

Join us at the University of Exeter, Exeter, Devon, UK on the 22nd and 23rd of May 2024 for:

Artificial Intelligence for geological modelling and mapping



Scan for details and
location information

A timely conference to help shape the future of geological mapping technology.
Now fully booked with 170+ international attendees from all sectors. Waitlist available. **Key speakers:**

Prof Florian Wellmann - Chair of Computational Geoscience at RWTH Aachen University, **Germany**

Dr Mark Lindsay - Science Leader in 4D Minerals at CSIRO, **Australia**

Michael Hillier – 3D modeller at Geological Survey of **Canada**

Dr Kristine Asch - Head of Geological Information Systems and Maps, BGR, **Germany**

Prof Guillaume Caumon - Professor of geomodelling at Nancy School of Geology and GeoRessources, **France**

The conference will take place in the University of Exeter's XFi building in Exeter, Devon, UK



University
of Exeter

Institute for Data
Science and Artificial
Intelligence



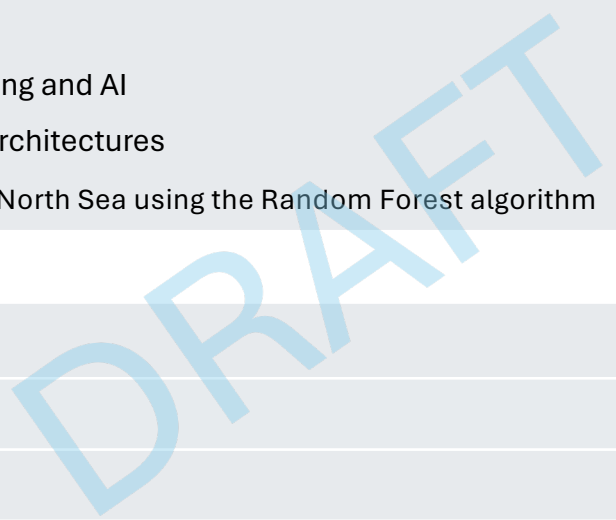
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Engineering and
Physical Sciences
Research Council

09:00 – 09:30	Registration and refreshments (+ put up posters if you have them)
09:30 – 09:40	Welcome address
09:40 – 10:30	Introductory session – where we stand, scene setter
09:40 – 10:10	• Kristine Asch , BGR, Germany – Geology without frontiers: The pioneer project of the first digital International Geological Map of Europe (IGME 5000)
10:10 – 10:30	• Charlie Kirkwood, University of Exeter, UK – AI for geological mapping: incremental progress or revolutionary shift?
10:30 – 11:00	Refreshments break
11:00 – 12:30	Session 1 – from observations to geological knowledge
11:00 – 11:30	• Mark Lindsay , CSIRO, Australia – The map is not the territory: Geosciences in the AI-era
11:30 – 11:50	• Paul Cleverly, Robert Gordon University, UK – How can Natural Language Processing (NLP) support Geological Modelling and Mapping?
11:50 – 12:10	• Tom Buckle, University of Exeter, UK – Improving Lithology Classification from pXRF using Multiscale Interval Features
12:10 – 12:30	• Emma Mailey, AtkinsRéalis, UK – Engineering geology in machine learning applications for geohazard identification
12:30 – 13:30	Lunch break
13:30 – 14:40	Session 2 – addressing uncertainty in geological modelling
13:30 – 14:00	• Guillaume Caumon , Université de Lorraine, France – On automation and uncertainty management in 3D geological interpretation and modelling: from geometry to graphs
14:00 – 14:20	• Vasily Demyanov, Herriot-Watt University, UK – Uncertainty in AI based reservoir modelling workflows
14:20 – 14:40	• Thomas Jerome, GMDK Inc, Canada – AI in geomodelling requires a strong, active human supervision. Learning from geostatistically-driven geomodelling from well data
14:40 – 15:00	Poster lightning talks – poster presenters introduce themselves and their research to the conference audience
15:00 – 15:30	Refreshments break
15:30 – 17:00	Poster session & networking (with a drink at 4)
17:00	Break for evening (suggest going to Impy?)
18:30 +	Conference dinner at Reed Hall – you'll need to book your place for this , a booking link will be shared on the 23 rd of April (We anticipate cost will be £30 per person)

