Joseph Asplet

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Research Experience

Postdoctoral Research. Department of Earth Sciences, University of Oxford. 2023 – present

- Researching the application of array seismology to detect and locate seismicity in the North Sea as part of the Oxford Martin School's AGILE Initiative Sprint "What do we need to know to safely store CO_2 beneath our Shelf Seas".
- Deployed and maintain an array of 8 telemetered seismometers on the North York Moors.
- Working on how local shear-wave splitting measurements can be used to help constrain the present-day stress field in the North Sea as part of the EU project "SHARP Storage - Stress history and reservoir pressure for improved quantification of CO2 storage containment risks".
- Co-organised a stakeholder engagement workshop.
- Convening session on "new advances in seismic anisotropy and attenuation" at American Geophysical Union (AGU) fall meeting 2024.

Research Associate. School of Earth Sciences, University of Bristol. 2021 – 2023

- Developed new techniques to detect the presence and extent of melt with the Earth using instantaneous frequency to measure seismic attenuation anisotropy.
- Designed and implemented research software, written in Python, to forward model velocity and attenuation anisotropy in fractured, fluid-filled, mediums.
- Regularly attended and presented results at national and international conferences.

PhD Student. School of Earth Sciences, University of Bristol. 2017 – 2021

- Devised new approaches to observe seismic anisotropy in the lowermost mantle using shear-wave splitting of core-refracted phases.
- Researched techniques to relate lowermost shear-wave splitting to geodynamic processes, such as lowermost mantle flow directions, and potential mineral compositions.
- Presented results at national and international conferences and in scientific journals.
- Received training in research software engineering, scientific programming in Python and using High-Performance Computing environments.

Education

University of Bristol 2017 – 2021

Ph.D. Geology: "New techniques for the robust identification and quantification of seismic anisotropy in the lowermost mantle"

Advisors: James Wookey and J-Michael Kendall.

University of Southampton (with study abroad at Pennsylvania State University) **2013 – 2017**

MSci Geophysics. First class honours.

Teaching Experience

Demonstrator/ Lead Demonstrator. School of Earth Sciences, University of Bristol. 2017 – 2023

- Led teaching of 1st year physics classes, for a group of up to 40 students, including supervising other demonstrators.
- Supervised master student and undergraduate summer intern project in my research group.
- Assisted running the Geophysics and Environment Geophysics field course (2018-9). Led teaching of near-surface magnetic surveying element for groups of up to 6 students. Assisted in teaching and marking of the field geology aspects of the course.
- Taught on a range of geophysics, maths, physics, and scientific computing (using both Python and MATLAB) courses.
- Marked practical exercises for the Seismology course (2019).

Publications

Sutton, M., Rufas, A., **Asplet, J.,** Moneron, J., Kallingal, M., Albini, D., Kettlety, T., Muslemani, H., Köppen, M., Cartwright, J., Bouman, H. A., Rickaby, R., Jackson, M., Smith, S. M., Allen, M., and Kendall, J. M. (2024). "Filling in evidence gaps for the safe deployment of offshore Geological Carbon Storage". The Agile Initiative, University of Oxford, UK. doi: 10.5287/ora-e9o5oxve8

Asplet, J., Kettlety, T., Felgett, M., Luckett, R., Kendall, J. and Kühn, D., 2024, June. Seismic Anisotropy as a Measure of in-Situ Stress for Safe CO2 Storage. In *85th EAGE Annual Conference & Exhibition (including the Workshop Programme).* European Association of Geoscientists & Engineers.

Kettlety, T., **Asplet, J.,** Hudson, T. and Kendall, J.M., 2024, June. Using Array Methods for Cost-Effective Onshore Passive Seismic Monitoring for Offshore CO2 Storage Projects. In *85th EAGE Annual Conference & Exhibition (including the Workshop Programme).* European Association of Geoscientists & Engineers.

