North Sea Transition Authority

UKCS Seismicity monitoring

MMV Technology Showcase

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UK Seismicity & the case for monitoring

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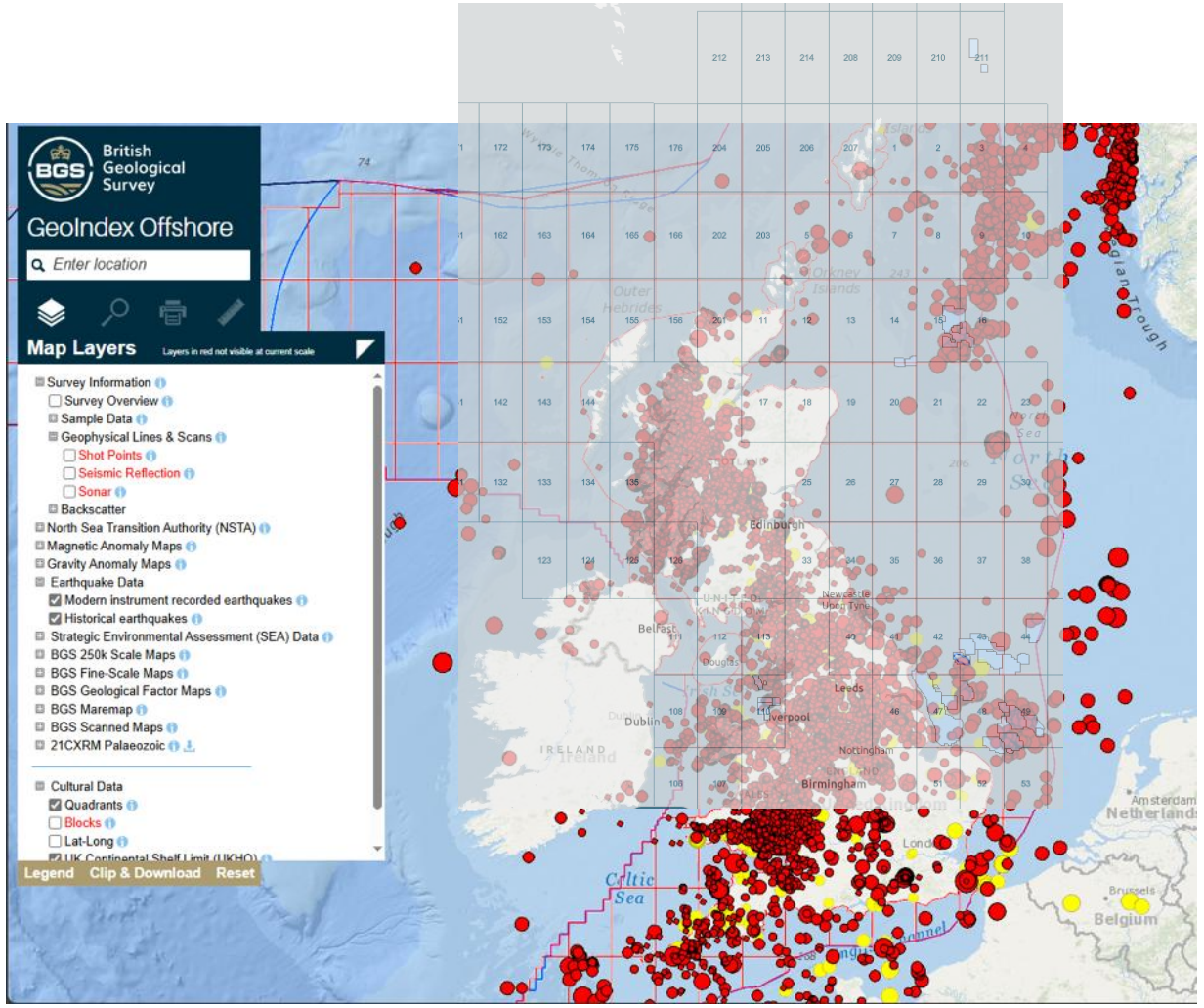
- Seismic events routinely recorded onshore and offshore – recognition that natural seismicity occurs
- Frequency and magnitude vary by area
- Data recorded and published via BGS' GeoIndex
- Proposed and permitted carbon stores lie offshore with variation in distance to population centres
- Several broad reasons for monitoring (discuss…)
  - Risk of induced seismicity via injection – feeding into CRA, and store integrity
  - Risk of natural seismicity causing containment issues
  - Stakeholder management
  - Public perception



https://globalnews.ca/news/11813198/industry-related-earthquakes-strike-north-of-edmonton/

https://www.bgs.ac.uk/news/new-hazard-maps-set-to-help-safeguard-uk-offshore-energy-industry/

