

Geological Society Journal Highlights



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Journal of the Geological Society



Journal of the Geological Society (JGS)

Editor-In-Chief: Dr Yildirim Dilek

About the Journal

The flagship Journal of the *Geological Society of London* the oldest geological society in the world, *JGS* is a key and established journal for researchers in the geosciences. The Journal publishes topical, innovative and interdisciplinary research with global reach across the full range of Earth and planetary sciences. Papers emphasize the development of an understanding of fundamental geological processes. The Journal features research, review, perspective and discussion articles as well as review focus series and thematic collections, such as "Sulfur in the Earth System", "Fold-and-thrust belts and associated basins: structure, sedimentation, and dynamics" and "Isotopic dating of deformation".

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Open Access

Mars as a time machine to Precambrian Earth

By Mathieu G. A. Lapôtre, Janice L. Bishop, Alessandro Ielpi, Donald R. Lowe, Kirsten L. Siebach, Norman H. Sleep, and Sonia M. Tikoo

As Mars transitioned from an early Earth-like state to the cold desert planet it is today, it preserved a near pristine record of surface environments in a world without plate tectonics and complex life. The records of Mars' Earth-like surfaces have remained largely untouched for billions of years, allowing space exploration to provide critical insights about the early days of our own planet. Here, we first review what Mars has taught us about volcanic, tectonic and metamorphic processes in the absence of discrete plates, drawing comparisons with the terrestrial and venusian records. Then, we summarize advances in understanding its early surface environments, including impact cratering, hydrological, sedimentary and geochemical processes.

Read more on the Lyell Collection www.lyellcollection.org/doi/10.1144/jgs2022-047



Open Access

The Life of Mary Anning, Fossil Collector of Lyme Regis: a Contemporary Biographical Memoir by George Roberts

By Michael A. Taylor and Michael J. Benton

Despite the modern celebrity of the fossil collector Mary Anning (1799–1847) of Lyme Regis and her frequent use as an icon in scientific education and popularization, there are few accounts of her life by her contemporaries. We report here a previously unpublished anonymous manuscript memoir of Anning's life, in the Special Collections of the University of Bristol Library. Evidence from textual analysis and handwriting corroborates its attribution to George Roberts (bap. 1804–60) of Lyme Regis, schoolmaster and historian. He wrote it at some time during 1837–47, perhaps 1839–47, by adapting a passage in his 1834 history of Lyme Regis. It was apparently intended for a new book, but was altered into an obituary after Anning's death.

Read more on the Lyell Collection www.lyellcollection.org/doi/10.1144/jgs2022-053





Quarterly Journal of Engineering Geology and Hydrogeology



Quarterly Journal of Engineering Geology and Hydrogeology (QJEGH)

Editor-In-Chief: Cherith Moses

About the Journal

Quarterly Journal of Engineering Geology and Hydrogeology (QJEGH) was established in 1967 to foster engineering geology research and practice. International in scope, its focus is on geology as applied to civil and environmental engineering and groundwater resource management. Publishing high-quality, authoritative, peer-reviewed, international papers, addressing sustainability, climate change, energy transition, geohazards and geo-resilience, to inform academic and industry practitioners in engineering geology and hydrogeology.

QJEGH publishes research papers, case studies, review articles, technical notes, photographic features and thematic collections, such as the "Hydrogeology of Sandstone" and "Climate change and resilience in Engineering geology and Hydrogeology"

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Open Access

High-resolution 3D geological modelling of heterogeneity in poorly exposed glacial deposits using sedimentary and glaciotectonic architectural element analysis: a case example from Sellafield in west Cumbria, UK

By Nicholas T. Smith, Jonathan W. Merritt, and Emrys R. Phillips

Three-dimensional modelling of superficial geology is challenging, particularly for complex industrial sites such as the Sellafield nuclear site, Cumbria, UK. A lithostratigraphic approach is sufficient to show distribution of key units where only a general understanding of hydrogeology is required. For many sites, however, a much higher-resolution understanding is needed to better characterize heterogeneity and identify potential pathways for contaminant transport within safety case development and remediation planning.

