The importance of an effective and adequate baseline for shale gas: the UK experience

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Overview

- Project background
- Hydrogeological and environmental setting
- Overview of initial results
- Some surprises and finding out why

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Rationale

- **<u>Independent</u>** integrated monitoring programme:
  - Water (ground and surface), air, seismicity, ground motion, soil gas and radon
- Provide high quality (spatial and temporal) data and information to:
  - Inform public, industry, regulators of environmental baselines and their natural variability
  - Assist in shaping regulatory monitoring and good practice
  - Improve understanding of sub-surface in the context of shale gas (avoid issues encountered elsewhere)
  - Test new technology/sensors
  - Support research and innovation

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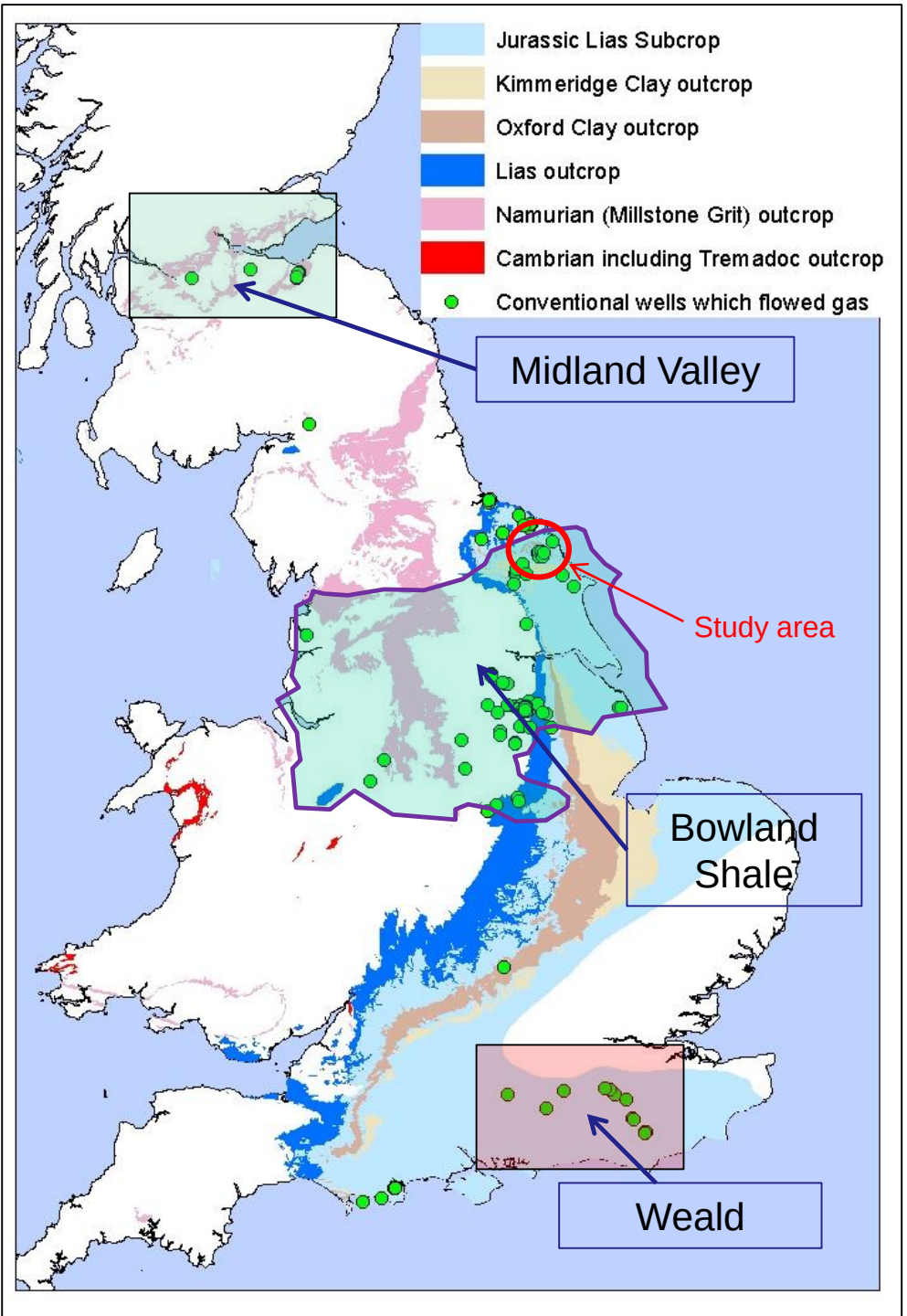


