


Catherine Spurin

Postdoctoral researcher at Stanford University

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British 

Academic Employment

Stanford University

August 2021 – present

- Postdoctoral researcher as part of the GeoCquest project, a collaboration between Stanford, Cambridge and Melbourne universities and CO2CRC
- Exploring reservoir engineering strategies to increase pore scale utilisation and accelerate trapping

Imperial College London

2015 – 2021

- Graduate Teaching Assistant (2017-2021)
- Undergraduate Research Assistant (2015). Completed an 8-week research placement modelling tsunami wave inundation.

Massachusetts Institute of Technology

June – August 2016

- Undertook an 8-week research placement having received a bursary from Imperial College.
- Research explored the formation of gravity driven fingers in porous, homogeneous, saturated media.

Education

Imperial College London

2017 – 2021

- PhD researcher. Funding obtained from the President's PhD scholarship award. This is Imperial's most prestigious PhD scholarship.
- Research focus is the study of intermittent flow pathways during steady-state two-phase flow using laboratory-based X-ray micro-CT imaging and synchrotron imaging.
- Principal investigator for a synchrotron campaign at the Swiss Light Source.

Imperial College London

2013 – 2017

- 1st class MSci in Geophysics. Engineering Dean's list for all 4 years. Highest MSci mark in my year.
- MSci thesis – analysing the development of gravity fingers observed in laboratory experiments during vertical infiltration of the wetting phase into a porous medium.

Nonsuch High School for Girls

2006 – 2013

- A-Levels – Mathematics (A*), Further Mathematics (A*), Physics (A*) and Geography (A).
- GCSEs – 8 A*'s, 4 A's and 1 C including English Language, Spanish and French.

Teaching & Supervising Experience

- Course instructor on the Fundamental of Multiphase Flow in Porous Media at Stanford University (2025). This course consists of 20 lectures and is aimed at MSc and PhD students.
- Interpore Academy short course lecturer: Fundamentals of Porous Media Structure and Characterization (2024). Received an average score of 9/10 from the students.
- Co-instructor on the Fundamental of Multiphase Flow in Porous Media at Stanford University with Prof. Hamdi Tchelepi (2024). Gave 5 lectures (out of 20) to MSc and PhD students.
- Co-supervisor of PhD students: Aman Raizada, Catherine Callas, Richard Larson, and Bex Abylkhani with Prof Sally Benson at Stanford University.
- Co-supervisor of PhD student Nihal Darraj with Prof Sam Krevor at Imperial College London.

- Previously a co-supervisor of MSc student with Dr Maja Ruecker at Eindhoven University of Technology (student graduated).
- Graduate Teaching Assistant (2017 – 2021) at Imperial College London for the undergraduate modules Maths Methods, Impact Cratering and the BSc dissertation project. Ran example sessions teaching the application of the skills learned during lectures and co-supervised the students as they conducted their research project.
- Hosted a high school student for 2 weeks (2018 and 2019) as part of the In2ScienceUK programme (a programme designed to progress young people from low income backgrounds to degrees and careers in STEM subjects). Organised activities to learn about science and provided support for university applications.
- Undergraduate Teaching Assistant (2016-2017) at Imperial College London for Maths Methods.

Additional Employment

USGS/ White House September 2024- April 2025

- Task force subcommittee member for CCUS permitting.

Isometric June 2023

- Consultant for carbon sequestration.

Delonex Energy (UK) Limited July 2015

- 2-week internship with oil exploration company modelling gravity observations using Oasis Montaj.
- Proposed a model for sediments thick enough to potentially mature oil source rocks which crop out in the area. Delonex subsequently farmed-into this asset and encountered good oil shows.

Everyone Active – Cheam, Westcroft and Acton Leisure Centres 2013 – 2017

- Swim Teacher for government supported swim lessons and schools.
- Built confidence leading large groups, having taught non-swimmer classes with up to 12 children.

Atkins Global July 2012

- 2-week work experience placement using CAD and STAR-CCM+ to model air flow in the 2012 Olympic ping-pong arena. Coding skills learnt purely from online resources.

