

Use of the European Geological Data Infrastructure for safeguarding Europe's groundwater resources and dependent ecosystems

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Abstract

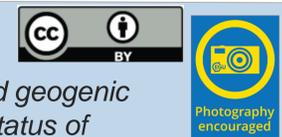
Changes in the quantity and quality of groundwater and water in the hydrological cycle in general have important implications for the evolution of water resources, the built environment, and terrestrial and aquatic ecosystems, globally. Exploitation of groundwater and other subsurface resources may lead to e.g. land subsidence, salt water intrusion, loss of important terrestrial and aquatic ecosystems and hence biodiversity. Together with biogeochemical flows of nitrogen and phosphorus and changes in the land-system and climate, these are currently considered the main environmental problems of the planet, which are breaching or close to breaching planetary boundaries. Changes in the hydrological cycle including groundwater is closely related to and affecting these changes. It is the ambition of the four GeoERA groundwater projects studying aspects of groundwater quantity and quality issues related to natural processes and human activities to further develop the European Geological Data Infrastructure as a leading information platform for groundwater data in Europe and one of the leading platforms, globally. Here we briefly present the contents and objectives of the four groundwater projects: HOVER - Hydrogeological processes and geological settings over Europe controlling dissolved geogenic and anthropogenic elements in groundwater of relevance to human health and the status of dependent ecosystems; RESOURCE - Resources of groundwater, harmonized at cross-border and Pan-European Scale; TACTIC - Tools for assessment of climate change impact on groundwater and adaptation strategies and VoGERA - Vulnerability of shallow groundwater resources to deep sub-surface energy-related activities. The four projects will deliver "FAIR" (Findable, Accessible, Interoperable and Reusable) data and information via the European Geological Data Infrastructure easily accessible for all relevant endusers. This will improve our understanding of the subsurface and support common efforts for developing geoethical uses of the subsurface.

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HOVER

Hydrogeological processes and geological settings over Europe controlling dissolved geogenic and anthropogenic elements in groundwater of relevance to human health and the status of dependent ecosystems

Vision

The project will address groundwater management issues related to drinking water, human and ecosystem health across Europe in relation to both geogenic elements and anthropogenic pollutants by data sharing, technical and scientific exchange between European GSOs.



- Evaluating health risks and spatial variability of concentrations of geogenic elements assessing thermal and mineral water
- Increase understanding of ecology and microbial diversity controls on transforming pollutants at groundwater-surface water transition zones
- Quantify groundwater age distributions and nitrate and pesticide travel times and pollution trends
- Develop harmonized aquifer vulnerability maps
- Develop common standards, databases and maps

Main tasks

Introduction

Changes in the quantity and quality of groundwater and water in the hydrological cycle in general have important implications for the evolution of water resources, the built environment, and terrestrial and aquatic ecosystems, globally.

It is the mission of the four GeoERA groundwater projects studying aspects of **groundwater quantity and quality** issues related to natural processes and human activities to provide groundwater **quantity and quality data** for the European Geological Data Infrastructure (EGDI) and develop this as a **leading information platform** for groundwater data in Europe and one of the leading platforms, globally.

Sound groundwater data is a prerequisite for sustainable management and protection of subsurface water resources for present and future generations.

The four groundwater projects providing data for EGDI are:

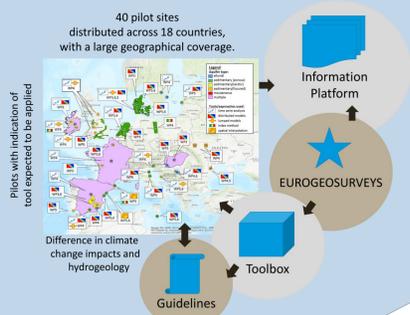
HOVER
RESOURCE
TACTIC
VoGERA

TACTIC

Tools for assessment of climate change impact on groundwater and adaptation strategies

Vision

The vision and mission of TACTIC is to improve the use and access to data and knowledge of the subsurface system acquired by the Geological Survey Organisations (GSO) in Europe for the use in climate change impact assessments and adaptation.



Main tasks

- Develop toolbox and guidelines
- Application and demonstration of tools in climate assessment pilots
- Making pilot results accessible via the GeoERA website and Information Platform (EGDI)

VoGERA

Vulnerability of shallow groundwater resources to deep sub-surface energy-related activities

Vision

The project will consider the possible impacts on groundwater from a range of sub-surface energy activities (geothermal energy, unconventional oil and gas exploitation, sub-surface storage and disposal of wastes)



- Development of conceptual models of shallow groundwater vulnerability to deep sub-surface energy activities
- Investigations into contamination pathways at four case study sites
- Development of a tool for use by decision makers to assess shallow groundwater vulnerability

Main tasks



RESOURCE

Resources of groundwater, harmonized at cross-border and Pan-European Scale

Vision

A coherent overview of all fresh groundwater over Europe is not available for policy development and evaluation. The RESOURCE project aims at demonstrating the potentials of the harmonization of information about Europe's groundwater resources.



Main tasks

- Good practices for harmonized data and information across borders for assessments of:
 - 3D structure of aquifers
 - water volumes available
 - water fluxes and water quality
- Cross-border demonstrations projects
- Pan-European map of the fresh groundwater resources

FAIR data

Findable, Accessible, Interoperable and Reusable

The four projects will deliver "FAIR" data - <https://www.go-fair.org/fair-principles/> following EU Horizon 2020 guidelines via the European Geological Data Infrastructure (EGDI) and the GeoERA website (see links below). The websites provide easy access to data visualization and download. **FAIR data will improve our understanding of the subsurface and support common efforts to develop sustainable and geothermal uses of the subsurface based on geoscientific data and principles.**

Visit GeoERA and the four groundwater projects at: <https://geoera.eu>

GeoERA Information Platform / European Geological Data Infrastructure (EGDI) at: <http://www.europe-geology.eu/>