Read more on the Lyell Collection www.lyellcollection.org/doi/10.1144/qjegh2022-022





The value of heat and geothermal waters

By David Banks

Evaluation of proposed geothermal projects often requires a value to be assigned to waterborne geothermal heat or geothermal fluids. A methodology for valuing low-enthalpy warm fluids (<90°C) is presented: the method uses a reference price for sale of waterborne district heating at a relatively high temperature (in this paper, we have assumed 70°C), and then discounts this price by the value of electricity that must be expended in a heat-pump compressor to transfer heat from the source fluid to the target reference level.

Read more on the Lyell Collection www.lyellcollection.org/doi/10.1144/qjegh2022-064



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Geoenergy

Editor-In-Chief: Jonathan Redfern

About the Journal

Published by GSL Publishing House on behalf of the *Geological Society* of London and the European Association of Geoscientists and Engineers (EAGE). Geoenergy focuses on the publication of timely and topical research in subsurface geoscience, critical for this new era of sustainable energy.

The Journal considers articles on the following themes:

- Energy storage: thermal energy storage, compressed air energy storage, hydrogen storage, hydroelectric storage
- Subsurface disposal and storage: carbon capture and storage (CCS), bioenergy with carbon capture and storage (BECCS), radioactive waste storage
- Geothermal energy: exploration, characterization and modelling of geothermal fields
- Hydrogen energy: exploration, production and storage of hydrogen
- Critical minerals and raw materials: minerals for the energy transition
- Sustainability: surveillance and long-term assurance for management

Explore more www.lyellcollection.org/journal/geoenergy



3D reservoir simulation of CO₂ injection in a deep saline aquifer of the Lower Paleozoic Potsdam Sandstone of the St Lawrence Platform, Gentilly Block, Quebec

By Elena Konstantinovskaya, Jose A. Rivero, Valentina Vallega, John Brodylo and Peter Coldham

Increasing demand in carbon dioxide storage volumes to reduce greenhouse gas emissions to net zero by 2050 implies assessment of CO_2 storage capacity, including deep saline aquifers, even in tight sandstone reservoirs. 3D reservoir simulations of supercritical CO_2 injection were carried out in the Lower Paleozoic Potsdam Sandstone of the St Lawrence Platform (Gentilly Block), Quebec to predict safe CO_2 injection rates, evaluate reservoir pressure build-up in the presence of sealing and permeable faults, and estimate the gas injection cumulative.

Read more on the Lyell Collection www.lyellcollection.org/doi/10.1144/geoenergy2022-001



The need for joined-up thinking in critical raw materials research

By Michael H. Stephenson, John Ludden, Jennifer McKinley, Ishwaran Natarajan, Susan Nash, David Leary, Yichuan Shi and Chengshan Wang

Critical raw materials (CRM) will be a cornerstone of the energy transition. CRM were recognised early by the Intergovernmental Panel on Climate Change (IPCC) as a prime part of the mitigation effort for climate change, and as such research into the genesis of key metals, as well as the sustainability of their mining should be a priority. However, research is geopolitically influenced by the security of supply concerns of nations or economic groups of nations such as the EU, Japan, USA and China. Many research networks and programs are aimed at resource security; and where collaboration does exist it is along geopolitical lines, potentially disadvantaging developing countries and their efforts to implement UN sustainable development goals (SDGs).

Read more on the Lyell Collection www.lyellcollection.org/doi/10.1144/geoenergy2023-001 This paper is part of the 'The energy-critical metals for a low carbon transition' collection





Petroleum Geoscience



Petroleum Geoscience (PG)

Editor-In-Chief: Jonathan Redfern

About the Journal

Published by GSL Publishing House on behalf of the *Geological Society of London* and the *European Association of Geoscientists and Engineers (EAGE)*. *Petroleum Geoscience* transcends disciplinary boundaries and publishes a balanced mix of articles that drives the science to enhance sustainable development covering all aspects of the petroleum system. The Journal content reflects the international nature of the research. *PG* welcomes a range of papers on themes that include: exploration, exploitation, appraisal, development and monitoring of sub-surface hydrocarbon resources; enhancing exploration efficiency, lowering technological and environmental risk, and improving hydrocarbon recovery; and transferable knowledge and integration of disciplines in an applied context.

