

Dr. Sinéad J. Lyster

PhD, MSci (Hons)
(she/her)

Department of Earth Sciences,
College of Earth, Ocean, and Environment,
University of Delaware,
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EDUCATION -----

Imperial College London

Oct. 2017–May 2022

Ph.D. in Geology, Department of Earth Science and Engineering.

- Thesis title: “*Quantifying the dynamics and behaviour of ancient fluvial systems in space and time.*”
- Doctoral advisor: Dr. Alexander Whittaker

University College London

Sept. 2012–July 2016

M.Sci. (integrated B.Sc. and M.Sc.) in Earth Sciences, Department of Earth Sciences.

APPOINTMENTS -----

University of Delaware

Jan. 2026–Present

Assistant Professor, Department of Earth Sciences

The Pennsylvania State University

July 2022–Dec. 2025

Postdoctoral Researcher, Department of Geosciences

Jan. 2024–Dec. 2025

- Research: Investigating delta evolution using flume experiments; remote sensing observations of Arctic sediment-laden sea ice; evaluating SWOT satellite estimates of Arctic river discharge.
- Postdoctoral advisor: Dr. Anastasia Piliouras

Postdoctoral Researcher, Department of Geosciences

July 2022–Dec. 2024

- Research: Quantifying landscape sensitivity and response to climate change; developing machine learning tools for automated interpretation of sedimentary outcrops.
- Postdoctoral advisor: Dr. Elizabeth Hajek

Springer Nature, London

Sept. 2016–July 2017

Journals Assistant

- Member of *Nature Reviews* journals copy-editing team.

PUBLICATIONS (underline denotes student mentee) -----

1. Wood, J., McLeod, J., **Lyster, S. J.** & Whittaker, A. C., **2025**, Reply to comment on ‘Rivers of the Variscan Foreland: fluvial morphodynamics in the Pennant Formation of South Wales, UK.’ *Journal of the Geological Society*, 182 (5), jgs2025-087, [DOI:10.1144/jgs2025-087](https://doi.org/10.1144/jgs2025-087).
2. Dean, C. D., Chiarenza, A. A., Doser, J. W., Farnsworth, A., Jones, L. A., **Lyster, S. J.**, Outhwaite, C. L., Butler, R. J., & Mannion, P. D., **2025**, The structure of the end-Cretaceous dinosaur fossil record in North America, *Current Biology*, 35 (9), 1973–1988, [DOI:10.1016/j.cub.2025.03.025](https://doi.org/10.1016/j.cub.2025.03.025).

3. McLeod, J. S., Whittaker, A. C., Bell, R. E., Hampson, G. J., Watkins, S. E., Brooke, S. A. S., Rezwan, N., Hook, J., Zondervan, J. R., Ganti, V. & **Lyster, S. J.**, 2024, Landscapes on the edge: river intermittency in a warming world, *Geology*, 52 (7), 512–516, [DOI:10.1130/G52043.1](https://doi.org/10.1130/G52043.1).
4. **Lyster, S. J.**, Whittaker, A. C., Farnsworth, A., & Hampson, G. J., 2023, Constraining flow and sediment transport intermittency in the geological past, *GSA Bulletin*, 136 (5-6), 2425–2442, [DOI:10.1130/B36873.1](https://doi.org/10.1130/B36873.1).
5. McLeod, J., Wood, J., **Lyster, S. J.**, Valenza, J. M., Spencer, A. R. T., & Whittaker, A. C., 2023, Quantitative constraints on flood variability in the rock record, *Nature Communications*, 14, 3362, [DOI:10.1038/s41467-023-38967-8](https://doi.org/10.1038/s41467-023-38967-8).
6. Wood, J., McLeod, J., **Lyster, S. J.** & Whittaker, A. C., 2022, Rivers of the Variscan Foreland: fluvial morphodynamics in the Pennant Formation of South Wales, UK, *Journal of the Geological Society*, 180(1), jgs2022-048, [DOI:10.1144/jgs2022-048](https://doi.org/10.1144/jgs2022-048).
7. **Lyster, S. J.**, Whittaker, A. C. & Hajek, E. A., 2022, The problem of paleo-planforms, *Geology*, 50 (7), 822–826. [DOI:10.1130/G49867.1](https://doi.org/10.1130/G49867.1).
8. **Lyster, S. J.**, Whittaker, A. C., Hajek, E. A. & Ganti, V., 2022, Field evidence for disequilibrium dynamics in preserved fluvial cross-strata: A record of discharge variability or morphodynamic hierarchy? *Earth and Planetary Science Letters*, 579, 117355, [DOI:10.1016/j.epsl.2021.117355](https://doi.org/10.1016/j.epsl.2021.117355).
9. **Lyster, S. J.**, Whittaker, A. C., Hampson, G. J., Hajek, E. A., Allison, P. A. & Lathrop, B. A., 2021, Reconstructing the morphologies and hydrodynamics of ancient rivers from source to sink: Cretaceous Western Interior Basin, Utah, USA, *Sedimentology*, 68, 2854–2886, [DOI:10.1111/sed.12877](https://doi.org/10.1111/sed.12877).
10. **Lyster, S. J.**, Whittaker, A. C., Allison, P. A., Lunt, D. J. & Farnsworth, A., 2020, Predicting sediment discharges and erosion rates in deep time — examples from the Late Cretaceous North American continent, *Basin Research*, 30, 1547–1573, [DOI:10.1111/bre.12442](https://doi.org/10.1111/bre.12442).
11. **Lyster, S.**, 2017 Biogeochemistry: a subglacial microbial methane sink, *Nature Reviews Chemistry*, 1, 0070, [DOI:10.1038/s41570-017-0070](https://doi.org/10.1038/s41570-017-0070).
12. Bridger, P., **Lyster, S.** & Hunt, A., 2016, The Paleocene–Eocene Thermal Maximum: investigating the connection between ocean drilling and climate science, *ECORD Newsletter*, 26, 15, [Available online](#).

