MEET THE GSEU

GEOLOGICAL SERVICE FOR EUROPE

Supporting Quantity of European Groundwater Resources

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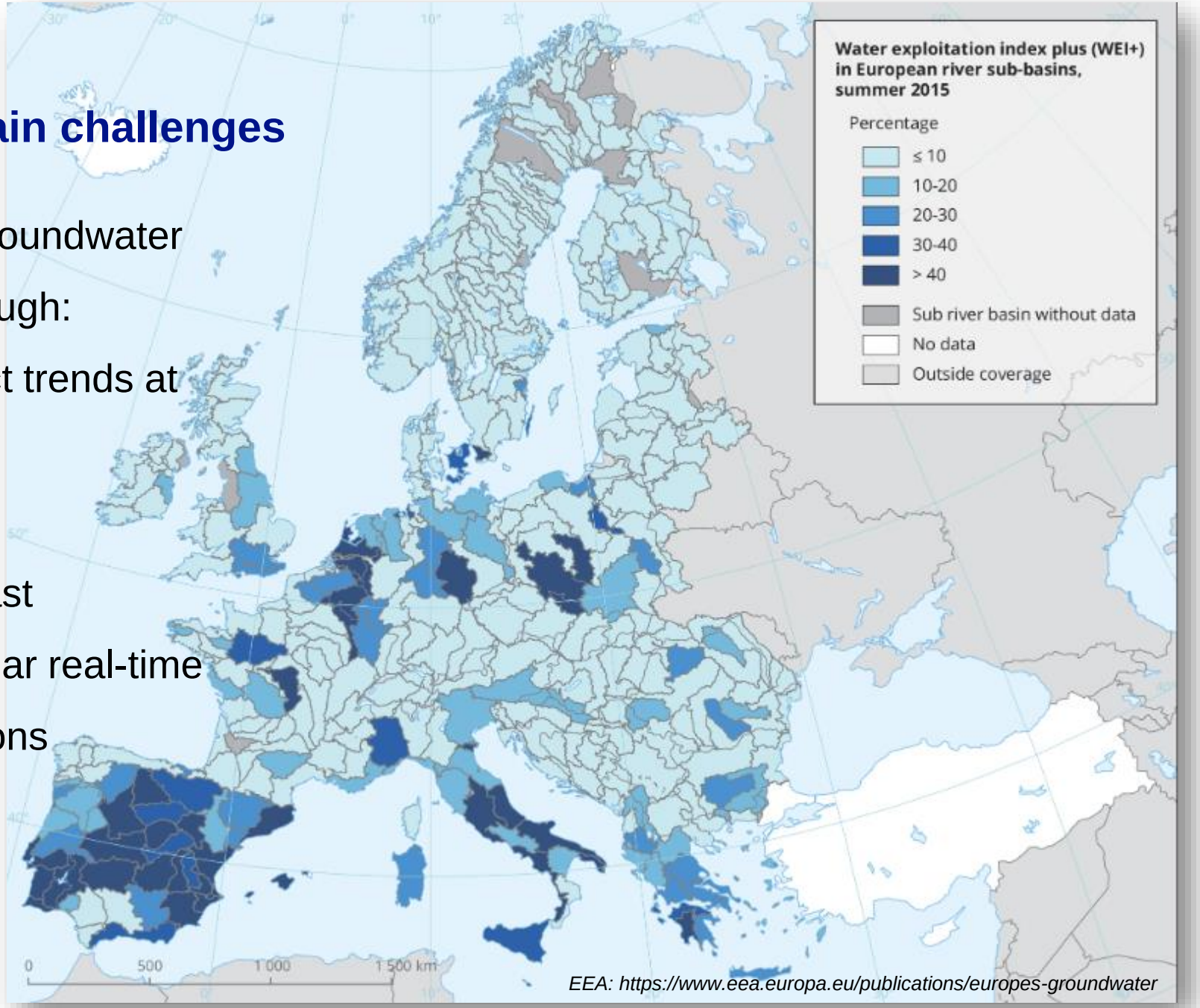
Groundwater Quantity: Main challenges

There is a need for analyzing groundwater systems at European scale through:

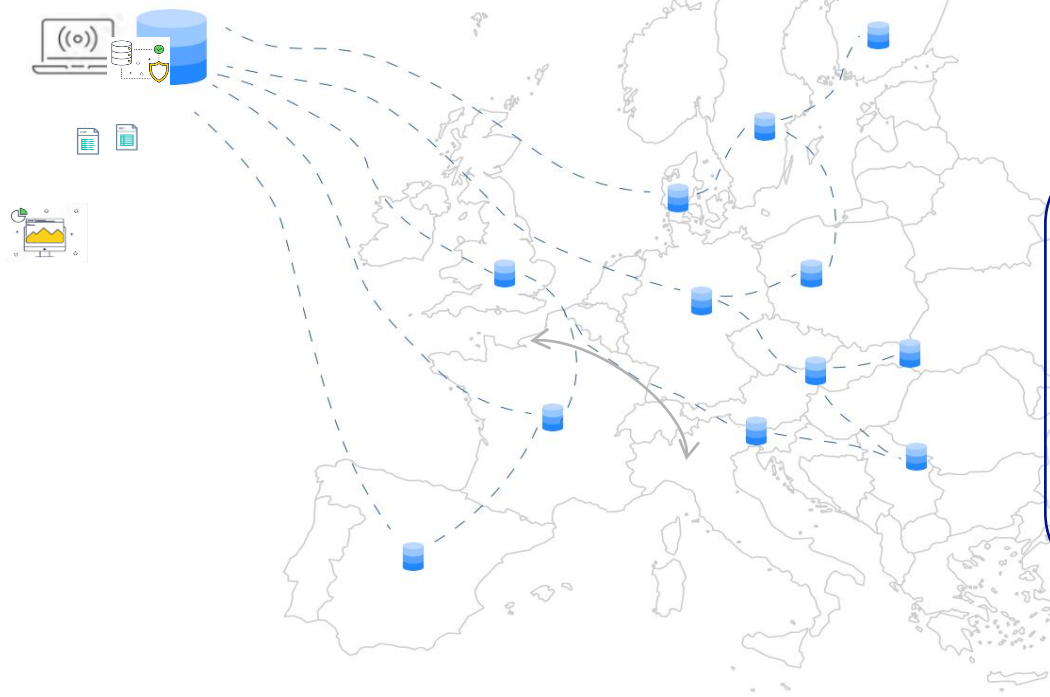
- FAIR compliant data to detect trends at various scales
- Drought detection system
- Data-driven models to forecast groundwater levels on the near real-time monitoring of selected locations



EEA: https://www.eea.europa.eu/publications/europes-groundwater

Overview of workflow

Data gathering: European Groundwater Monitoring Database (EUGM)



Collect, harmonise, merge and integrate data from groundwater monitoring sites at EU scale. Datasets are accessible through web services or direct download.

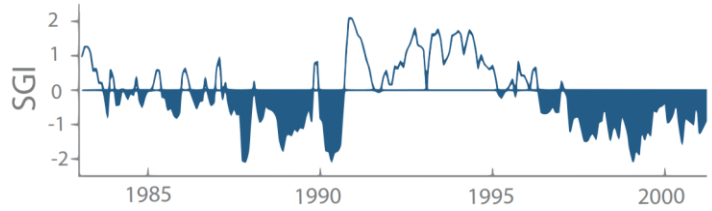
Integrate information into the EGDI platform, following **Open Geospatial Consortium standards**.

Data Model

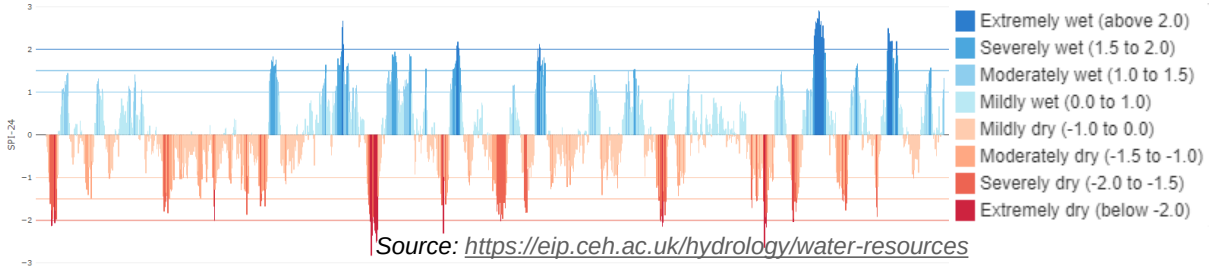
Analysis

Drought analysis

Characterize **groundwater droughts** across different monitoring sites.



