





Dutch participation to EPOS: the European Research Infrastructure for solid Earth sciences

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1. The science challenge driving EPOS-NL

EPOS-NL is the Netherlands contribution of National Research Infrastructures (NRIs) to the **European Plate Observing System (EPOS)**, which is the pan-European infrastructure for solid Earth sciences.

EPOS-NL will integrate all national geophysics facilities into a coherent research infrastructure and develop new research facilities and state of the art **open data access**. The new research infrastructure will support **multi-scale, multiphysics research** that will deliver a quantum leap in imaging of subsurface structure and processes and in predictive modelling, in the field of:

- Geo-energy: exploration and exploitation of new, low carbon geo-energy resources in the Netherlands and Europe, in particular geothermal energy.
- Geo-storage: geological storage of CO2, fuels like natural gas and renewably generated hydrogen, and wastes related to energy production.
- Geo-hazards: such as induced earthquakes and subsidence caused by human activities in the subsurface.

2. SYSTEM-SCALE NATURAL LABORATORIES

ENER

A. Groningen gas field seismic network (KNMI)



B. DAPWELL geothermal well (TUD)



The Groningen gas field is a unique natural observatory for induced seismicity. **Big data** from the dense seismic network of borehole stations in Groningen will be integrated in the the ORFEUS data centre and made **openly available** to the geoscientific community through the EPOS Thematic Core Service Seismology.

A deep **geothermal doublet**, built with new materials (composite casing) and extensive monitoring and testing instrumentation, will be installed on the TU Delft campus. Cores will be stored and tested in the laboratory for the petrophysical properties of the reservoir rocks and a seismic network at the surface will monitor fluid motions.

3. INTEGRATED LABORATORIES FACILITIES

C. Earth Simulation Laboratory (ESL, UU)

D. Multi-scale Imaging and Tomography (MINT, UU & TUD)





The ESL will integrated the existing world-class **multi-scale**, **multi-phyics experimental facilities** (HPT Laboratory; TecLab) supported by existing **numerical modelling facilities for seismology** research at UU. New facilities will inlcude a high-resolution imaging of the 4D internal deformation of analogue models and an ultra-high resolution HPT testing machine able to deform rock samples with an open fluid flow system. A cluster of instruments to visualise correlative 3D and 2D structures of rock samples at all scales ranging from meters to nanometers. MINT will include **X-ray tomography systems** with a range of resolutions and sample size capabilities and cutting-edge **automated electron microscopes**. MINT will be able to image rocks at all scales and allow notriously difficult sub-micron pore and fracture networks to be analysed and scaled to larger rock structures.