In review

- a. **Lyster, S. J.** & Piliouras, Vegetation effects on delta evolution with rising sea level: Insights from experimental deltas, (In review for *JGR Earth Surface*)

In preparation

- a. **Lyster, S. J.**, Murphy, K., Hajek, E. A., Whittaker, A. C. & Alpheus, S, A decrease in river discharge variability during the Paleocene–Eocene Thermal Maximum, southern Pyrenees, Spain, (In preparation for *The Sedimentary Record*)
- b. **Lyster, S. J.** & Hajek, E. A, Tectonic setting limits paleohydraulic reconstructions, (In preparation for *Geology*).
- c. **Lyster, S. J.** & Hajek, E. A, Landscape response timescales control the fluvial stratigraphic record of climate events, (In preparation for *Geology*).

CONFERENCE PROCEEDINGS (underline denotes student mentee) -----

First author

1. **Lyster, S. J.**, & Plliouras, A., **2024**, Non-vegetated vs. vegetated landscapes: Using physical experiments to isolate the effect of vegetation on delta channel mobility and deltaic stratigraphy, *AGU Fall Meeting*.
2. **Lyster, S. J.**, & Hajek, E. A., **2024**, The interplay between basin and channel response timescales controls alluvial architecture: A comparison of global river response to the Paleocene–Eocene Thermal Maximum, *SEPM International Sedimentary Geosciences Congress*.
3. **Lyster, S. J.**, Hajek, E. A. & Whittaker, A. C., **2023**, Fluvial response to the Paleocene–Eocene Thermal Maximum: Basin-scale to bed-scale controls on signal propagation and preservation, *International Conference on Fluvial Sedimentology*.
4. **Lyster, S. J.**, Whittaker, A. C. & Hajek, E. A., **2023**, The problem of paleo-planforms: Using modern river observations to reconstruct ancient river planforms, *International Conference on Fluvial Sedimentology*.
5. **Lyster, S. J.**, Whittaker, A. C., Farnsworth, A., Hampson, G. J., & Hajek, E. A., **2023**, Constraining intermittency in the geological past: Implications for reconstructing water discharges and sediment fluxes in ancient source-to-sink systems, *EGU General Assembly*.
6. **Lyster, S. J.**, Whittaker, A. C., Farnsworth, A., Hampson, G. J., Alpheus, S., & Hajek, E. A., **2022**, Constraining the intermittency of flow and sediment transport in the geological past, *AGU Fall Meeting*.
7. **Lyster, S. J.**, Whittaker, A. C. & Hajek, E. A., **2021**, Reconstructing river planform in ancient fluvial systems, *BSRG Annual General Meeting*.
8. **Lyster, S. J.**, Whittaker, A. C., Hajek, E. A. & Ganti, V., **2021**, Evidence of bedform disequilibrium dynamics in preserved fluvial cross-strata: A record of flood variability or morphodynamic hierarchy? *AGU Fall Meeting*.
9. **Lyster, S. J.**, Whittaker, A. C., Hajek, E. A., Ganti, V. & Allison, P. A., **2021**, River discharge variability in the rock record: quantitative insights from Late Cretaceous North American fluvial systems, *EGU General Assembly*.
10. **Lyster, S. J.**, Whittaker, A. C., Hajek, E. A. & Ganti, V., **2020**, River discharge variability in the rock record: quantitative insights from Late Cretaceous North American fluvial systems, *BSRG Annual General Meeting*.
11. **Lyster, S. J.**, Whittaker, A. C., Hampson, G. J., Hajek, E. A., Allison, P. A. & Lathrop, B. A., **2020**, Quantifying the morphologies and hydrodynamics of paleorivers in four dimensions: Cretaceous Western Interior Basin, Utah, USA, *AGU Fall Meeting*.
12. **Lyster, S. J.**, Whittaker, A. C., Allison, P. A., Lathrop, B. A., and Hedley, G. W., **2019**, Palaeohydrology of Late Cretaceous sediment routing systems, Utah, USA, in space and time, *BSRG Annual General Meeting*.
13. **Lyster, S. J.**, Whittaker, A. C. & Allison, P. A., **2019**, Predicting fluvial suspended sediment discharges in the geologic past — examples from the Cenomanian and Turonian North American continent, *EGU General Assembly*.
14. **Lyster, S. J.**, Whittaker, A. C. & Allison, P. A., **2018**, Predicting sediment discharges from the continents in deep time — examples from the Cenomanian and Turonian of North America, *BSRG Annual General Meeting*.

