

GEoREST-WORKSHOP ON INDUCED SEISMICITY

11-13 March
2024
Palma de Mallorca
Spain

A multi-physics database of injection-induced seismicity in geo-energy projects

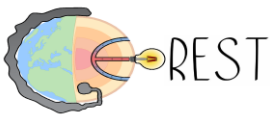
Iman R. Kivi¹, Auregan Boyet², Haiqing Wu², Linus Walter², Sara Hanson-Hedgecock²,
Francesco Parisio², Victor Vilarrasa²

¹Department of Earth Science and Engineering, Imperial College London, London, United Kingdom

²Global Change Research Group (GCRG), IMEDEA, CSIC-UIB, Esporles, Spain

Abstract:

Geo-energies play a critical role in the energy transition necessary to achieving climate goals. Exploiting these resources commonly involves fluid injection/extraction into/from the subsurface, which has frequently induced seismicity, sometimes large enough to be felt by the local population and even cause damage to the infrastructure. Extensive efforts have been dedicated in recent years to process understanding, forecasting and management of induced seismicity. These investigations require data from different disciplines, including seismology, geology, petrophysics and geomechanics, although such multi-disciplinary data are hardly gathered together. This motivated us to develop a publicly available, physics-based database of injection-induced seismicity (Kivi et al., 2022). The database is presented in a flat-file format and is accompanied by a data-description paper (Kivi et al., 2023), making it readily accessible and understandable to all end users. It currently contains information for 158 induced earthquakes caused by geoenergy applications worldwide. Collected data covers general site information, host rock properties, in situ geologic and tectonic conditions, fault characteristics, operational field parameters and recorded seismic activities. The database contributes to advancing research on induced seismicity at different fronts. In particular, it provides a unique opportunity for exploring meaningful links between operational parameters and induced seismicity, leading to the development of scaling relationships for constraining the maximum possible earthquake magnitudes.



GEoREST-WORKSHOP ON INDUCED SEISMICITY

11-13 March
2024
Palma de Mallorca
Spain

References

Kivi, I. R., Boyet, A., Wu, H., Walter, L., Hanson-Hedgecock, S., Parisio, F., Vilarrasa, V. (2022). [Dataset] Global physics-based database of injection-induced seismicity. <https://doi.org/10.20350/digitalCSIC/14813>

Kivi, I. R., Boyet, A., Wu, H., Walter, L., Hanson-Hedgecock, S., Parisio, F., Vilarrasa, V. (2023). Global physics-based database of injection-induced seismicity. *Earth System Science Data Discussions*, 15: 3163–3182. <https://doi.org/10.5194/essd-15-3163-2023>