

EGU2020-4253

<https://doi.org/10.5194/egusphere-egu2020-4253>

EGU General Assembly 2020

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## Integrated and sustainable management of subsurface resources - Introducing the contributions of the four GeoERA groundwater projects to the European Geological Data Infrastructure

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The IPCC and IPBES reports, the sustainable development goals of the United Nations and the societal challenges for Europe defined by Horizon 2020 and Horizon Europe all emphasize the strong need for integrated and sustainable management of subsurface resources to protect society and biodiversity. The four GeoERA groundwater projects contribute to this important goal by studying the current and future quantitative and chemical status of European groundwater bodies. The quantity and quality issues related to natural processes, human activities and climate change are investigated to improve our basis for informed decision making e.g. for climate change mitigation and adaptation. The four projects provide new and important data for further development of the European Geological Data Infrastructure (EGDI) as a leading information platform for sustainable and integrated management of subsurface resources in Europe and one of the leading platforms, globally. The four projects will deliver “FAIR” (Findable, Accessible, Interoperable and Reusable) data easily accessible for all relevant end users via EGDI. This will improve our understanding of the subsurface and support common efforts in public-private partnerships to meet the UN sustainable development goals and to develop efficient tools for climate change impact assessment, mitigation and adaptation. Here we briefly present some main objectives and deliverables of the four groundwater projects: **1) 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” – studies e.g. I) geogenic (natural) groundwater quality issues affecting human health, II) polluted groundwater focusing on nitrate, pesticides and emerging contaminants that besides human health potentially affect biodiversity and the ecological status of terrestrial and aquatic ecosystems and III) groundwater age and travel time distributions in European aquifers, which are useful for assessment of the history, migration and fate of contaminants in the subsurface and the vulnerability of the European groundwater resources towards pollution **2) RESOURCE** – “Resources of groundwater, harmonized at cross-border and Pan-European Scale” – studies I) transboundary aquifers between Poland and Lithuania; as well as Belgium, The Netherlands and Germany; II) Karst and Chalk aquifers across Europe and III) Develops a new Pan European

groundwater resources map that includes information on volumes, age and quality (salinity) **3) TACTIC** – “Tools for assessment of climate change impact on groundwater and adaptation strategies” – compiles and studies climate change impact assessment and adaptation tools within more than 40 pilot areas distributed across Europe and **4) VoGERA** – “Vulnerability of shallow groundwater resources to deep sub-surface energy-related activities” – studies groundwater vulnerability to energy-related activities in the UK, the Netherlands, Belgium and Hungary.

**How to cite:** Hinsby, K., Gourcy, L., Broers, H. P., Højberg, A. L., and Bianchi, M.: Integrated and sustainable management of subsurface resources - Introducing the contributions of the four GeoERA groundwater projects to the European Geological Data Infrastructure , EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-4253, <https://doi.org/10.5194/egusphere-egu2020-4253>, 2020