Shale gas/oil in the UK

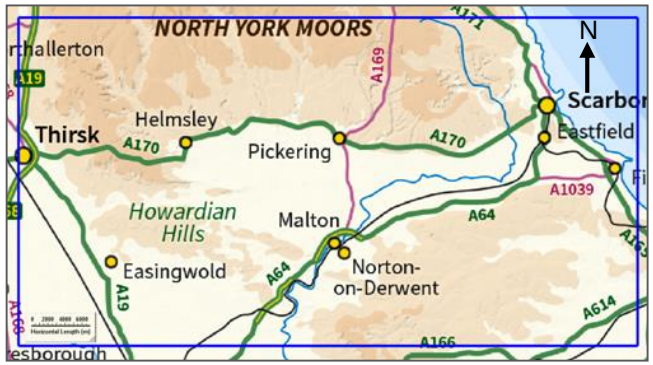
- Carboniferous: N. Britain and Ireland
- Jurassic: Wessex Basin and The Weald
- Lower Palaeozoic: Wales
- Geology different to US

- Two planning applications for hydraulic fracturing:
  - Lancashire
  - N. Yorkshire

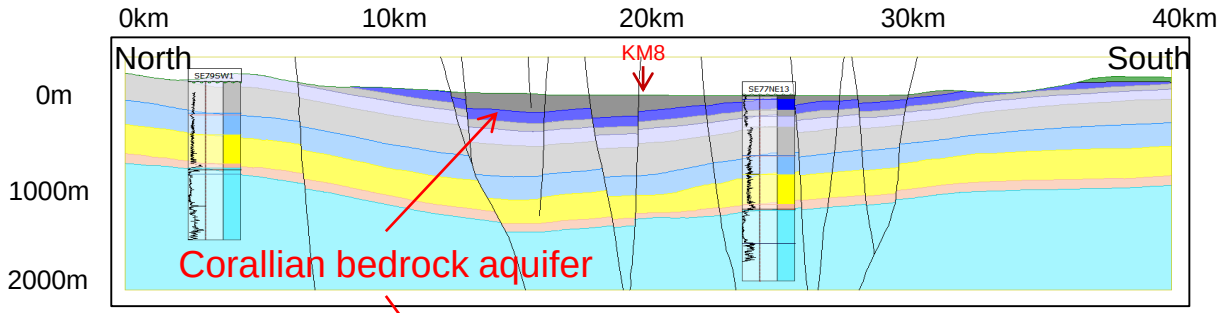
Geology

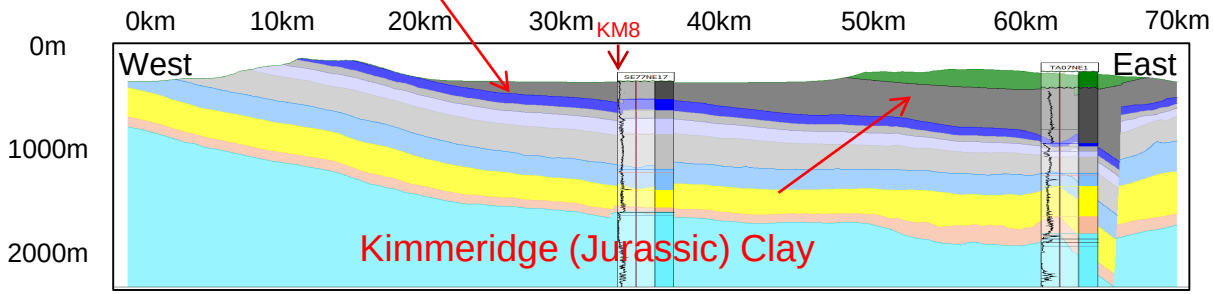
(A) Bedrock

(B) Superficial



A





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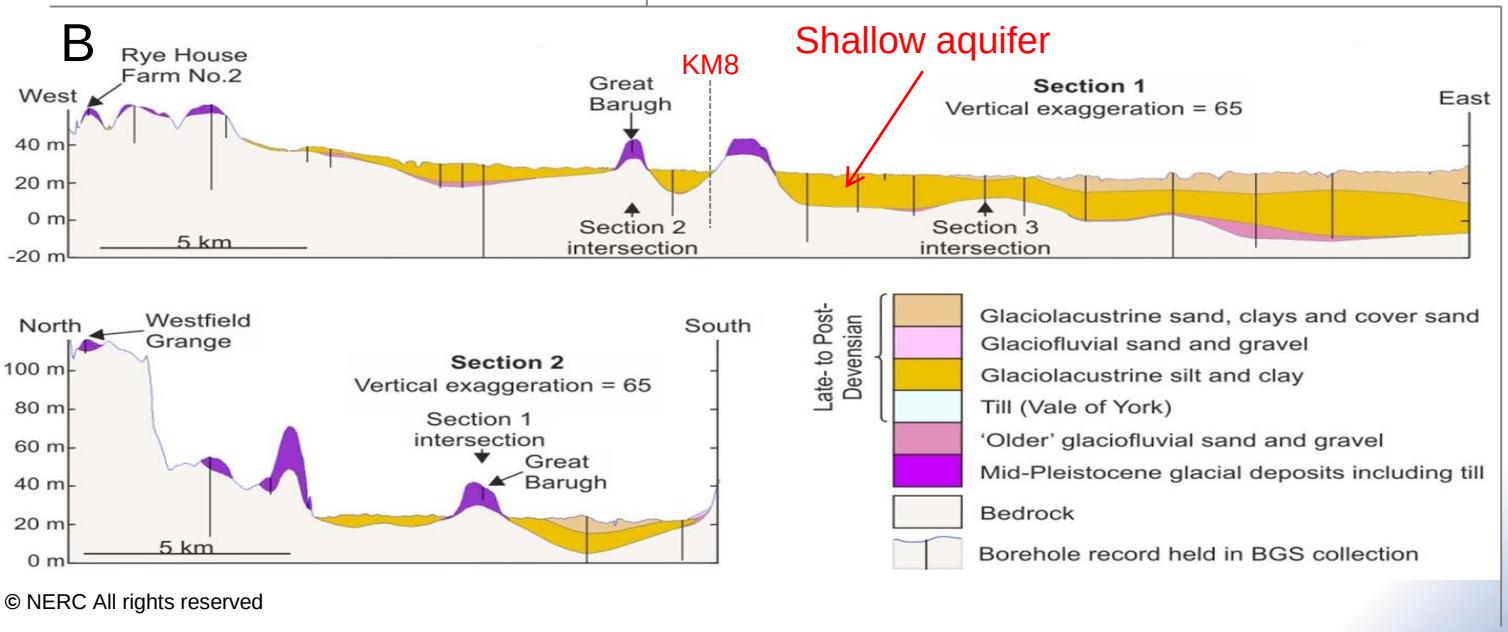