15. **Lyster, S. J.**, Whittaker, A. C., Allison, P. A. & Kelland, S. J., **2018**, Spatial and temporal variation in fluvial sediment supply to the Cretaceous Western Interior Seaway of North America, *Working Group on Sediment Generation*.

Co-author

1. Piliouras, A., Guo, X., **Lyster, S.**, Coss, S., Harlan, M. & Durand, M., **2025**, Community repository for SWOT discharge data, *AGU Fall Meeting*.
2. Piliouras, A., Guo, X., **Lyster, S.**, Phillipson, N., & Crosby, B., **2025**, Variability in Arctic river discharge, suspended sediment transport, and turbidity, *SWOT Science Team Meeting*.
3. Murphy, K., **Lyster, S. J.** & Hajek, E. A., **2023**, Comparing riverbed sediment changes in response to the Paleocene–Eocene Thermal Maximum event, Pyrenees Mountains, Spain, *GSA Connects*.
4. Sharmili, N., Hajek, E. A., Walker, J., Alpheus, S. & **Lyster, S. J.**, **2023**, How are channel lateral migration and avulsion reflected in fluvial sand-body architecture? *International Conference on Fluvial Sedimentology*.
5. Whittaker, A. C., McLeod, J. S., Wood, J., & **Lyster, S. J.**, **2022**, Quantitative constraints on paleohydrology and flood variability in ancient rivers, *AGU Fall Meeting*,
6. Hajek, E. A., Conn, R., Ewing, R., Hammond, T., Koh, J. I., **Lyster, S. J.**, Mann, E., Tunwal, M. & White, E., **2022**, Building a community tool for automated facies interpretation from sedimentary outcrop photos, *GSA Connects*.
7. Moreland, A. M., Tunwal, M., Hajek, E. A. & **Lyster, S. J.**, **2022**, Effect of sediment supply on subsurface connectivity in fluvial and deltaic sedimentary environments, *GSA Connects*.
8. Whittaker, A. C., **Lyster, S. J.**, McLeod, J., Wood, J., Hajek, E. A. & Ganti, V., **2022**, Flood variability in the rock record? Disequilibrium bedform preservation in ancient fluvial stratigraphy, *EGU General Assembly*.
9. Wood, J., McLeod, J., Whittaker, A. C. & **Lyster, S. J.**, **2021**, Rivers of the Variscan foreland: A reconstruction of fluvial morphodynamics in the Pennant Sandstone Formation of South Wales, *BSRG Annual General Meeting*.
10. McLeod, J., Whittaker, A. C., **Lyster, S. J.** & Wood, J., **2021**, Quantifying flood variability in the rock record: New constraints from the Upper Carboniferous Pennant Sandstone, South Wales, *BSRG Annual General Meeting*.
11. Hajek, E. A., Alpheus, S., Baisden, T., Chamberlin, E. P., Greenberg, E., **Lyster, S. J.** & Trampush, S. M., **2021**, Ancient river deposits provide insight into dominant morphodynamic processes in river networks under different boundary conditions, *AGU Fall Meeting*.