Asplet, J., Wookey, J., Kendall, J.M., Chapman, M., and Das, R. 2024
Shear-wave attenuation anisotropy: a fluid detection tool, *Seismica.* Doi:10.31223/X5838Z

Hudson, T., **Asplet, J.**, and Walker, A., *2023.,*
Automated shear-wave splitting analysis for single- and multi-layer anisotropic media. *Seismica*. Doi:10.31223/X5R67Z

Asplet, J., Wookey, J. & Kendall, M., 2022.,
Inversion of shear-wave waveforms reveals deformation in the lowermost mantle. *Geophysical Journal International,* **232**, 97–114. Doi:10.1093/gji/ggac328

Asplet, J., 2021
New techniques for the robust identification and quantification of seismic anisotropy in the lowermost mantle.
University of Bristol, url:https://hdl.handle.net/1983/06dcb896-db47-4052-a40c-77b86fa5eaf7

Asplet, J., Wookey, J. & Kendall, M., 2020.,
A potential post-perovskite province in D'' beneath the Eastern Pacific: evidence from new analysis of discrepant SKS–SKKS shear-wave splitting.
Geophysical Journal International, **221**, 2075–2090. Doi:10.1093/gji/ggaa114

Grants and Awards

- Government of Jersey postgraduate scholarship. Awarded £15,000 over 2017-2020.
- Runner-up – Best Talk award at the British Geophysical Association Postgraduate Research in Progress conference 2019.
- University of Southampton progression scholarship. Annual award of £500 for academic excellence from 2013-2017.

Professional Service and Community Roles

- Secretary to the International Union of Geodesy and Geophysics (IUGG) UK National Committee
- Organised the University of Bristol geophysics research group's seminar series from 2020-2023
- Reviewer for *Physics of the Earth and Planetary Interiors, Geophysical Journal International, Journal of Volcanology and Geothermal Research, and Geochemistry, Geophysics, Geosystems.*
- Solid Earth theme representative on the 2020 Wessex Doctoral Training Network (DTN) conference organising committee (a joint meeting between the GW4+, Spitfire and Oxford NERC doctoral training programmes).
- Convened the 2019 British Geophysical Association Postgraduate Research in Progress conference.
- Organised the 2019 University of Bristol School of Earth Sciences postgraduate seminar series.
- Member of the American Geophysical Union (AGU) and SEDI.

Conferences and Seminar presentations

SHARP Consortium Meeting, Delft, 2023. Talk

Seismic anisotropy as a measure of in-situ stress.

International Union of Geodesy and Geophysics General Assembly 2023. Talk

A new probe for geofluids? Measurements of attenuation anisotropy using instantaneous frequency

AGU Fall Meeting 2022. Poster.

Simultaneous measurement of shear-wave velocity and attenuation anisotropy using instantaneous frequency.

British Seismology Meeting 2022. Talk.

Simultaneous measurement of attenuation and velocity anisotropy using shear waves.

Study of the Earth's Deep Interior (SEDI) 2022. Poster.

Differential attenuation in shear waves: a probe of mantle partial melt.

AGU Fall Meeting 2020. Poster.

Probabilistic inversion of shear-wave splitting for D'' anisotropy.

AGU Fall Meeting, 2019. Talk.

A post-perovskite province in D'' beneath the Eastern Pacific? New evidence from discrepant SKS-SKKS shear-wave splitting.

University of Leeds 2019. **Invited talk.**

Discrepant SKS-SKKS shear-wave splitting highlights a potential ridge of post-Perovskite along the core-mantle boundary.

CREEP Innovative Training Network Workshop, Les Houches, 2019. **Invited poster.**

Resolving discrepant shear-wave splitting as a probe of lowermost mantle anisotropy.

British Seismology Meeting 2019. Talk.

Discrepant SKS-SKKS shear-wave splitting suggests a post-perovskite province in D'' beneath the Eastern Pacific.

British Geophysical Association Postgraduate Research in Progress, 2019. Talk.

Discrepant SKS-SKKS shear-wave splitting highlights a potential ridge of post-Perovskite in D'' beneath the Eastern Pacific.

University of Bristol Natural Systems and Processes 2019. Poster.

Resolving discrepant shear-wave splitting as a probe of lowermost mantle anisotropy.

UK SEDI 2019. Poster.

Discrepant SKS-SKKS shear-wave splitting highlights a possible ridge of post-Perovskite near the core-mantle boundary.

Wessex DTN Congress 2019. Poster.

Resolving discrepant shear wave splitting as a probe of lowermost mantle anisotropy

University of Bristol Postgraduate Seminar, 2018. Talk.

Resolving discrepant shear-wave splitting as a probe of lowermost mantle anisotropy.

British Geophysical Association Postgraduate Research in Progress, 2018. Poster.

Imaging the Earth's dynamic mantle: Using SKS-SKKS splitting to probe D'' anisotropy.

SEDI 2018. Poster.

Probing the lowermost mantle using discrepant SKS-SKKS shear-wave splitting.

Wessex DTN Congress 2018. Poster.

Imaging the Earth's Dynamic Mantle: Using shear-wave splitting to probe the lowermost mantle.