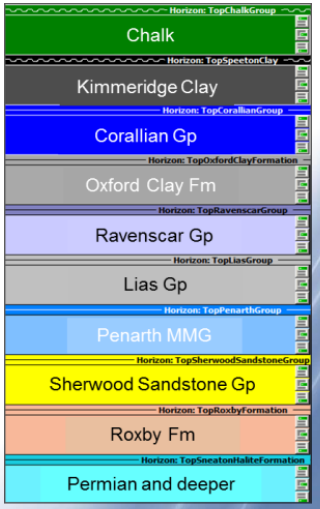

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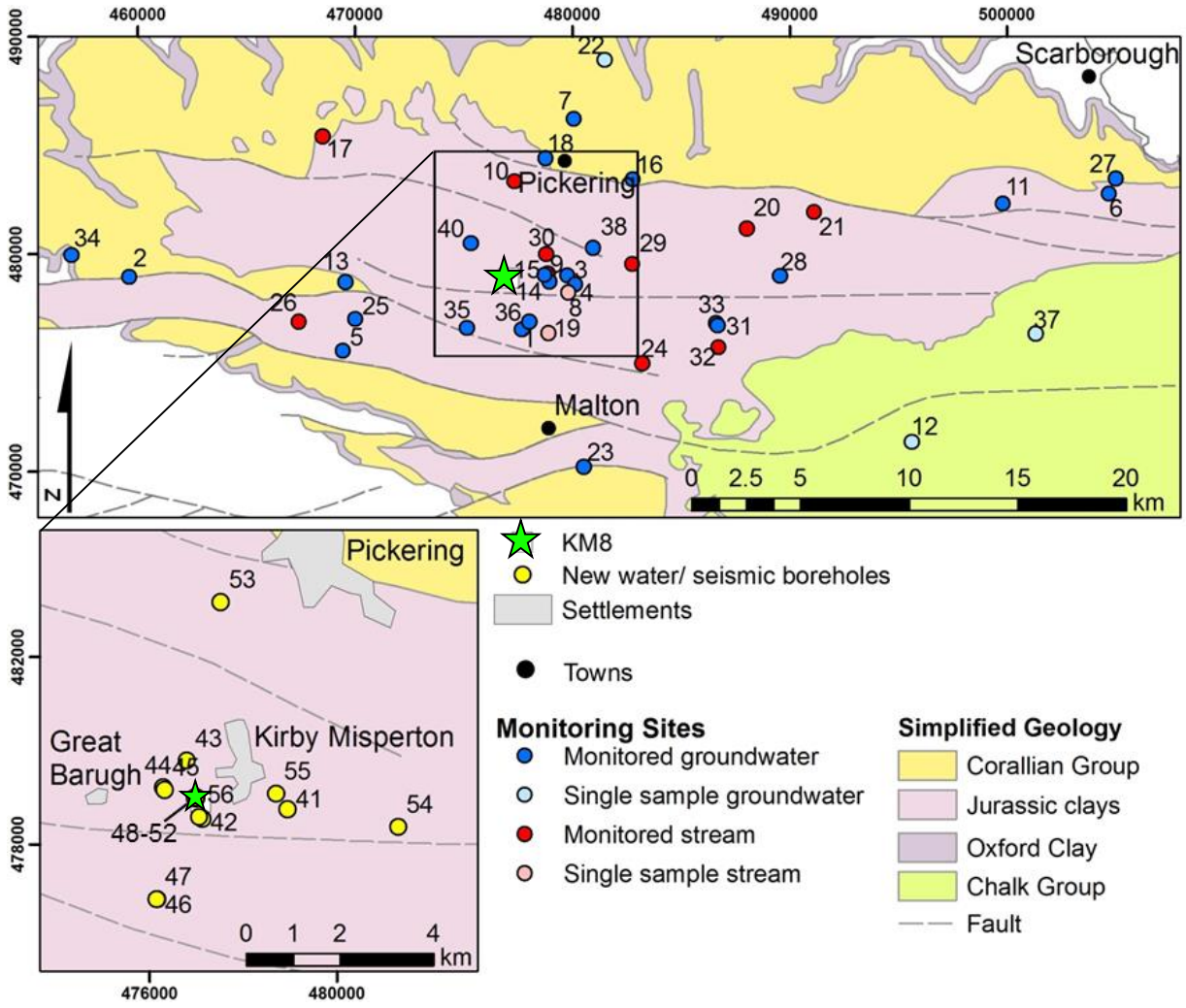
Groundwater monitoring