INVITED TALKS -----

1. The Pennsylvania State University, Department of Geosciences, October 2025. Department Seminar.
2. *Landscapes Live*, April 2025. Webinar
3. Cornell University, Department of Earth and Atmospheric Sciences, March 2025. Department Seminar.
4. University of Delaware, Department of Earth Sciences, March 2025. Department seminar.
5. University of Pittsburgh, Department of Geology and Environmental Science, February 2025. Department seminar.

6. Stanford University, Department of Earth & Planetary Sciences, January 2024. Department Seminar.
7. Harrow and Hillingdon Geological Society, London, January 2024. Monthly lecture.
8. UC Santa Barbara, Department of Geography, November 2023. UCSB Surface Processes Group seminar.
9. *Seds Online*, October 2023. Webinar.
10. International Conference on Fluvial Sedimentology, Riva del Garda, Italy, July 2023. Keynote speaker.
11. Imperial College London, Department of Earth Science and Engineering, May 2023. Earth and Planets seminar.
12. University of Minnesota, Department of Earth and Environmental Sciences, March 2023. Department seminar.
13. Tulane University, Department of Earth and Environmental Sciences, November 2022. Department seminar.

TEACHING -----

The Pennsylvania State University

June 2022–Dec. 2025

Course Developer

- Developed and delivered a 3-hour fluvial sedimentology laboratory exercise to undergraduate geoscience students.
- Co-developed and co-delivered a 2-hour river morphodynamics laboratory exercise to graduate level engineering students.

Teaching Assistant

- *Field course*: Field stratigraphy (Guadalupe Mountains, USA, ×1)

Imperial College London

Graduate Teaching Assistant

Oct. 2017–May 2022

- *Classroom courses*: Surface Processes (×5); Stratigraphy and Geomaterials (×1); Structural Geology I: Deforming the Earth (×5); Structural Geology II: Maps and Structures (×3); Basin Analysis (×1); Field Skills (×1).
- *Field courses*: Sediments and Structures in the Field (Pyrenees, ×2); Sediments and structures in South Wales (Wales, ×2); Geological Transect through an Active Mountain Belt (Apennines and Elba, ×3).
- *Virtual field courses*: Sediments and Structures — Virtual fieldtrip to South Wales (×1); The Italian Apennines — Virtual Synthesis of an Active Mountain Belt (×2).

STUDENT SUPERVISION -----

Master's students:

1. Jonah McLeod, Imperial College London, 2021–2022: “*Quantifying flood variability in the rock record: New constraints from the Upper Carboniferous Pennant Sandstone, South Wales.*”

2. James Wood, Imperial College London, 2021–2022: “*Rivers of the Variscan foreland: A reconstruction of fluvial morphodynamics in the Pennant Sandstone Formation of South Wales.*”
3. George Hedley, Imperial College London, 2019–2020: “*Reconstructing the characteristics of fluvio-deltaic trunk channels with palaeohydrological methods — an example from the Ferron Sandstone, Utah, USA.*”

Undergraduate students:

1. Zane Saylor, Penn State, 2024: Laboratory assistant
2. Kalen Murphy, visiting student (REU) at Penn State, 2023: “*Comparing riverbed sediment changes in response to the Paleocene–Eocene Thermal Maximum event, Pyrenees Mountains, Spain.*”
3. Andrew Moreland, visiting student (REU) at Penn State, 2022: “*Effect of sediment supply on subsurface connectivity in fluvial and deltaic sedimentary environments.*”
4. Thomas Yu, Imperial College London, 2021: “*Predicting sediment fluxes from the continents to the oceans in deep time.*”

FIELDWORK -----

2025 **Graduate field teaching:** Teaching assistant for ×1 graduate course in the Guadalupe Mountains, USA (sedimentology and stratigraphy).

2022 **Wyoming and Utah, USA:** 2-week sedimentological field campaign.

2021 **Pyrenees, Spain:** 2-week sedimentological field campaign.

2021 **Wales, UK:** 2.5 week sedimentological field campaign.

2019 **Utah, USA:** 4-week sedimentological field campaign.

2018 **Utah, USA:** 2-week sedimentological field campaign.

2017–2022 **Undergraduate and graduate field teaching:** Teaching assistant for ×2 undergraduate courses in the Pyrenees, Spain (sediments and structures), ×3 graduate courses in the Apennines and Elba, Italy (sediments, structures, geomorphology, active tectonics), ×2 undergraduate courses in Wales, UK (sediments and structures), and ×3 undergraduate/graduate virtual courses.

2012–2016 **Undergraduate field training:** >60 days of geological fieldwork training in the UK (Norfolk; Dorset; Cornwall), Spain (southern Pyrenees; Almería), Italy (Apennines), Germany (Nördlinger Ries impact crater; Solnhofen), and Iceland.