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Open Access

Predicting oil field performance using machine learning programming: a comparative case study from the UK continental shelf

By Ukari Osah and John Howell



Predicting the performance of a subsurface oil field is a large, multivariant problem. Production is controlled and influenced by a wide array of geological and engineering parameters which overlap and interact in ways that are difficult to unravel in a manner that can be predictive. Supervised machine learning is a statistical approach which uses empirical learnings from a training dataset to create models and make predictions about future outcomes.

Read more on the Lyell Collection www.lyellcollection.org/doi/full/10.1144/petgeo2022-071 This paper is part of the 'Digitally enabled geoscience workflows: unlocking the power of our data' collection



3D numerical modelling and simulation of the impact of fault zones on fluid flow in sandstones of the Rio do Peixe Basin, NE Brazil

By Rômulo C. Stohler, Francisco C. C. Nogueira, Claudio L. Mello, and Jorge A. B. Souza

Deformation bands are usually responsible for a reduction in permeability perpendicular to the structure planes of up to three orders of magnitude, while the fault core represent a reduction of up to seven orders of magnitude in cross-fault permeability, imposing large anisotropies to fluid flow. As deformation bands occur distributed along the damage zone, they impact not only the across-fault flow but also the along-fault flow. The fault core is usually represented using fault-transmissibility multipliers (TMs) along the fault planes, using well-established workflows.

Read more on the Lyell Collection www.lyellcollection.org/doi/10.1144/petgeo2022-024





Geochemistry:

Exploration, Environment, Analysis



Geochemistry: Exploration, Environment, Analysis (GEEA)

Editor-In-Chief: Scott Wood

About the Journal

Geochemistry: Exploration, Environment, Analysis (GEEA) is a co-owned journal of the *Geological Society of London* and the *Association of Applied Geochemists (AAG)*.

GEEA welcomes papers that focus on the use of geochemistry in mineral exploration and resource development, the application of geochemistry to environmental issues related to mining and mineral processing, and the development of methods and techniques to geochemically analyze rocks, soils, sediments, waters, and vegetation.

Explore more www.lyellcollection.org/journal/geea



Open Access

Lithogeochemistry in exploration for intrusion-hosted magmatic Ni-Cu-Co deposits

By Stephen J. Barnes

Magmatic Ni-Cu-Co-platinum group element deposits are notoriously difficult exploration targets owing to a lack of alteration haloes or other extended distal footprints. Success requires prediction of prospective terranes, followed by identification of suitable host intrusions and deposition sites within those intrusions. At the regional scale, potential ore-hosting magmas tend to have lithophile trace element trends falling on mixing lines between primitive or slightly depleted source mantle and typical upper continental crust, with several significant exceptions.

Read more on the Lyell Collection www.lyellcollection.org/doi/10.1144/geochem2022-025

Open Access

Geochemical and mineralogical soil survey of the conterminous USA: a project retrospective

By David B. Smith

From 2007 to 2010, the United States Geological Survey (USGS) conducted a low-density (one site per 1600 km2), geochemical and mineralogical soil survey of the conterminous USA (c. 8 × 106 km2). This project was initiated to address the lack of a national soil geochemical database that was a critical need for state and federal environmental agencies, public health specialists and those engaged in risk assessment of contaminated land. Sampling and analytical protocols were developed in consultation with stakeholders at a 2003 workshop, and pilot studies were carried out from 2004 to 2007. Sampling began in 2007 and concluded in 2010. Chemical and mineralogical analyses were completed in 2013, and the datasets were released to the public that same year.

