

SIMON J. LLOYD, PhD

GEOPHYSICIST | DATA & MODELLING SPECIALIST | SAFETY-CRITICAL OPERATIONS LEADER

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EXECUTIVE PROFILE

Multidisciplinary technical leader with a rare combination of frontier Earth-science research, high-performance computing, data engineering, international field operations, commercial aviation instruction and operational management. Author or co-author of 11 peer-reviewed papers - seven as first author - with 200+ citations and publications in Science Advances, Nature Geoscience, Earth and Planetary Science Letters and other leading journals. Proven in building robust analytical systems, diagnosing complex failures, leading field campaigns and delivering high-stakes work in regulated environments. Brings scientific rigour, systems thinking, calm judgement and an unusually broad record of turning difficult problems into precise, auditable outcomes.

IMPACT AT A GLANCE

11

PEER-REVIEWED PAPERS

7

FIRST-AUTHOR PAPERS

200+

CITATIONS

~2,000

PILOT-IN-COMMAND HOURS

1,600+

FLIGHT-INSTRUCTOR HOURS

95%

ATPL THEORY AVERAGE

SIGNATURE CAPABILITIES

Quantitative Science & Analytics

Statistical analysis; uncertainty assessment; Monte Carlo methods; data validation; large scientific datasets; evidence synthesis; publication-quality visualisation.

Data Engineering & Reproducibility

Python; MATLAB; Excel; Microsoft Access; Git/SSH; NetCDF; structured pipelines; relational data; version control; auditability; quality assurance.

Leadership & Operations

International field-campaign leadership; training; procedural compliance; risk management; budgeting; inventory/stock control; stakeholder coordination; documentation.

HPC & Numerical Modelling

3-D spherical geodynamo simulations; ARCHER2; ARC4; batch scheduling; Linux; shell scripting; job arrays; restarts; simulation ensembles; diagnostic extraction.

Geospatial & Earth Science

Palaeomagnetism; absolute palaeointensity; QGIS; GPlates; tectonic reconstruction; global database analysis; field sampling; experimental methods.

Communication

Peer-reviewed scientific writing; conference presentation; teaching; public outreach; technical reporting; cross-disciplinary collaboration; customer-facing communication.

CAREER HIGHLIGHTS

- Published research spanning Earth's magnetic-field behaviour from the Precambrian to the Phanerozoic, including a 2026 Science Advances paper showing prolonged weak geomagnetic field strength after the Cambrian radiation.
- Built and operated end-to-end HPC modelling pipelines, transforming raw spherical dynamo simulations into validated, reusable field-model products and ensemble diagnostics.
- Took ownership of a production PINT database upgrade, diagnosed a live filtering failure caused by legacy lookup logic, deployed the fix and verified correct behaviour across key query filters.
- Led international palaeomagnetic field campaigns in Brazil and Western Australia and collaborated on field programmes in Orkney and Quebec.
- Progressed from commercial flying instructor to Chief Flying Instructor, combining safety oversight, training standards, human-factors judgement and high-pressure operational decision-making.
- Previously managed the full warehousing and stock-control function in a manufacturing business, including budgeting, fleet control and a workforce of 12 permanent staff plus a similar number of contractors.

PROFESSIONAL EXPERIENCE

Postdoctoral Research Associate | University of Liverpool - Geomagnetism Laboratory

Nov 2021 - 2026

Experimental palaeomagnetism, numerical modelling, global-data analysis, international field research and scientific communication.

- Led analytical investigations into complex geophysical datasets using quantitative modelling, statistical analysis, uncertainty assessment and rigorous data-quality evaluation.
- Designed reproducible research workflows spanning experimental measurements, global data synthesis, computational modelling, visualisation and publication.
- Ran 3-D spherical geodynamo simulations on ARCHER2 and ARC4; managed batch-scheduled, long-duration simulation ensembles, restarts, storage constraints and cross-system workflows.

