NERC-funded Research Experience Placement (REPs) Summer 2025

Project title

What controls the localisation of seismicity in the New Madrid seismic zone: insights from seismic tomography.

Lead supervisor

Sergei Lebedev

Project description

The New Madrid Seismic Zone (NMSZ) in the US is a type example of a localised area with high seismicity in the interior of a tectonic plate. This project will test the hypothesis that the deformation and seismicity are localised in NMSZ due to its relatively thin, warm and, thus, mechanically weak lithosphere, as compared to that of the surroundings.

The student will obtain publicly available earthquake catalogues from international data centres and compare them to the state of the art evidence on the lithospheric thickness from seismic tomography. They will compile and analyse joinly the relevant available tomographic models. The student will also perform a literature review on the proposed causes of the seismicity and on the lithospheric structure of the region. New seismic tomography of the region may be performed if available models turn out to have insufficient resolution for the analysis. The goal of the project is to obtain new insights into the basic mechanism that conrols the distribution of seismicity in the area.

The student will receive training in methods of seismic data analysis from the supervisor and his team members. The student will work together with the members of the supervisor's research group and will be invited to attend their weekly group meetings and other gatherings.

Project restrictions

None noted.

Working arrangements

Only parts of the project can be done remotely. Learning the geophysics software from the team and performing seismic tomography or thermodynamic inversions can only be done on site. The student could work remotely, however, on the literature review and on obtaining publicly available earthquake catalogues from international data centres. Some of the analysis of the results can be done remotely as well, with regular online meetings with the supervisor and his team members. While there no substitute for in-person interactions in an active research lab, the supervisor and his group have extensive experience of working effectively in the remote mode. The student would be integrated into the research group in person, at least during the on-site parts of the project, and the involvement can continue via online meetings during remote work if that is necessary.