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3d-modelling workflows for trans-nationally shared geological models - first approaches from the project GeoMol

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To meet the EU's ambitious targets for carbon emission reduction, renewable energy production has to be strongly upgraded and made more efficient for grid energy storage. Alpine Foreland Basins feature a unique geological inventory which can contribute substantially to tackle these challenges. They offer a geothermal potential and storage capacity for compressed air, as well as space for underground storage of CO_2. Exploiting these natural subsurface resources will strongly compete with existing oil and gas claims and groundwater issues. The project GeoMol will provide consistent 3-dimensional subsurface information about the Alpine Foreland Basins based on a holistic and transnational approach.
Core of the project GeoMol is a geological framework model for the entire Northern Molasse Basin, complemented by five detailed models in pilot areas, also in the Po Basin, which are dedicated to specific questions of subsurface use. The models will consist of up to 13 litho-stratigraphic horizons ranging from the Cenozoic basin fill down to Mesozoic and late Paleozoic sedimentary rocks and the crystalline basement.
More than 5000 wells and 28 000 km seismic lines serve as input data sets for the geological subsurface model. The data have multiple sources and various acquisition dates, and their interpretations have gone through several paradigm changes. Therefore, it is necessary to standardize the data with regards to technical parameters and content prior to further analysis (cf. Capar et al. 2013, EGU2013-5349).
Each partner will build its own geological subsurface model with different software solutions for seismic interpretation and 3d-modelling. Therefore, 3d-modelling follows different software- and partner-specific workflows. One of the main challenges of the project is to ensure a seamlessly fitting framework model. It is necessary to define several milestones for cross border checks during the whole modelling process. Hence, the main input data set of the framework model are interpreted seismic lines, 3d-models can be generated either in time or in depth domain. Some partners will build their 3d-model in time domain and convert it after finishing to depth. Other participants will transform seismic information first and will model directly in depth domain. To ensure comparability between the different parts transnational velocity models for time-depth conversion are required at an early stage of the project.
The exchange of model geometries, topology, and geo-scientific content will be achieved applying an appropriate cyberinfrastructure called GST. It provides functionalities to ensure semantic and technical interoperability. Within the project GeoMol a web server for the dissemination of 3d geological models will be implemented including an administrative interface for the role-based access, real-time transformation of country-specific coordinate systems and a web visualisation features.

The project GeoMol is co-funded by the Alpine Space Program as part of the European Territorial Cooperation 2007-2013. The project integrates partners from Austria, France, Germany, Italy, Slovenia and Switzerland and runs from September 2012 to June 2015. Further information on www.geomol.eu.

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