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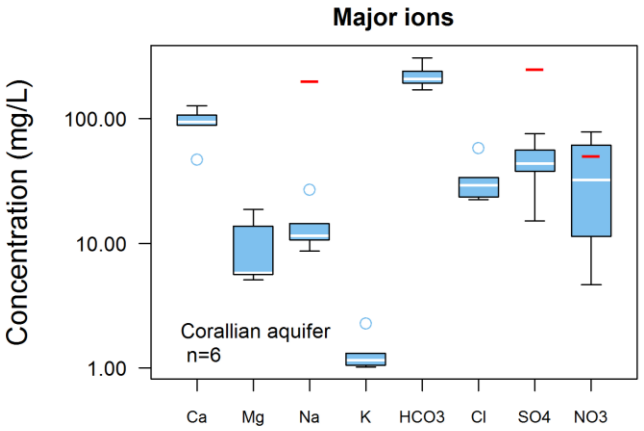
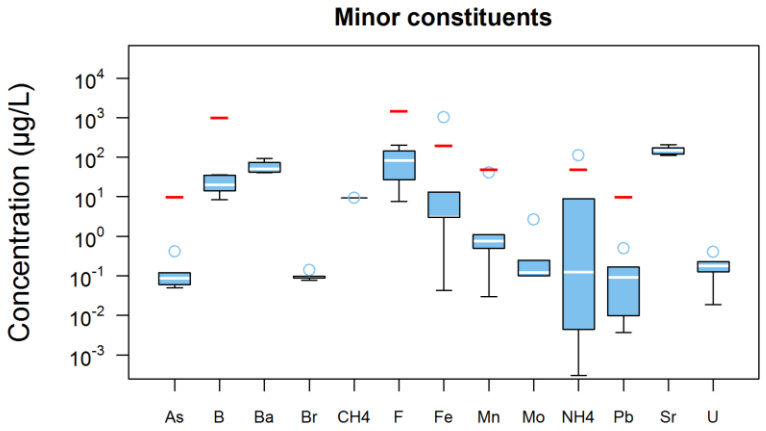
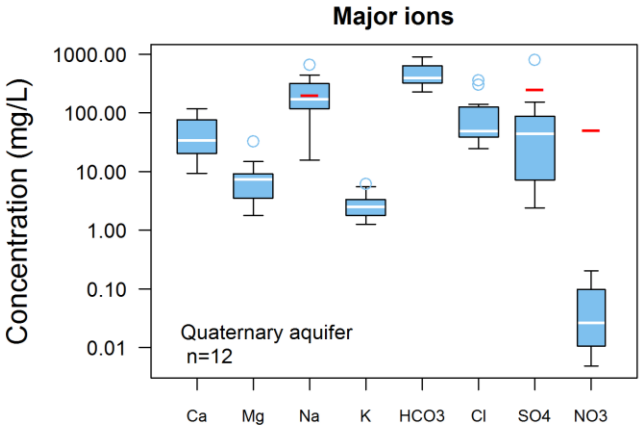
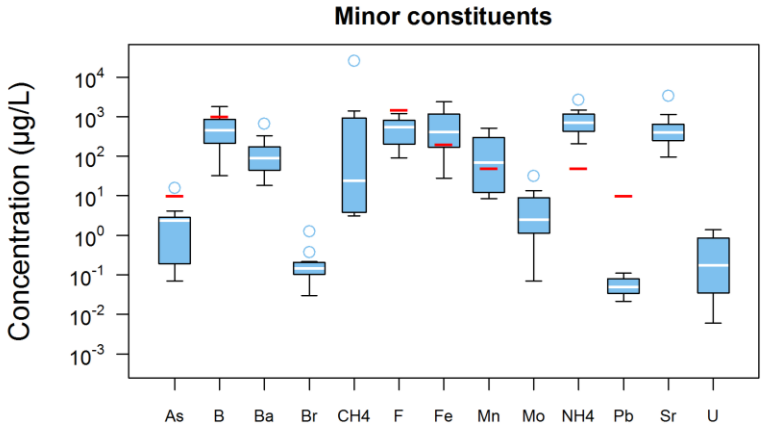
Inorganic chemistry