NSTA role

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- The NSTA takes a risk-based approach to monitoring of carbon stores – our key test is clear, and the Storage Regulations set out the aims of monitoring
- The NSTA convened a workshop in March 2025 with all UKCS licensees invited, and brought together the BGS, Oxford, and Bristol universities
- Aimed to discuss the issue, and propose a workgroup towards developing a common industry approach
- Following a number of engagements and discussions, the COMPaSS project was developed…

Paragraph 2(2) of Schedule 2 of the Storage Regulations…

- Monitoring is required to:
  - **Compare** the actual & modelled behaviour of the injected CO_2
  - Detect **significant irregularities**
  - Detect **migration** of CO_2
  - Detect **leakage** of CO_2
  - Detect any **adverse effects** on the environment, and in particular on:
    - drinking water
    - human populations
    - users of the surrounding biosphere
  - **Assess** effectiveness of any corrective measures
  - **Update** the Containment Risk Assessment

The problem

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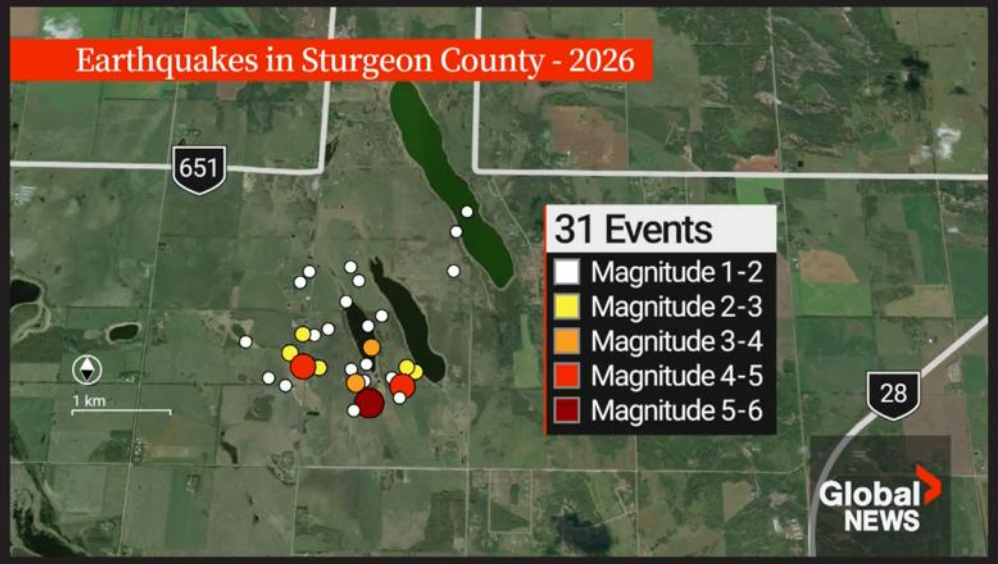
Global NEWS Watch World Canada Local Politics Money Health Entertainment L

ENVIRONMENT

String of industry-related earthquakes strike north of Edmonton

By Jasmine King • Global News
Posted April 22, 2026 9:00 pm · Updated April 23, 2026 1:34 am · **3 min read**



WATCH: People living north of Edmonton say over the past three weeks, they've felt their houses move and the ground shake due to numerous earthquakes. Experts say it's happening more often in that area, and they have a pretty good idea why. Jasmine King reports – Apr 22, 2026