Read more on the Lyell Collection www.lyellcollection.org/doi/10.1144/geochem2022-031





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Earth Science, Systems and Society (EScubed)

Editor-In-Chief: Kathryn Goodenough

About the Journal

Earth Science, Systems and Society (EScubed) is a new, fully gold open access journal, owned and published by the Geological Society of London using the systems and services of Frontiers Media. ES^3 is dedicated to the publication of timely and topical research of high importance across the breadth of the geosciences, with a special focus on cross-disciplinary research that showcases the relevance of geoscience to sustainability in society.

The Journal's mission focuses on encouraging inclusivity and diversity in publishing, engaging directly with early career researchers, embodying principles of openness and transparency in science, and presenting a forward-looking perspective on geoscience and related disciplines.

As a not-for-profit endeavour from the Geological Society of London, any surplus is reinvested in discounts and waivers to increase access for those without funding.

Explore more www.escubed.org/journals/earth-science-systems-and-society

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Open Access

Suyya's Flood: Numerical Models of Kashmir's Medieval Megaflood and Ancient Lake Kerewa Drainage Events

By Muntaha Urooj, Roger Bilham, Bikram S. Bali and S. Imran Ahmed

In the mid-ninth century, an earthquake triggered a landslide that blocked the narrow gorge of the Jhelum River where it exits the Kashmir Valley. The landslide impounded a lake that extended ≈ 100 km along the floor of the valley, implying an impounded volume of ≤ 21 km3, flooding the capital, Srinagar, and much agricultural land. An engineered breach of the landslide was contrived by a Medieval engineer resulting in the catastrophic release of flood waters. Using reasonable assumptions we calculate the probable minimum drainage time of this Medieval flood (<4 days) and maximum downstream surge velocities (≈ 12 m/s).

Read more on Escubed's website www.escubed.org/articles/10.3389/esss.2021.10040/full



Open Access

Geoscience Solutions for Sustainable Offshore Wind Development

By A. P. M. Velenturf, A. R. Emery, D. M. Hodgson, N. L. M. Barlow, A. M. Mohtaj Khorasani, J. Van Alstine, E. L. Peterson, S. Piazolo and M. Thorp

Low carbon energy infrastructure, such as wind and solar farms, are crucial for reducing greenhouse gas emissions and limiting global temperature rise to 1.5°C. During 2020, 5.2 GW of offshore wind capacity went into operation worldwide, taking the total operational capacity of global offshore wind to 32.5 GW from 162 offshore windfarms, and over 200 GW of new capacity is planned by 2030. To meet netzero targets, growth of offshore wind generation is expected, which raises new challenges, including integration of offshore wind into the natural environment and the wider energy system, throughout the wind farm lifecycle.

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Read more on Escubed's website www.escubed.org/articles/10.3389/esss.2021.10042/full



Systems and Society

The Geological Society's Fully Open Access journal www.escubed.org

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Scottish Journal of GEOLOGY



Volume 58, Part 2, pages 89–146 2022

Published by the Geological Society Publishing House for the Geological Societies of Edinburgh and Glasgow

Scottish Journal of Geology (SJG)

Editor-In-Chief: Colin Braithwaite

About the Journal

Joint publication of the *Geological Society of Glasgow* and the *Edinburgh Geological Society*. *SJG* publishes papers on all aspects of the geology of Scotland and its adjacent areas, including the North Sea and North Atlantic margins. The geology of Scotland is an important natural laboratory for all branches of Earth science; many studies in geology have been carried out in Scotland and *SJG* provides a forum for their publication. Traditionally, the Journal has acted as the focus for papers on all aspects of Scottish geology and its contiguous areas, including the surrounding seas. The publication policy has always been outward looking, with the Editors encouraging review papers and papers on broader aspects of the Earth sciences that cannot be discussed solely in terms of Scottish geology. The Journal fully deserves its high reputation worldwide and intends to maintain its status in the front rank of publications in the Earth sciences.

