Geophysical Research Abstracts
Vol. 18, EGU2016-9306-1, 2016
EGU General Assembly 2016

Surface-wave tomography of Ireland and surroundings using ambient noise and teleseismic data

Raffaele Bonadio (1), Pierre Arroucau (1), Sergei Lebedev (1), Thomas Meier (2), Andrew Schaeffer (3), Andrea Licciardi (1), and Nicola Piana Agostinetti (1)

(1) Dublin Institute for Advanced Studies, Dublin, Ireland, (2) Institute of Geosciences, Christian-Albrechts University of Kiel, Kiel, Germany, (3) Department of Earth Sciences, University of Ottawa, Ottawa, Canada

Ireland's geology is dominated by northeast-southwest structural trends and suture zones, mostly inferred from geological mapping and a few active source seismic experiments. However, their geometry and extent at depth and their continuity across the Irish Sea are still poorly known. Important questions also remain unanswered regarding the thickness and bulk properties of the sedimentary cover at the regional scale, the deformation and flow of the deep crust during the formation of Ireland, the thickness of Ireland's lithosphere today, and the thermal structure and dynamics of the asthenosphere beneath Ireland.

In this work, we take advantage of abundant, newly available broadband data from temporary array deployments and permanent seismic networks in Ireland and Great Britain to produce high-resolution models of seismic velocity structure and anisotropy of the lithosphere.

We combine Rayleigh and Love phase velocity measurements from waveform cross-correlation using both ambient noise and teleseismic data in order to produce high-quality dispersion curves for periods ranging from 1 to 300 s. The phase velocity measurement procedures are adapted from *Meier et al.*[2], *Lebedev et al.*[1] and *Soomro et al.*[3] and are automated in order to deal with the large amount of data and ensure consistency and reproducibility. For the nearly 200 stations used in this study, we obtain a very large number of dispersion curves from both ambient noise and teleseimic data. Dispersion measurements are then inverted in a tomographic procedure for surface-wave phase velocity maps in a very broad period range. The maps constrain the 3D seismic-velocity structure of the crust and upper mantle underlying Ireland and the Irish Sea.

References

[1] Lebedev, S., T. Meier, R. D. van der Hilst. Asthenospheric flow and origin of volcanism in the Baikal Rift area, Earth Planet. Sci. Lett., 249, 415–424, 2006.

[2] Meier, T., K. Dietrich, B. Stockhert, H.P. Harjes, One-dimensional models of shear wave velocity for the eastern Mediterranean obtained from the inversion of Rayleigh wave phase velocities and tectonic implications, Geophys. J. Int. 156, 45–58, 2004.

[3] Soomro, R.A., C. Weidle, L. Cristiano, S. Lebedev, T. Meier. Phase velocities of Rayleigh and Love waves in central and northern Europe from automated, broadband, inter-station measurements, Geophys. J. Int., 204, 517–534, 2016.