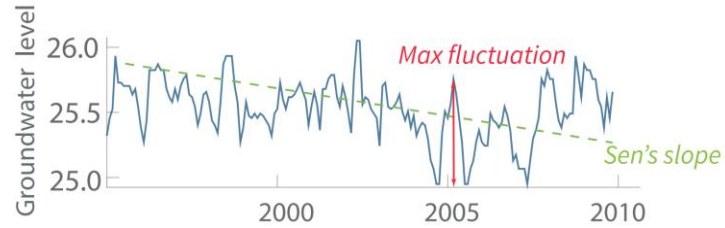
Index for standardising groundwater level time series and groundwater drought characterization based on the Standardized Precipitation Index (**SPI**) and the Standardised Groundwater Level Index (**SGI**)



Source: https://eip.ceh.ac.uk/hydrology/water-resources

Groundwater depletion and extremes

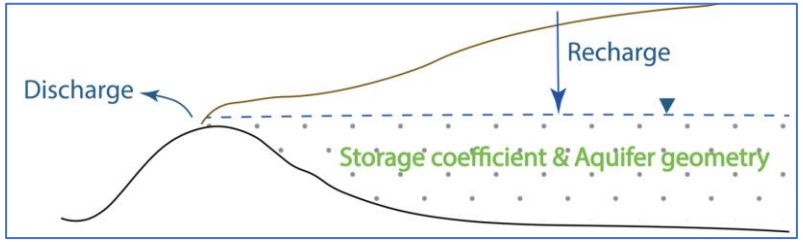
Approaches to **groundwater level trend detection and quantification**, and development of common methods for trend analysis of groundwater levels



Sen's slope and Mann-Kendall **trend** tests on GWL signals

Groundwater resilience

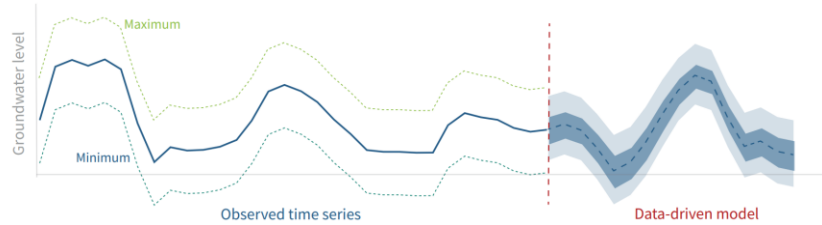
Identify **strategic aquifers** with high **resilience** to overabstraction. Assess and utilize the mean groundwater residence time index