-A A+

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The problem - UKCS

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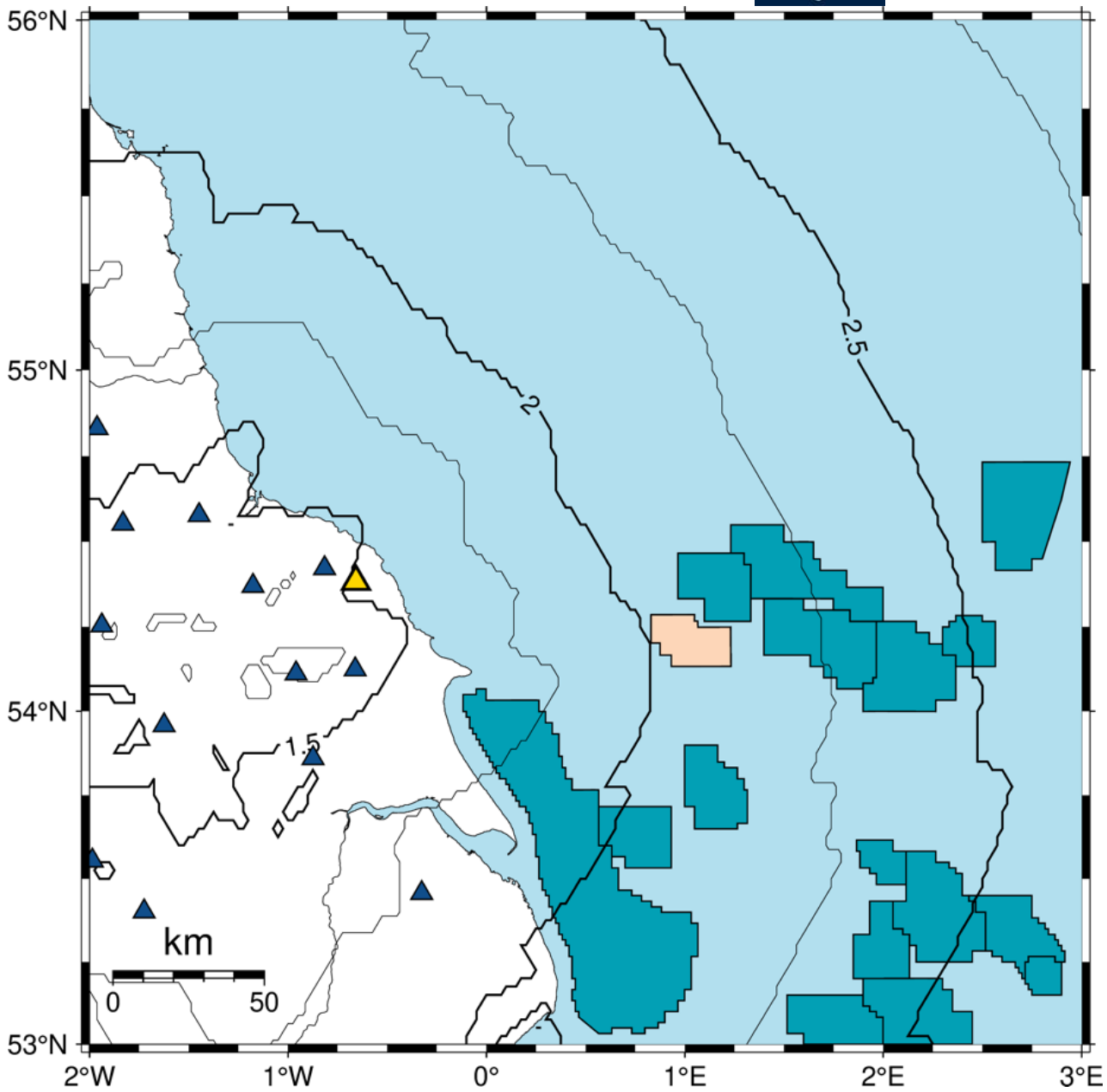