- Developed pipelines converting raw simulation/state outputs into standardised Gauss coefficients and analysis-ready products, integrating shell, Python and MATLAB tooling.
- Computed magnetic and kinetic energy budgets, ohmic dissipation and ohmic fraction, ensuring interpretation used statistically stable regimes rather than transient numerical artefacts.
- Contributed to the PINT global palaeointensity database and later repaired a production query issue by tracing a legacy code/lookup mismatch and rebuilding the affected logic.
- Built internally consistent palaeomagnetic datasets from overlapping sources, resolved duplicate-ID and Unicode/indexing failures, and carried out plate-tectonic reconstructions using QGIS and GPlates.
- Produced technical reports, peer-reviewed papers, conference presentations and documentation for specialist and non-specialist audiences; collaborated with international research teams.
- Organised and led major international fieldwork, coordinating sampling programmes, equipment, travel, accommodation and collaborators.

SELECTED HIGH-VALUE TECHNICAL PROJECTS

Geodynamo simulation pipeline - Configured and ran production spherical dynamo simulations; consolidated multi-GB outputs with rsync; converted NetCDF/statefiles to Gauss coefficients; integrated QPM analysis and published reusable simulation products with derived physical diagnostics.

PINT database upgrade & production fix - Migrated the backend dataset, preserved related Access tables, diagnosed an age-filter failure, identified the mismatch between new method codes and legacy lookup logic, rebuilt the logic and verified live filters including age, method, polarity and QPI.

PSV dataset & tectonic reconstruction - Merged multiple non-unique, mixed-encoding sources into a trusted global dataset; enforced ID-age uniqueness, repaired parsing failures, reconstructed sites/VGPs with GPlates and standardised geometry/polarity conventions.

Shaw-method performance study - Implemented 10,000-repeat Monte Carlo down-sampling; objectively compared linearity metrics and accuracy/precision trade-offs; tested reliability against known-field data and experimentally assessed heating-duration dependence.

SCOPE selection criteria - Compiled 27 published criteria sets; derived seven objective thresholds; performance-tested ~44,000 candidate fits against known-field benchmarks and documented specimen-level outcomes for reproducible application.

Teaching Assistant / Demonstrator in Geophysics | University of Liverpool

Jan 2018 - Dec 2020

- Delivered undergraduate practical and demonstration support in geophysics, helping students interpret methods, data and technical procedures.

Geophysics Intern | ESG Geophysical Surveying, Deeside, Cheshire

May - Sep 2015

- Early professional geophysics experience within a commercial surveying environment.

AVIATION & COMMERCIAL LEADERSHIP

Chief Flying Instructor | Air Sofia, Bulgaria

Nov 2010 - Sep 2012

Senior responsibility for training standards and instructor quality in a commercial flight-training organisation.

- Maintained and raised flight-training standards in a regulated, safety-critical environment; oversaw student progression, standards compliance and operational discipline.
- Applied human factors, threat-and-error management, risk assessment and calm decision-making under time pressure.

Customer Services Specialist | Bank of America, Chester

Sep 2009 - Jul 2010

- Delivered a broad range of regulated financial-services support across multiple systems while meeting continuous quality and efficiency measures; quickly became one of the department's leading performers.

Commercial Flying Instructor | Cabair College of Air Training

Jan 2008 - Jul 2009

- Trained high volumes of ab-initio students from zero experience to Commercial Pilot standard at a leading integrated-training facility; maintained formal records and progress reports while working to strict targets and deadlines.

Senior Flying Instructor | Flight schools across Yorkshire

Aug 2006 - Dec 2007

- Delivered tailored training across three flight schools, building repeat customer business through accurate assessment, communication and high-quality instruction.

Commercial Flight Training | USA & UK

Jun 2004 - Jul 2006

- Completed advanced commercial and instrument training at Phoenix East Aviation (Florida), Cabair College of Air Training, Santa Cruz Flying School (California) and Leeds Flight School, achieving exceptional theoretical and practical results.

EARLIER OPERATIONAL MANAGEMENT

Warehouse Manager | Trigon Snacks Ltd, Liverpool

Mar 2002 - Jun 2004

- Owned the warehousing and stock-control function in a fast-paced manufacturing business, including production planning, office administration, purchase invoicing and delivery reconciliation.
- Managed 12 permanent staff and approximately 12 contractors; controlled a large forklift fleet and reported directly to senior management.

