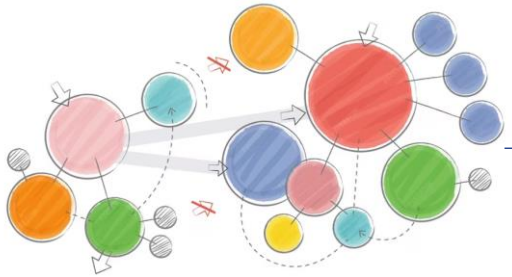


Following **data model** in accordance with OGC standards

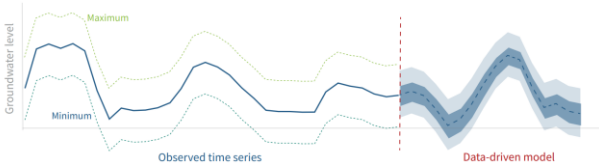
Data preprocessing



Clustering



Model selection and training



Machine learning models

Build on existing- and create new data

EU GREEN WEEK PARTNER EVENTS

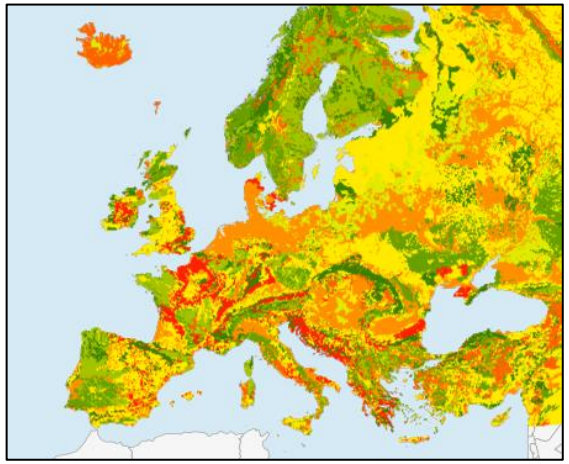
EGDI

Data Tools | Scientific themes | About EGDI | English

EuroGeoSurveys The Geological Surveys of Europe

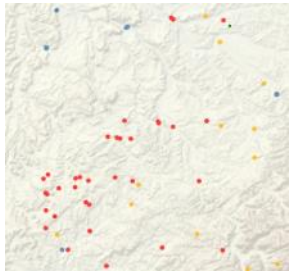
Welcome to European Geological Data Infrastructure (EGDI)

EGDI map viewer

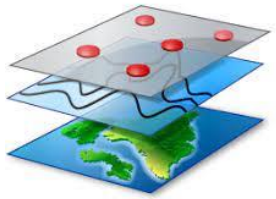


GeoERA GROUNDWATER

Re-use of previous information



Groundwater quality data across EU

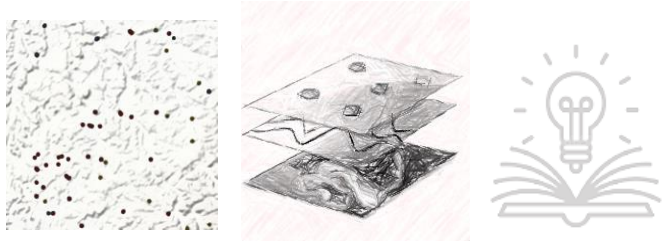


Base geoinformation (hydrogeological maps)

Knowledge background

Transnational, harmonized data gathering, monitoring and evaluation of groundwater quality patterns and trend identification

EU Geological surveys collaboration



New EU hydrogeochemical data, base data and knowledge background

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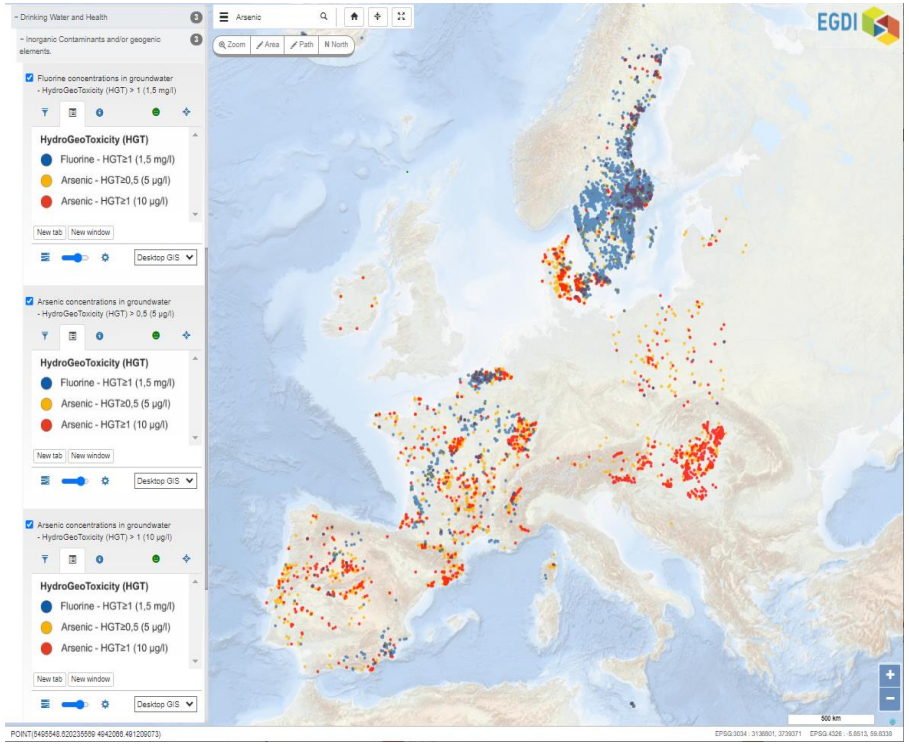
Groundwater Quality needs