Kettlety, Asplet, Tarasewicz, EAGE 2025

The problem - UKCS

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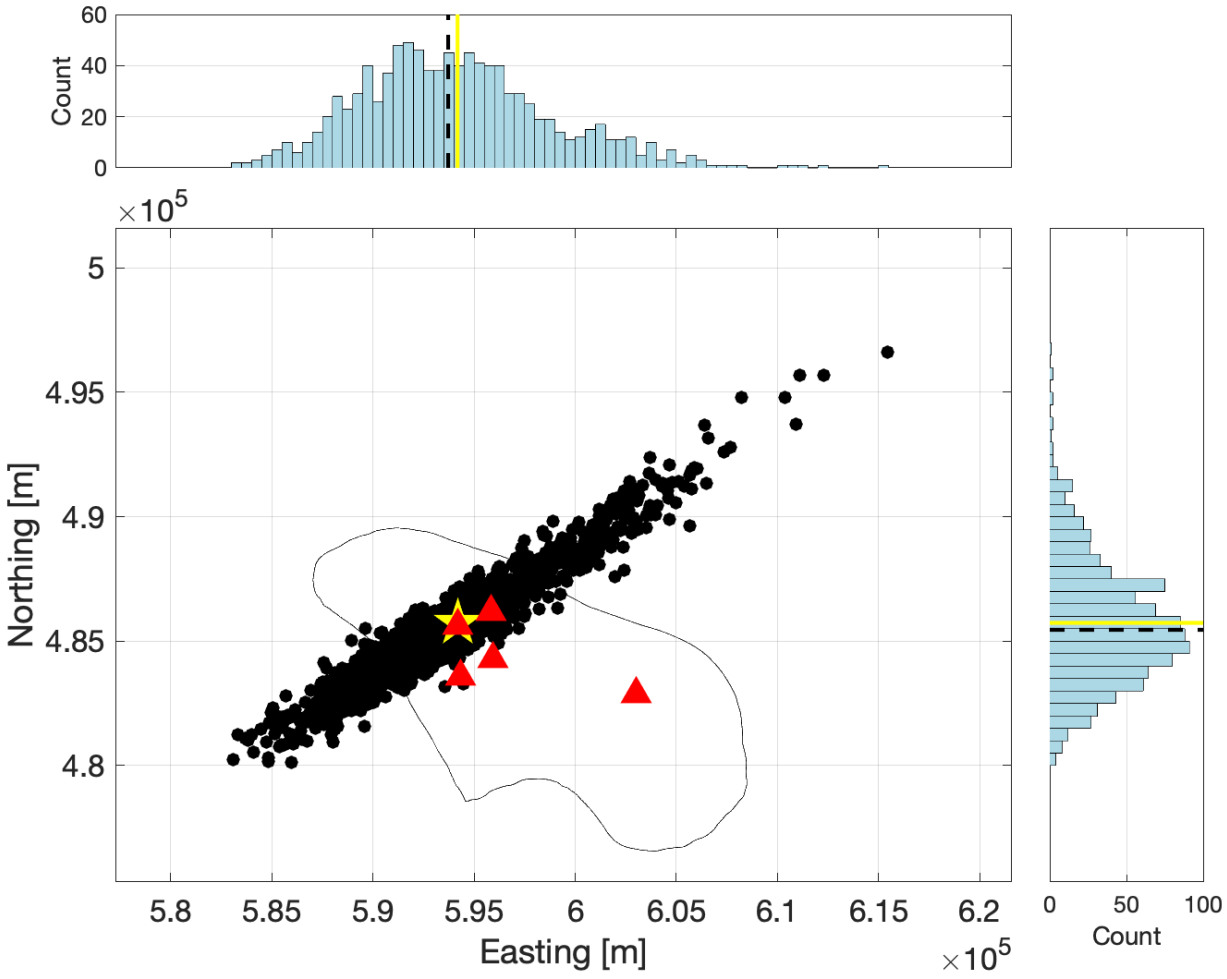