BURSARIES/GRANTS -----

2019 **£7,500, Imperial College London’s Stevenson Fund:** Awarded to a woman student to undertake an international research placement with a woman academic.

2019 **£1,458, The Geological Society’s Mike Coward fund:** Awarded to support research fieldwork.

2019 **£500, British Sedimentological Research Group’s Gill Harwood Memorial Fund:** Awarded to support research fieldwork.

2017 ~£86,000, NERC PhD Studentship: Awarded to complete doctoral studies, inc. stipend and tuition fees for 3.5 years and research/fieldwork support.

RECOGNITION -----

2020 Outstanding Graduate Teaching Assistant, Imperial College London

PROFESSIONAL DEVELOPMENT -----

2022 My Green Lab Ambassador training (My Green Lab, Penn State)
2022 Safer People Safer Places Transgender and Gender Inclusion workshop (Penn State)
2022 Safer People Safer Places Foundation workshop (Penn State)
2021 Bullying and Harassment workshop (Imperial College London)
2021 Racism Awareness workshop (Imperial College London)
2021 Promoting Diversity, Equality, and Inclusion workshop (Imperial College London)
2019 Active Bystander workshop (Imperial College London)
2019 Science in Policy and Media workshop (NERC, UK)
2018 Sustainable Development Goals workshop (NERC, UK)
2018 Teams and Communication workshop (Imperial College London)

DEPARTMENT/UNIVERSITY SERVICE -----

2024, 2025 Judge, Graduate Geosciences Colloquium, Department of Geosciences, Penn State
2021 Panel reviewer, Undergraduate Research Opportunities Program, Department of Earth Science and Engineering, Imperial College London
2015–2016 Committee member, Geology Society, University College London
2014–2016 Student ambassador, Department of Earth Sciences, University College London

EXTERNAL/COMMUNITY SERVICE -----

Peer reviewer:

Basin Research; Geology; GSA Bulletin; JGR Planets; Journal of Sedimentary Research; Sedimentology

Judge:

2024 Outstanding Student Presentation Awards (OSPA) at AGU
2023 Outstanding Student and PhD candidate Presentation (OSPP) at EGU

Conference session convener/chair:

2024 *Linking Surface Processes to the Stratigraphic Record: Past is the Key to the Future*, AGU Fall Meeting

2024 *The Earth Surface as a Natural Lab: Advances in Isolating Landscape Evolution Controls*, AGU Fall Meeting

2022 *Deciphering the stratigraphic record of surface processes: New insights into ancient landscape dynamics on Earth and other planetary bodies*, AGU Fall Meeting

2022 *Quantifying the drivers of landscape evolution across spatial and temporal scales*, AGU Fall Meeting

2021 *Quantifying the drivers of landscape evolution across spatial and temporal scales*, AGU Fall Meeting

Workshop/course delivery:

2023 Co-instructor and co-organiser for the Penn State/Society for Sedimentary Geology (SEPM) virtual short course entitled “*Fluvial landscape reconstruction from the sedimentary record*”

Mentorship:

2023 Steepest Descent mentor: Geomorphology mentoring program at EGU

Leadership:

2023– Founder and chair, SEPM Fluvial Sedimentology Research Group

OUTREACH/ENGAGEMENT -----

2024–2025 Association for Women Geoscientists (AWG) mentorship program mentor, Department of Geosciences, Penn State

2023–2024 School visit volunteer, Department of Geosciences, Penn State (organised/ran stream table activities for visiting 4th grade students)

2023–2024 Letters to a Pre-Scientist volunteer (pen-pal program to exchange letters with middle school science students)

2020 Earth Science and Engineering Careers Day speaker, Imperial College London

2019 Women in Science Day speaker, Tolworth Girls’ School and Sixth Form, UK

2019 “Science without Borders” exhibit, Imperial Lates, Imperial College London

2018 Pint of Science festival organiser, London, UK

2018 Pint of Science festival organiser, London, UK

2016 UK Festival of Geology organiser, London, UK

2016 Natural history and wildlife television researcher, Silverback Films, UK

2016 Natural history and wildlife television researcher, Talesmith, UK

2015 UK Festival of Geology organiser, London, UK

CERTIFICATIONS/TRAINING -----

2024 Laboratory and Research Safety (Penn State, PA, USA)

2022 Epinephrine Auto-injector (NOLS, PA, USA)

2022 Wilderness First Aid (NOLS, PA, USA)

2018 Beginner Mental Health First Aid (MHFA, UK)

2017 Fieldwork First Aid (Merlin, UK)