Scholarships, Awards & Funding Secured

- Imperial College President's PhD Scholarship - £120,000 (2017-2021).
- Swiss Light Source beam time awarded (principal investigator) – approx. €80,000 for 10 x 8hr beamtime shifts (June 2019).
- Ernest Edward Glorney Scholarship for excellence in 4th year undergraduate study - £2,000 (2017).
- Funding from Imperial's Exploration Board for 2 different expeditions - £2,200 (2016 and 2017).
- Centurion's Trust Award for extra-curricular activities at Imperial College London - £750 (2016).
- Imperial's International Research Opportunity Bursary for research at MIT - £4,000 (2016).
- Undergraduate Research Opportunity Bursary for research at Imperial College - £1,600 (2015).
- Award from the British Geophysical Association for being the best performing student in the Morocco geophysics field course - £100 (2015).
- Winner of the Jack Petchey Achievement Award for inspiring participation in sport - £200 (2012).

Conference Presentations & Invited Talks

- Interpore conference, May 2025 – invited oral presentation
- Invited talk at California State University Los Angeles, March 2025
- AGU Fall Meeting, December 2024, Washington DC, USA – oral presentation
- Invited talk at LNLS – Laboratório Nacional de Luz Síncrotron, November 2024
- CCUS conference Houston, March 2024 – oral presentation
- Towards Net Zero Seminar, Imperial College London, May 2023 – invited speaker
- Gordon Research Seminar on Flow and Transport in Permeable Media, July 2022, Switzerland – poster presentation
- Interpore, September 2021, online – oral presentation
- Interpore, September 2020, online – oral presentation
- Invited talk for the Geology Research Seminars, February 2020, Ghent University, Ghent, Belgium
- AGU Fall Meeting, December 2019, San Francisco, USA – poster presentation
- UKCCRC early career researcher led webinar, October 2019, recorded in Edinburgh, UK – invited speaker
- Interpore, May 2019, Valencia, Spain – oral presentation and chair of a session
- SPE talk, April 2019, London, UK – invited speaker
- Gordon Research Seminar on Flow and Transport in Permeable Media, July 2018, Newry, USA – poster presentation
- IEAGHG summer school for carbon capture and storage, June 2018, Trondheim, Norway – poster presentation

Publications

1. **Spurin, C.**, Callas, C., Darraj, N., Rücker, M., & Benson, S., 2025. The Importance and Challenges Associated with Multi-scale Heterogeneity for Geological Storage. *InterPore Journal*, 2(1), IPJ260225–2. Invited commentary.
2. **Spurin, C.**, Ellman, S., Bultreys, T., Kurotori, T., Benson, SM., and Tchelepi, H.A., 2024. The role of injection method on residual trapping: Insights into bridging scales and heterogeneity. *Advances in Water Resources*, Volume 197, 2025.
3. **Spurin, C.**, Ellman, S., Sherburn, D., Bultreys, T. and Tchelepi, H., 2024. Python workflow for segmenting multiphase flow in porous rocks. *Transport in Porous Media*.
4. Heijkoop, S., Rieder, D., Moura, M., Rücker, M. and **Spurin, C.**, 2024. A Statistical Analysis of Fluid Interface Fluctuations: Exploring the Role of Viscosity Ratio. *Entropy*, 26(9), p.774.
5. **Spurin, C.**, Ellman, S., Bultreys, T. and Tchelepi, H.A., 2024. The role of injection method on residual trapping at the pore-scale in continuum-scale samples. *International Journal of Greenhouse Gas Control*, 131, p.104035.
6. **Spurin, C.**, Roberts, G.G., O'Malley, C.P., Kurotori, T., Krevor, S., Blunt, M.J. and Tchelepi, H., 2023. Pore-Scale Fluid Dynamics Resolved in Pressure Fluctuations at the Darcy Scale. *Geophysical Research Letters*, 50(18), p.e2023GL104473.
7. Flemisch, B., Nordbotten, J.M., Fernø, M., Juanes, R., Both, J.W., Class, H., Delshad, M., Doster, F., Ennis-King, **C. Spurin**, J. and Geiger, S., 2024. The FluidFlower Validation Benchmark Study for the Storage of CO₂. *Transport in Porous Media*, pp.1-48.
8. Wang, S., **Spurin, C.**, Bultreys, T., 2023. Pore-scale Imaging of Multiphase Flow Fluctuations in Continuum-Scale Samples. *Water Resources Research*, 59(6), p.e2023WR034720.
9. **Spurin, C.**, Berg, S., Armstrong, R. and McClure, J., 2022. Dynamic Mode Decomposition for Analyzing Dynamics in Multi-phase Flow in Porous Media. *Advances in Water Resources*, 175, p.104423