09:00 – 09:30	Morning refreshments
09:30 – 11:00	Session 3 – probabilistic geomodelling and machine learning
09:30 – 10:00	• Florian Wellmann , RWTH Aachen University, Germany – Probabilistic learning with geological models
10:00 – 10:20	• Charlie Garayt, École des Mines de Paris + Geovariances, France – Simulating horizontally infinite 2D geomodels with GANs
10:20 – 10:40	• Mahsa Paknezhad, Datarock, Australia – Enhancing geological mapping through latent diffusion inpainting of surface infrastructure artifacts in remote sensing imagery
10:40 – 11:00	• Fabian Leal, University of Western Australia, Australia – Interpreting Deepkriging for Spatial Interpolation in Geostatistics
11:00 - 11:30	Refreshments break
11:30 – 12:30	Session 4.1 – AI in geological survey organisations, part 1
11:30 – 12:00	• Michael Hillier , Geological Survey of Canada, Canada – GeoINR: Advancing 3D Implicit geological modelling with implicit neural networks
12:00 – 12:20	• Suzanne Atkins, TNO, Netherlands – AI methods for offshore windfarm geotechnical analysis: translating seismic lines into geotechnical cross sections
12:30 – 13:30	Lunch break
13:30 – 14:30	Session 4.2 – AI in geological survey organisations, part 2
13:30 – 13:50	• Matthew Paice, British Geological Survey, UK – Updating the UK superficial drift thickness model using machine learning and AI
13:50 – 14:10	• Daniel Coutts, Geological Survey of Canada, Canada – Mapping of geologic outcrop descriptions with deep learning architectures
14:10 – 14:30	• Willem Dabekaussen, TNO, Netherlands – Probabilistic spatial modelling of seabed-sediment composition in the Dutch North Sea using the Random Forest algorithm
14:30 – 15:00	Refreshments break
15:00 – 16:00	Group discussion session – breakout into discussion groups to discuss key topics
16:00 – 16:30	Group discussion feedback – each group to report back on findings / thoughts
16:30 – 16:40	Closing address
16:40	End / finish / celebrate / relax! Until next time...



POSTERS

Antoine Heude, Justine Elias – Envisol.fr, France

Variography and geostatistical tools for the QAQC of AI generated quantification of pollutants in contaminated lands

Charlie Moon – Moon Geology, Robin Shail – University of Exeter, UK

Detailed lithological mapping from geochemistry: an example from SW England using automated catchment generation and integration of different geochemical media

Trais Kliphuis, Velimir Vesselinov – Envitrace, USA

AI/ML for characterization, mapping, and prediction of groundwater contamination plumes

Peter Webb – Getech Group, UK

Modelling surface heat flow for resource exploration in the energy transition

Angelica Capozzoli – Università degli Studi di Napoli Federico II, Italy

Automatic identification of areas of archaeological interest using Unsupervised Machine Learning algorithms applied to electromagnetic data

Pichaya Zerme – Geological Survey of Sweden, Sweden

SeaMoreEco – Seamless monitoring, restoration, and conservation in the northern Gulf of Bothnia

Maurizio Ambrosino – University of Sannio, Italy

Using compositional indicators and machine learning for mapping geochemical domains

Sebastián Garzón – Utrecht University, Netherlands

Machine-learning based automation of borehole lithostratigraphic interpretation

Amandine Fratani – RING, GeoRessources / ENSG, Universite de Lorraine / CNRS, Nancy, France

Using Random Forest to learn pairwise associations of fault traces

Charlie Kirkwood – University of Exeter, UK

Geological knowledge acquisition as a computational optimisation problem

Velimir Vesselinov, Trais Kliphuis – Envitrace, USA

Mapping geothermal resources using AI/ML

DISCUSSION TOPICS FOR BREAKOUT GROUPS (open to other suggestions, please get in touch with idsai@exeter.ac.uk)

Are AI/ML/statistical methods really the sensible way forward?

Arguments for and against the development of AI/ML/statistical methods for geological modelling and mapping, versus traditional methods. Could it be that we're in a hype bubble with no utility?

Developing the technology

What are the routes to progressing the technical aspects of geological modelling and mapping in the age of artificial intelligence? E.g. algorithms, models, inference methods, data acquisition and ingestion

Identifying specific applications

Where can AI approaches to geological modelling and mapping have greatest impact, and at what timescales? Are there low-hanging fruit along the way? E.g. for consideration; **critical minerals**, geothermal, carbon storage

Shifting culture

The roots of geological modelling and mapping are not in AI methods. How can the geological community best move forward to (if appropriate) embrace AI methodologies for the benefit of the science?

Equality, diversity, and inclusion

How can we ensure that the community around artificial intelligence for geological modelling and mapping is as egalitarian, diverse, and inclusive as possible? (and help to avoid 'AI geology' being a splinter group).

Skills for the future

What skills do the geologists of the future need to have? How can we make sure that we're training the next generation to have the skills that they'll need?

Funding sources & collaboration opportunities

What funding opportunities are out there to support development of AI for geological modelling and mapping? Can we work together to access these, or work together to make more funding opportunities available?

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