Bokelmann, Götz; Estève, Clément; Lu, Yang

Passive seismic imaging for geothermal reservoirs: the Schwechat depression under Eastern Vienna

Universität Wien, Österreich;
Goetz.Bokelmann@univie.ac.at

The Vienna Basin is one of the main target areas for deep geothermal exploration in Austria. Knowledge of the subsurface heavily relies on active seismic reflection that is expensive and logistically demanding. Affordable geophysical prospecting methods are needed to reduce subsurface uncertainty. Over recent years, passive seismic tools, e.g., ambient noise tomography, have proven to be cost-effective and environment-friendly. Here we present a passive-seismic study of the central Vienna Basin, which has revealed the shear-wave velocity structure of the neogene as well as the pre-neogene basin. We deployed an array of ~100 seismic nodal instruments during 6 weeks over summer 2023. We measured fundamental-mode Rayleigh and Love-wave group velocity dispersion from seismic ambient noise and employed transdimensional Bayesian tomography to invert for isotropic group velocity maps at periods ranging from 0.8 to 5.5 s. We then extracted Rayleigh and Love group velocity dispersion curves from the group velocity maps at all locations and jointly inverted them for shear-wave velocity as a function of depth using a transdimensional Bayesian framework. We discuss features observed in our 3D shear-wave velocity model as well as interfaces that are relevant to geothermal exploration, such as the Schwechat depression, the Aderklaa Conglomerates, and the sediment-basement interface

Session: Pangeo workshop: Mineral Raw Materials, and Energy Transition
Keywords: Seismologie, Geothermie, Umgebungsrauschen, Oberflächenwellen, Schwechat-Depression