Explore more www.lyellcollection.org/journal/sjg



Some geomorphological implications of recent archaeological investigations on river terraces of the River Dee, Aberdeenshire

By Richard Tipping, Tim C. Kinnaird, Kirsty Dingwall, and Irvine Ross

Excavation and survey of archaeological sites have in recent years generated new data on the chronology of river terraces on the River Dee between Banchory and Peterculter in Aberdeenshire. Terrace fragments have been mapped and correlated on altitudinal grounds, for the first time. Five terrace surfaces are identified and named, refining the terminology of the British Geological Survey. Three are distinct surfaces within the Lochton Sand and Gravel Formation. The relation between them, regional deglaciation and the formation of the Late Devensian Loch of Park, north of Crathes, suggests some time separated their development.

Read more on the Lyell Collection www.lyellcollection.org/doi/full/10.1144/sjg2022-010



Open Access

Investigation of coastal environmental change at Ruddons Point, Fife, SE Scotland

By Sarah Louise Boyd, Tim C. Kinnaird, Aayush Srivastava, John E. Whittaker, and C. Richard Bates

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Ruddons Point, on the Firth of Forth coastline, Scotland, is a laterally extensive terrace of glacial and marine sediment deposits raised above current sea-level, situated near to Kincraig Point, a key site that records a series of stepped erosional platforms carved into the local bedrock, interpreted as post Last Glacial Maximum palaeoshorelines. The deposits at Ruddons Point continue inland, with exposures of the raised sands and gravels cut by the local river, the Cocklemill Burn. The site provides an opportunity to examine the depositional history through the Late Devensian and Holocene.

Read more on the Lyell Collection www.lyellcollection.org/doi/10.1144/sjg2022-005

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Proceedings of the YORKSHIRE GEOLOGICAL SOCIETY

Regional Geology – Global Impact





Published for the Yorkshire Geological Societ by the Geological Society of London

Proceedings of the Yorkshire Geological Society (PYGS)

Editor-In-Chief: Paul Wignall

About the Journal

The Proceedings of the Yorkshire Geological Society (PYGS) has been published without a break since 1839. It is one of the leading journals of British geology. Each year two parts are issued containing original research papers on all aspects of geology. The Journal aims to make local observations, records and datasets available to inform understanding of geological processes and history more widely, both within and across disciplines. Emphasis is on publication of research and reviews relating to northern and eastern England and its offshore area, but not exclusively.

Explore more www.lyellcollection.org/journal/pygs

Open Access

A new giant theropod dinosaur track from the Middle Jurassic of the Cleveland Basin, Yorkshire, UK

By John G. Hudson, Mike Romano, Dean R. Lomax, Rob Taylor, and Marie Woods

A new specimen of a rare large theropod dinosaur print of Middle Jurassic age is described from the Long Nab Member of the Scalby Formation, Cleveland Basin, Yorkshire. This is only the sixth specimen of this type recorded from the Cleveland Basin since they were first discovered in 1934. The present specimen is included in the same, but slightly modified morphotype Bxviii as some of the previous ones, since it shows additional features including an elongated metapodium. The specimen is assigned to the ichnogenus Megalosauripus, and was possibly made by a Megalosaurus-like theropod. The elongated metapodium may be the result of resting or crouching behaviour.

Read more on the Lyell Collection www.lyellcollection.org/doi/10.1144/pygs2022-008



Open Access

The Carboniferous Langness Conglomerate Formation, Isle of Man; an alluvial fan rift-phase deposit

By Peter Strogen

Re-examination of the Langness Conglomerate Formation (LCF) on the coast near Dreswick Harbour, Isle of Man, has established that it is over 65 m thick, twice previous estimates. It formed as a small streamdominated fan deposit during syndepositional faulting which controlled thickness and facies variations. The sub-Carboniferous surface shows considerable relief, perhaps as much as 10 m and is intricately brecciated and channelled just beneath the base of the conglomerate indicating a pluvial climate even prior to deposition of the LCF. Palaeocurrent data shows that sediment was derived from the NNW. Low in the LCF the sediment is all local in origin, but more exotic material is present higher up.