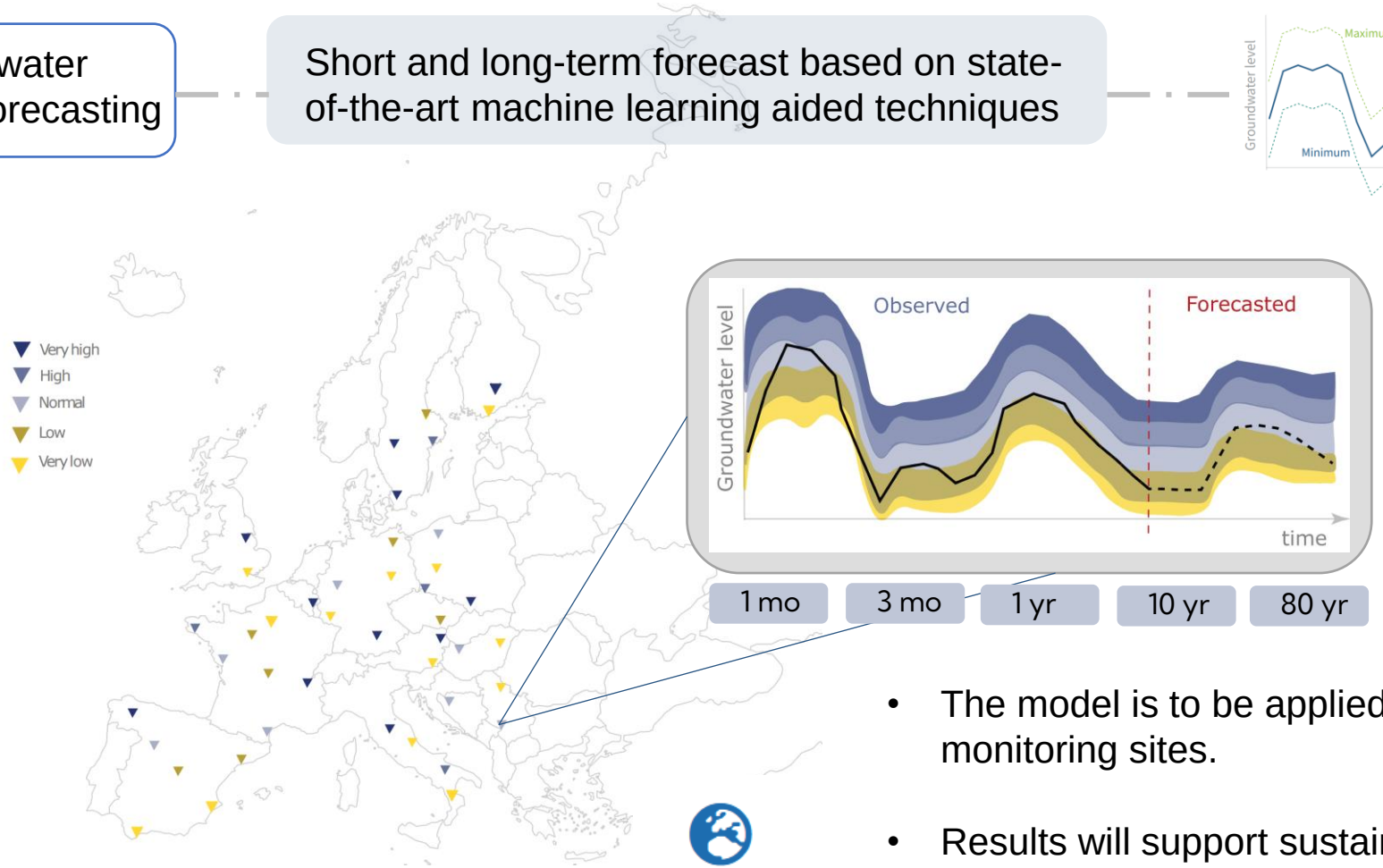


Analysis: Groundwater level forecasting across Europe

Groundwater levels forecasting

Short and long-term forecast based on state-of-the-art machine learning aided techniques





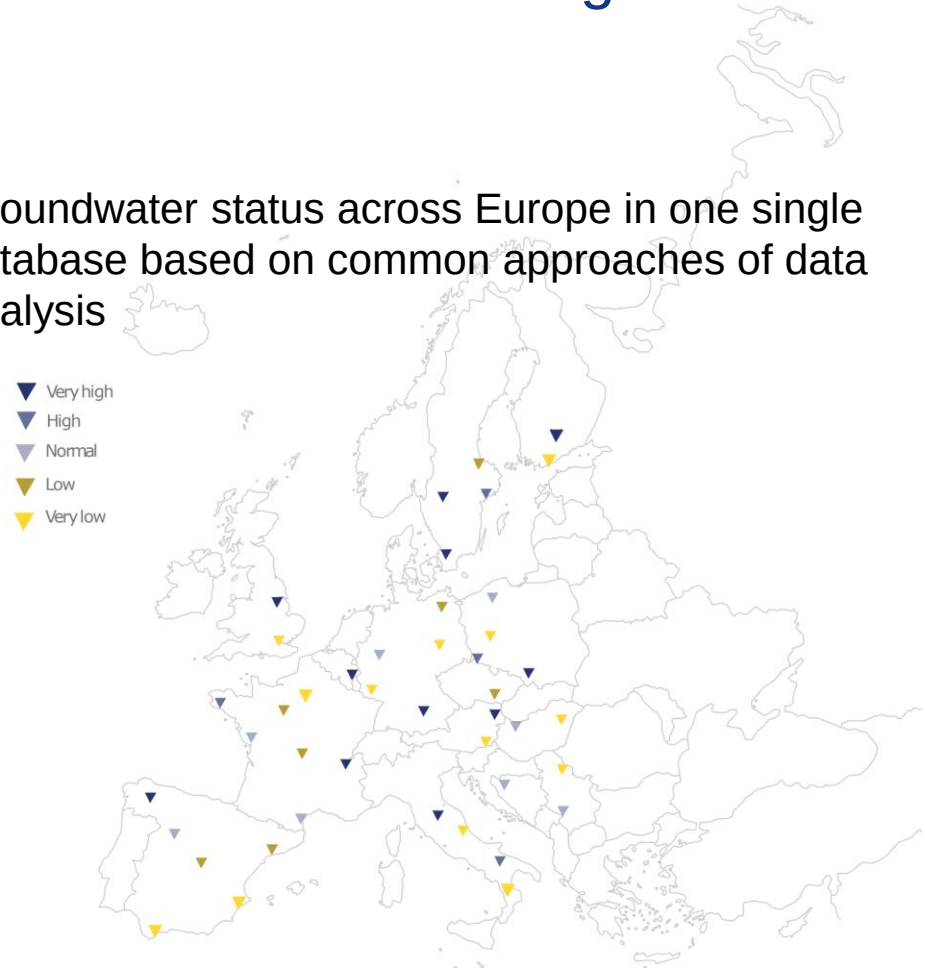
Historical records of groundwater level across Europe and forecasting based on **data-driven models**, based on widely accessible input data.