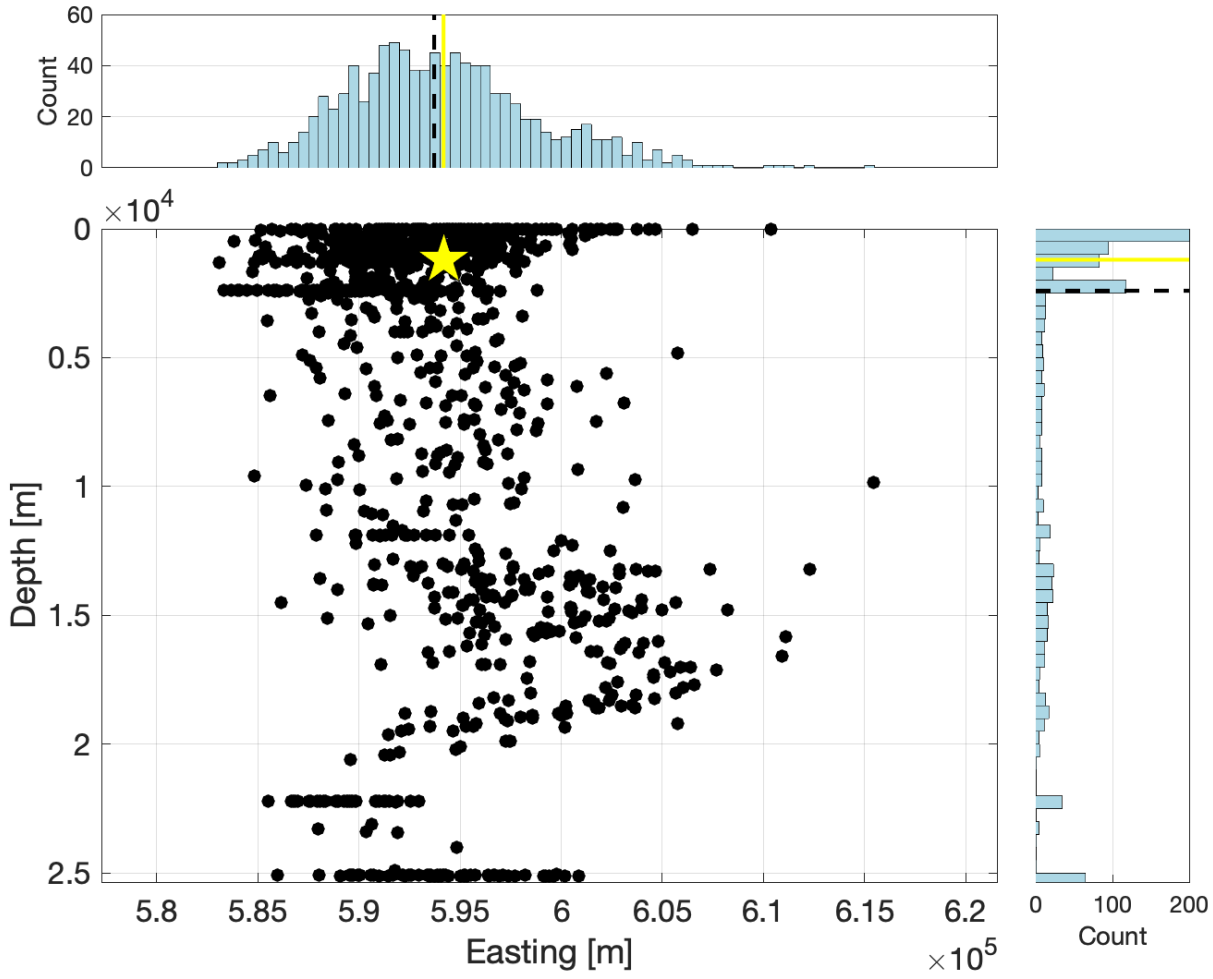

Kettlety, Asplet, Tarasewicz,
EAGE 2025

Goals for earthquake monitoring

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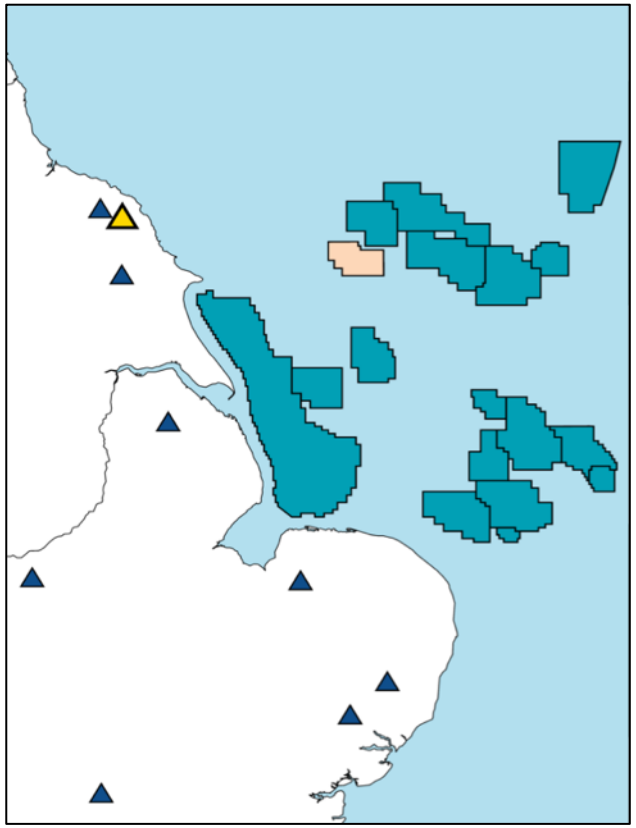