There is a need for a groundwater quality **mapping** system based on harmonized approaches at EU scale :

- focusing on chemical properties that are relevant for environmental protection,
- Accounting for the **properties of the subsurface** for trend detection and **groundwater quality patterns**,
- considering mobility and persistence of contaminants related to **drivers, pressures and uses under conditions of climate change**.

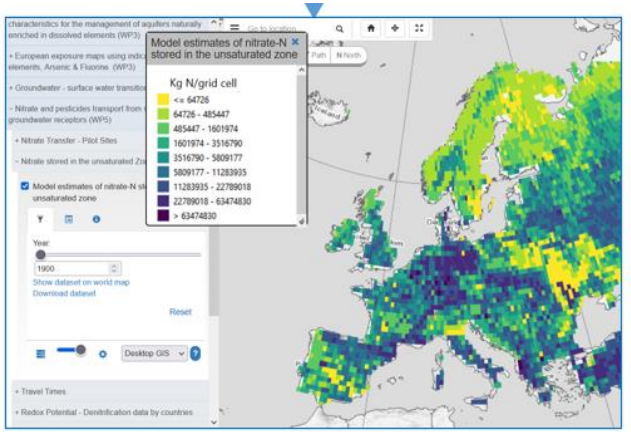


Methods applied to GW quality patterns and trends

Geostatistics, Statistics, Machine Learning: assessment and classification of factors controlling large-scale patterns in GW quality

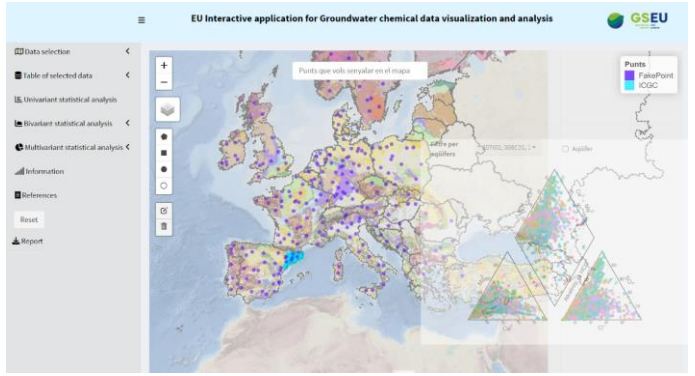
Matrix of human activity vs. groundwater pollutants: Link between human activities and emission of potentially harmful pollutants into groundwater

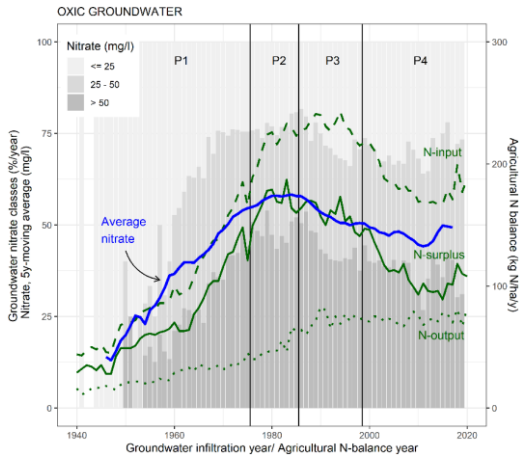
GW quality indicator and trend : Mapping selected groundwater pollutants and their evolution under drivers and pressure



*EU **map of probability for pollutants occurrences** in GW*

***Online groundwater chemical data visualization and analysis** as an intelligent data management (IDM) system*





***Nitrate trend assessment** based on state-of-the-art machine learning aided techniques and geostatistical techniques*

Main takeaways

- As part of the Geological Service for Europe (GSEU), groundwater quantity and quality data is being collected from all participating partners to develop products that enhance the understanding- and support protection and sustainable use of groundwater resources across Europe.
- The collected groundwater data is harmonized and prepared for advanced analysis. It will be stored in a central database and made accessible through the EDGI platform, supporting data monitoring, mapping and visualization of trends and forecasts.
- State-of-the-art methodologies in data-driven modeling will be applied to the harmonized data, required for advanced analysis and providing valuable insights in groundwater availability and patterns in evolution of groundwater contamination.