10. **Spurin, C.**, Rücker, M., Moura, M., Bultreys, T., Garfi, G., Berg, S., Blunt, M.J. and Krevor, S., 2022. Red Noise in Steady-State Multiphase Flow in Porous Media. *Water Resources Research*, 58(7), p.e2022WR031947.
11. Garfi, G., John, C.M., Rücker, M., Lin, Q., **Spurin, C.**, Berg, S. and Krevor, S., 2022. Determination of the spatial distribution of wetting in the pore networks of rocks. *Journal of Colloid and Interface Science*, 613, pp.786-795.
12. Ekanem, E.M., Rücker, M., Yesufu-Rufai, S., **Spurin, C.**, Ooi, N., Georgiadis, A., Berg, S. and Luckham, P.F., 2021. Novel adsorption mechanisms identified for polymer retention in carbonate rocks. *JCIS Open*, p.100026.
13. **Spurin, C.**, Bultreys, T., Rücker, M., Garfi, G., Schlepütz, C.M., Novak, V., Berg, S., Blunt, M.J. and Krevor, S., 2021. The development of intermittent multiphase fluid flow pathways through a porous rock. *Advances in Water Resources*, 150, p.103868.
14. **Spurin, C.**, Bultreys, T., Rücker, M., Garfi, G., Schlepütz, C.M., Novak, V., Berg, S., Blunt, M.J. and Krevor, S., 2020. Real-time imaging reveals distinct pore scale dynamics during transient and equilibrium subsurface multiphase flow. *Water Resources Research*, 56(12), p.e2020WR028287.
15. Scanziani, A., Alhosani, A., Lin, Q., **Spurin, C.**, Garfi, G., Blunt, M.J. and Bijeljic, B., 2020. In Situ Characterization of Three-Phase Flow in Mixed-Wet Porous Media Using Synchrotron Imaging. *Water Resources Research*, 56(9), p.e2020WR027873.
16. Rücker, M., Bartels, W.B., Bultreys, T., Boone, M., Singh, K., Garfi, G., Scanziani, A., **Spurin, C.**, Yesufu-Rufai, S., Krevor, S. and Blunt, M.J., 2020. Workflow for Upscaling Wettability from the Nanoscale to Core Scale. *Petrophysics*, 61(02), pp.189-205.
17. **Spurin, C.**, Bultreys, T., Bijeljic, B., Blunt, M.J. and Krevor, S., 2019. Mechanisms controlling fluid breakup and reconnection during two-phase flow in porous media. *Physical Review E*, 100(4), p.043115.
18. **Spurin, C.**, Bultreys, T., Bijeljic, B., Blunt, M.J. and Krevor, S., 2019. Intermittent fluid connectivity during two-phase flow in a heterogeneous carbonate rock. *Physical Review E*, 100(4), p.043103.

Extra-Curricular Activities

- Committee member for the Interpore Young Academy.
- Committee member for the Porous Media Tea Time Talks, a YouTube channel promoting Early Career Researchers and encouraging collaboration between different institutions for research in porous media.
- Was the first person to run the length of Estonia. Also represent Imperial College at Cross-Country and am a keen long-distance runner, having completed multiple marathons, ultra-marathons, and long-distance triathlons.
- Was the Geophysics Society Vice President for 2 years (2014-2016) and helped arrange talks, social events and the first Geophysics Society Tour, which was to Mt. Etna.