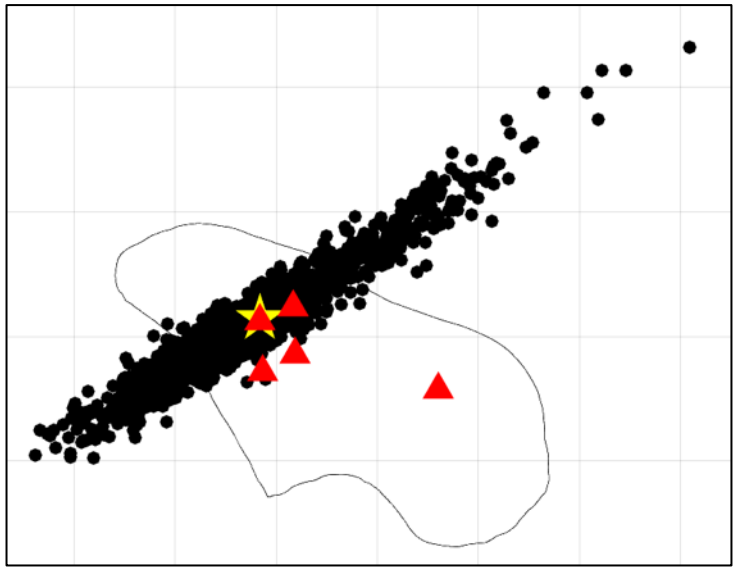

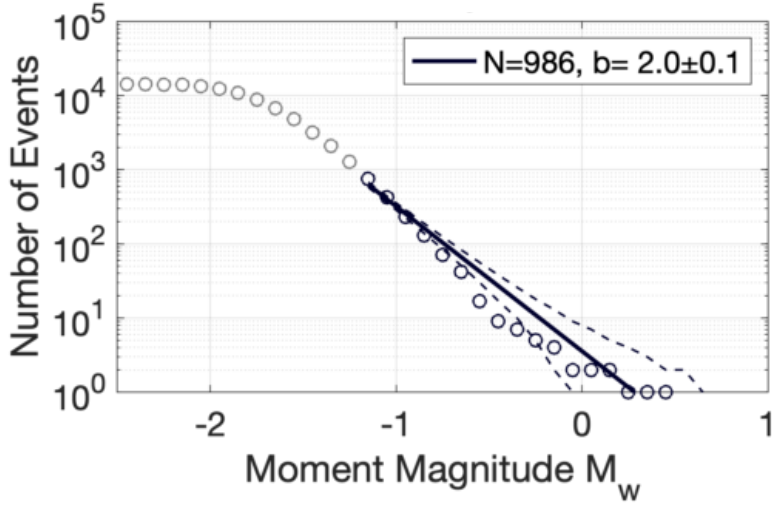

- Event attribution
- Fault localisation
- Sequence properties

Long term goal

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Funding (public & private?)

Integrated data streams

Offshore monitoring system

Fulfilling monitoring requirements

Reporting

Interpretation

Research and development

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Proposed R&D project: COMPaSS – CO_2 storage Monitoring development for Passive Seismic Systems

British Geological Survey

University of BRISTOL

Research and development

LONG-TERM GOAL

Elevate UK offshore passive seismic monitoring capability to support safe, responsible and transparent CO_2 storage operations.

Research and development

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Elevate UK offshore passive seismic monitoring capability to support safe, responsible and transparent CO_2 storage operations.

WP1 Monitoring System Development

1.1 Hardware deployment and maintenance

Deploy and maintain offshore seismic sensors and supporting infrastructure.

1.2 Software development

Develop and integrate acquisition, processing and data management software.

1.3 Reporting

Deliver monitoring products, alerts and reports to stakeholders.

Deliverables D1.1 – D1.3

Research and development

British Geological Survey | University of Bristol | North Sea Transition Authority

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WP2 Novel Data Integration

2.1 DAS and OBS processing

Process distributed acoustic sensing (DAS) and ocean bottom seismometer (OBS) data to detect and characterise seismic events.

2.2 Array processing

Develop and apply advanced array processing to improve detection and location performance.

Deliverables D2.1 – D2.2

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WP3 Network Design Modelling

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Develop modelling tools to simulate seismic detection, location and attribution performance.

3.2 Optimisation
Optimise sensor configurations and network designs to maximise monitoring effectiveness.

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INTEGRATED OFFSHORE MONITORING CAPABILITY

- Lower detection thresholds
- Improved event location & attribution
- Integration of DAS, OBS and arrays
- Independent, high-quality monitoring framework

DELIVERING VALUE TO STAKEHOLDERS

OPERATORS
Support operational decision-making, compliance and risk management.

REGULATORS
Provide robust evidence for regulation, risk assessment and assurance.

PUBLIC & COMMUNITIES
Enhance transparency, build trust and demonstrate stewardship.