- The model is to be applied on near-real time groundwater monitoring sites.
- Results will support sustainable groundwater management.

What is expected?

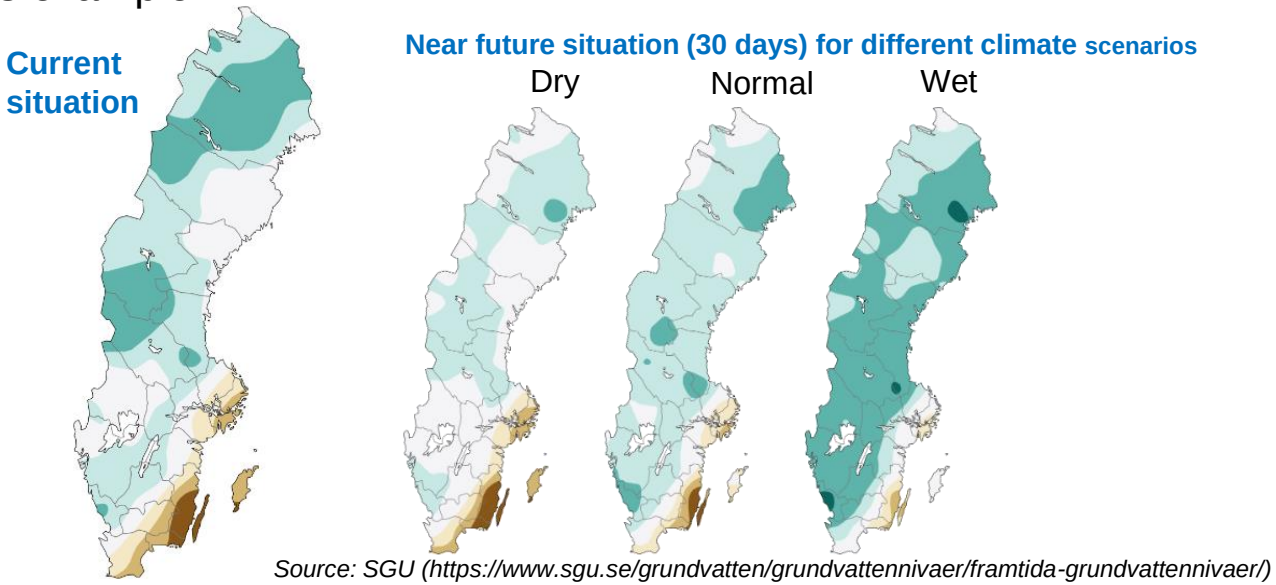
Visualization and integration on EGDI

Groundwater status across Europe in one single database based on common approaches of data analysis



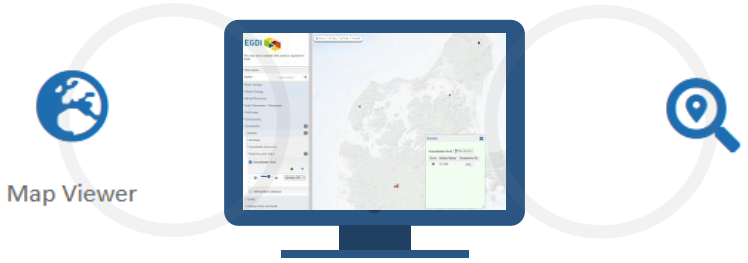
Interpolation maps of current and future groundwater status.

As example:



Source: SGU (https://www.sgu.se/grundvatten/grundvattennivaer/framtida-grundvattennivaer/)

Integration into the **EGDI** platform



Relevance of this project to EU GW policy

- Systematic reporting, storing and visualizing current and future groundwater level development as a proxy to **groundwater resources availability**

- Monitoring, reporting and acting on the development of groundwater resources in the short and longer term, in support of **sustainable groundwater management** as a response to competing uses and climate change.