Read more on the Lyell Collection www.lyellcollection.org/doi/10.1144/pygs2022-002



The Lyell Collection

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About the *Geological Society*

The *Geological Society of London* was founded in 1807 and is the UK national society for geosciences. It is a global leader in Earth science publishing, dedicated to providing a high-quality service throughout the world. The *Geological Society of London* is a not-for-profit organisation, and a registered charity (no. 210161). The Society aims to be an inclusive and thriving Earth science community advancing knowledge, addressing global challenges, and inspiring future generations.

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The *Geological Society of London* offers authors choice, flexibility and a personal service from a dedicated in-house team and expert editorial collaborators. The Society is committed to publishing high-quality, peer-reviewed Earth science literature, available for consumption around the world. *Geological Society of London* members qualify for discounts on Open Access Article Processing Charges (APC). APCs are waived for eligible authors at institutions that have signed a Transformative Open Access Read and Publish agreement. A list of qualifying institutions appears on our website. Find out more about Open Access at **www.geolsoc.org.uk/open-access**





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Journal of the Geological Society

For any queries or to express interest in contributing to a thematic collection, please contact us: jgs@geolsoc.org.uk



Chemical Evolution of the Mid-Paleozoic Earth System and Biotic Response

The mid-Paleozoic was a critical interval in the development of Earth's environment and habitability.

www.lyellcollection.org/topic/collections/chemical-evolution-of-the-midpaleozoic-earth-system



Emerging knowledge on the tectonics of the South China Sea

The South China Sea is one of the largest marginal seas in the Western Pacific region and developed as a result of the Cenozoic lithospheric stretching of the southeastern edge of the Eurasian Plate.

www.lyellcollection.org/topic/collections/south-china-sea

Geoenergy

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Hydrogen as a future energy source – exploration, storage, monitoring

Hydrogen has been identified as a clean substitute for carbon-based fuel, as it does not emit CO_2 when releasing its energy.

www.lyellcollection.org/content/hydrogen



The Earth as a thermal battery: future directions in subsurface thermal energy storage systems

Subsurface reservoirs, both shallow aquifers and deeper reservoirs, hold the potential to be part of large scale (GWth scale) thermal energy storage systems. These systems may store thermal energy for daily or seasonal withdrawal.

www.lyellcollection.org/content/thermal-energy

Quarterly Journal of Engineering Geology and Hydrogeology

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The Engineering and hydrogeological aspects of renewable, alternative and novel energy generation, storage and supply Collection

This collection is encouraging submissions that deal with the role of engineering geology and/or hydrogeology in the energy transition.

www.lyellcollection.org/content/novel-energy



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Petroleum Geoscience and Geoenergy

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Digitally enabled geoscience workflows: unlocking the power of our data *Petroleum Geoscience* and *Geoenergy* are calling for papers to be submitted to a joint collection on digitally enabled geoscience workflows.

Data science – including automation, data analytics, machine learning and processing of extremely large datasets – is now an important part of everyday life and is transforming the way scientists conduct research and develop new technologies, enabling specific tasks to be implemented with minimal human supervision.

www.lyellcollection.org/topic/collections/digitally-enabled-geoscience-workflows

Geochemistry: Exploration, Environment, Analysis

For any queries or to express interest in contributing to this thematic collection, please contact us: geea@geolsoc.org.uk



Geochemical processes related to mined, milled, or natural metal deposits in a rapidly changing global environment

Alteration to the rate or intensity of natural weathering of metal ore deposits has the potential to negatively affect Earth's surface environments.

www.lyellcollection.org/topic/collections/geochemical-processes-related-tomined-milled-or-natural-metal-deposits

Earth Science, Systems and Society

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Geoscience for a Sustainable Society

This Special Issue of *Earth Science, Systems and Society* addresses the role of geoscience in enabling, supporting or hindering the transition to a sustainable society across a range of temporal and spatial scales.

www.escubed.org/research-topics/7/geoscience-for-a-sustainable-society



Inclusion and Diversity in Earth and Environmental Sciences

This Special Issue of *Earth Science, Systems and Society* addresses inclusion, diversity, equality and social justice within Earth Sciences.

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