Corallian aquifer

Water Quality Standard

Quaternary aquifer

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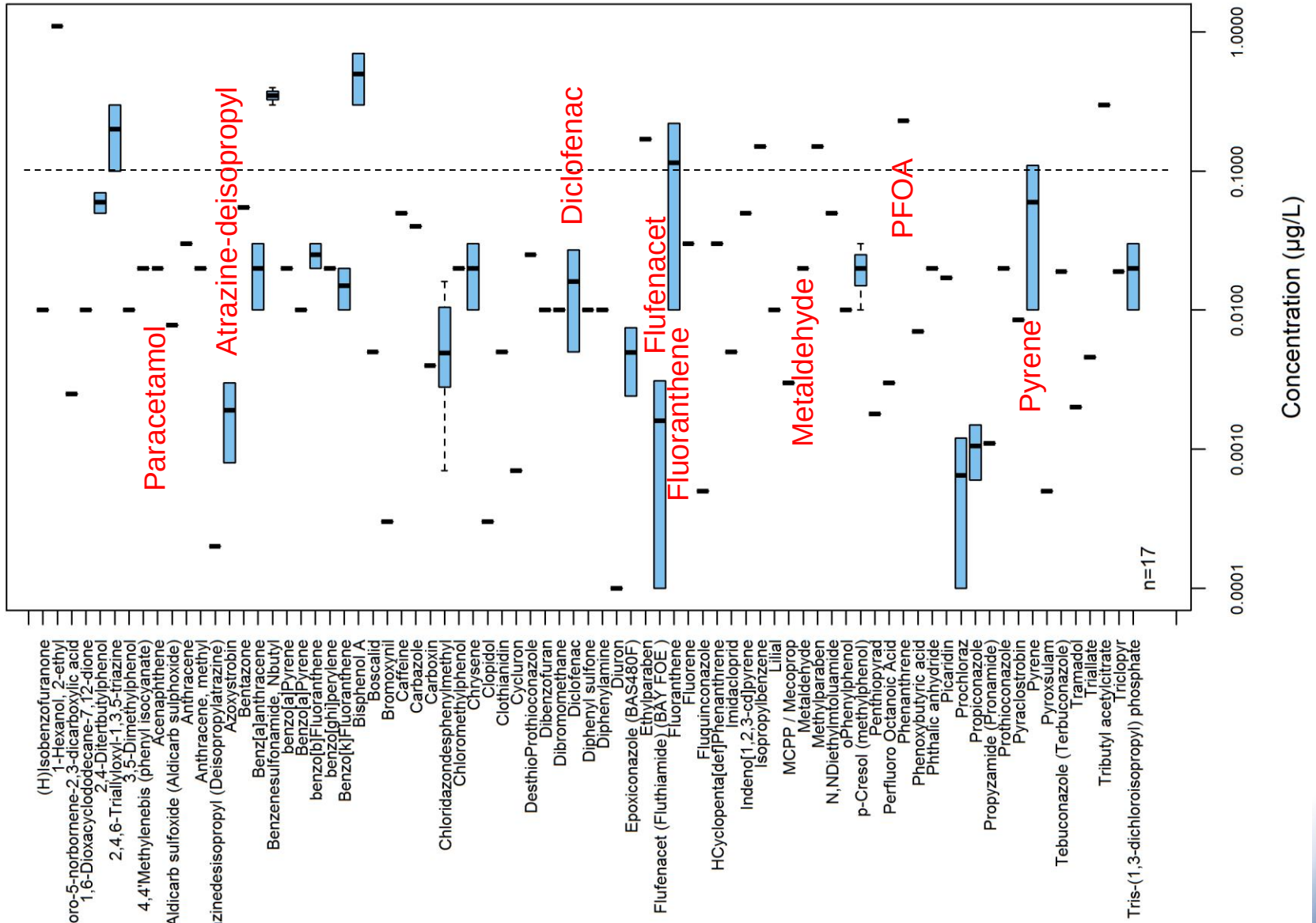

