NERC-funded Research Experience Placement (REPs) Summer 2025

Project title

Seismic tomography constraints on the origin of seismicity in the east-central US and Canada

Lead supervisor

Sergei Lebedev

Project description

Eastern and central North America is tectonically stable, in contrast with the active western part of the continent. Yet, a number of areas feature numerous earthquakes, including large ones. This project will investigaete to what extent the distribution of earthquakes is controlled by the lateral variations in the structure of the lithosphere, with relatively thin, warm and, thus, mechanically weak lithosphere localising deformation and seismicity. 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 mechanisms that conrol the distribution of the seismicity, with inferences for intraplate seismicity in general. The student will receive training in methods of seismic data analysis from the supervisor, co-supervisor and their team. The student will work together with the members of the supervisor's research group and will be encouraged to attend their weekly group meetings and other meetings.

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.