Catering Manager | Youth Hostel Association - Hartington Hall

May 1999 - Feb 2002

- Managed kitchen and dining operations for a 120-cover flagship five-star hostel, balancing customer service, budgeting, team management, efficiency and quality control.

EDUCATION

2017 - 2022	PhD, Geophysics (Palaeomagnetism & Palaeointensity) - University of Liverpool, Department of Earth, Ocean and Ecological Sciences.
2014 - 2017	BSc (Hons) Geophysics (Geology), First Class Honours - University of Liverpool.
2013 - 2014	Access to Higher Education Diploma, Laboratory Science, Distinction - Wirral Metropolitan College.

AVIATION & OTHER QUALIFICATIONS

- JAA Commercial Pilot Licence (CPL) - Multi-Engine
- JAA Multi-Engine Instrument Rating (MEIR)
- FAA Multi-Engine Instrument Rating (MEIR)
- Flying Instructor / Examiner qualification (2006)
- JAA Flight Instructor Rating - Unrestricted, Night
- FAA Commercial Pilot Licence (CPL) - Multi-Engine
- Airline Transport Pilot Licence (ATPL) theory examinations - 95%
- Previously held Counterbalance and Reach Forklift Truck licences

INTERNATIONAL FIELD EXPERIENCE

Sep - Oct 2025 Brazil	Organised and led a collaborative three-week palaeomagnetic field campaign across northern and southern Brazil, coordinating sampling with international collaborators.
Oct 2022 Orkney, Scotland	Field campaign with University of Oslo collaborators targeting Devonian volcanic rocks and Permo-Carboniferous lamprophyre dykes, including Kiaman Superchron material.
Aug 2019 Western Australia	Organised and led a collaborative three-week palaeomagnetic field campaign across Western Australia.
Aug 2017 Quebec, Canada	Two-week palaeomagnetic sampling campaign.

TEACHING, SUPERVISION & PUBLIC ENGAGEMENT

- Undergraduate Teaching Assistant / Demonstrator in geophysics, University of Liverpool (2018-2020).
- Organised and supervised a two-week Nuffield Research Placement for A-Level students (2023).
- Royal Society Summer Science Exhibition - "Magnetic to the Core" exhibitor (2019).
- Self-organised geomagnetism activities for approximately 60 pupils aged 7-9 at St Michael's Primary School.
- Delivered geophysical-survey activities for approximately 80 sixth-form students at Wirral Grammar School for Boys.

AWARDS, PRESENTATIONS & PROFESSIONAL AFFILIATIONS

- Geophysical Journal International student paper/publication award (2021).
- PGR Conference - Best Poster (2020).
- Wirral Metropolitan College - Student of the Year in Mathematics (2014).
- American Geophysical Union (AGU) Fall Meeting - presentations in 2020 and 2023; 2020 talk GP010-03.
- Regular presenter at the UK Magnetic Interactions palaeomagnetism and rock-magnetism meeting since c. 2018, including meetings at Liverpool, Southampton, St Andrews, Cambridge and Oxford.
- Fellow, Royal Astronomical Society (documented from 2019); American Geophysical Union affiliation documented from 2020.

RESEARCH CONTRIBUTIONS

- Produced new palaeointensity constraints across the Cryogenian, early Cambrian, Paleoproterozoic and Kiaman Superchron, helping constrain long-term geomagnetic-field evolution and deep-Earth processes.
- Developed and evaluated palaeointensity methodology, including Shaw-type and high-frequency microwave approaches, with emphasis on objective quality assessment and reproducibility.
- Combined laboratory experiments, global data synthesis, database engineering, tectonic reconstruction, statistical analysis and numerical geodynamo modelling in integrated research programmes.
- Contributed to development, quality assessment and scientific exploitation of the global PINT palaeointensity database.

INTERESTS

Science and mathematics; computing and multimedia; aviation; graphic design; music and guitar; reading; languages; travel; running, mountaineering and fitness; camping; windsurfing.

PEER-REVIEWED PUBLICATIONS

11 peer-reviewed papers | 7 first-author | 200+ citations. Newest first.

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Lloyd, S. J., Biggin, A. J., Hopkins, R., Tully, A., Cych, B., Paterson, G. A., & Trindade, R. I. F. (2026). Earth's magnetic field remained weak for 40 million years after the Cambrian radiation. *Science Advances*, 12(30), eaeg2325. doi:10.1126/sciadv.aeg2325

2

Biggin, A. J., Davies, C. J., Mound, J. E., Lloyd, S. J., Engbers, Y. E., Thallner, D., Clarke, A. T., & Bono, R. K. (2026). Mantle heterogeneity influenced Earth's ancient magnetic field. *Nature Geoscience*, 19(3), 345-352. doi:10.1038/s41561-025-01910-1

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Chen, X., Biggin, A. J., & Lloyd, S. J. (2026). Stabilization of full-vector palaeosecular variation in the last 5 Myr: insights from a newly updated palaeointensity (PINT) data base. *Geophysical Journal International*, 244(2). doi:10.1093/gji/ggaf490

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Lloyd, S. J., Biggin, A. J., Domeier, M., Lundmark, A. M., & van der Boon, A. (2025). Low Geomagnetic Paleointensity in the Mid-Part of the Kiaman Superchron. *Journal of Geophysical Research: Solid Earth*, 130, e2024JB030314. doi:10.1029/2024JB030314

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Lloyd, S. J., Biggin, A. J., Halls, H., & Denysyn, S. (2024). Weak paleointensities from 1.6 Ga Greenland dykes: Further evidence for a billion-year period of paleomagnetic dipole low during the Paleoproterozoic. *Earth and Planetary Science Letters*, 648, 119110. doi:10.1016/j.epsl.2024.119110

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Lloyd, S. J., Biggin, A. J., Hill, M. J., de Groot, L., Suttie, N., Morris, J., Boehnel, H., & Shaw, J. (2023). The use of high frequency microwaves in absolute palaeomagnetic intensity experiments. *Frontiers in Earth Science*, 11, 1188528. doi:10.3389/feart.2023.1188528

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Lloyd, S. J., Biggin, A. J., Paterson, G. A., & McCausland, P. J. A. (2022). Extremely weak early Cambrian dipole moment similar to Ediacaran: Evidence for long-term trends in geomagnetic field behaviour? *Earth and Planetary Science Letters*, 595, 117757. doi:10.1016/j.epsl.2022.117757

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Bono, R. K., Paterson, G. A., van der Boon, A., Engbers, Y. A., Grappone, J. M., Handford, B., Hawkins, L. M. A., Lloyd, S. J., Sprain, C. J., Thallner, D., & Biggin, A. J. (2022). The PINT database: A definitive compilation of absolute palaeomagnetic intensity determinations since 4 billion years ago. *Geophysical Journal International*, 229, 522-545. doi:10.1093/gji/ggab490

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Lloyd, S. J., Biggin, A. J., & Li, Z.-X. (2021). New Paleointensity Data Suggest Possible Phanerozoic-Type Paleomagnetic Variations in the Precambrian. *Geochemistry, Geophysics, Geosystems*, 22(10), e2021GC009990. doi:10.1029/2021GC009990

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Lloyd, S. J., Paterson, G. A., Thallner, D., & Biggin, A. J. (2021). Improvements to the Shaw-Type Absolute Palaeointensity Method. *Frontiers in Earth Science*, 9, 701863. doi:10.3389/feart.2021.701863

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Lloyd, S. J., Biggin, A. J., Halls, H., & Hill, M. J. (2021). First Palaeointensity Data from the Cryogenian and their potential implications for Inner Core Nucleation Age. *Geophysical Journal International*, 226(1). doi:10.1093/gji/ggab090

TECHNICAL ENVIRONMENT

Analysis & code	Python; MATLAB; Excel; shell scripting; statistical analysis; Monte Carlo methods; scientific visualisation.
HPC & systems	ARCHER2; ARC4; Linux; batch schedulers; job arrays; Git/SSH; rsync; reproducible simulation workflows.
Data & geospatial	Microsoft Access; relational tables; NetCDF; CSV; QGIS; GPlates; data validation; structured archives.
Scientific methods	Palaeomagnetism; palaeointensity; Shaw-type, Thellier-type and microwave methods; QPI/SCOPE quality criteria; global database analysis.

RESEARCH PROFILES & CONTACT

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