77 compounds detected – one sampling round

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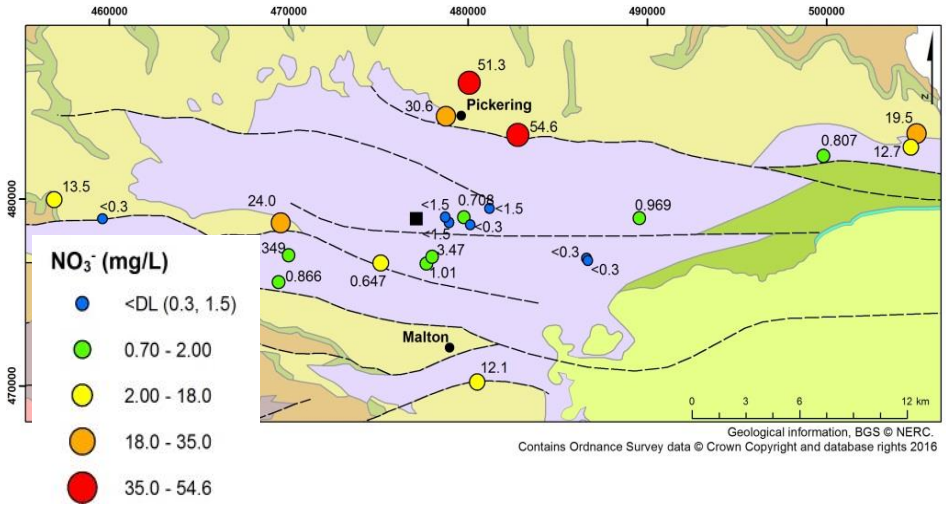
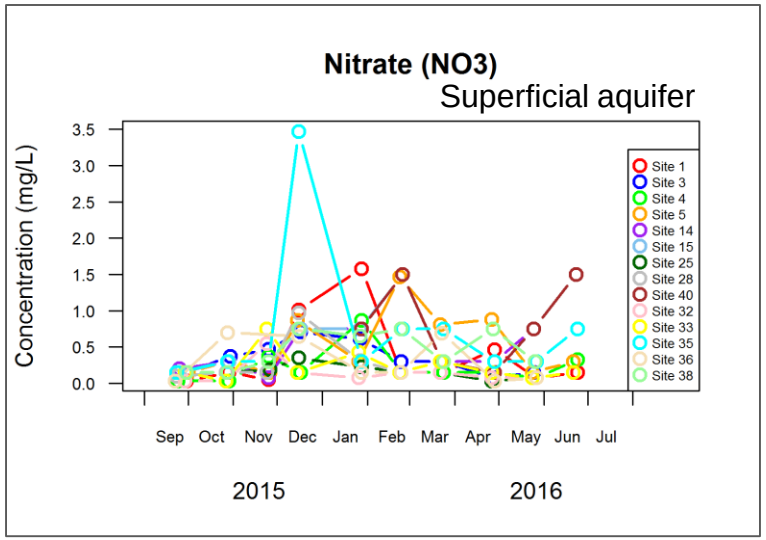
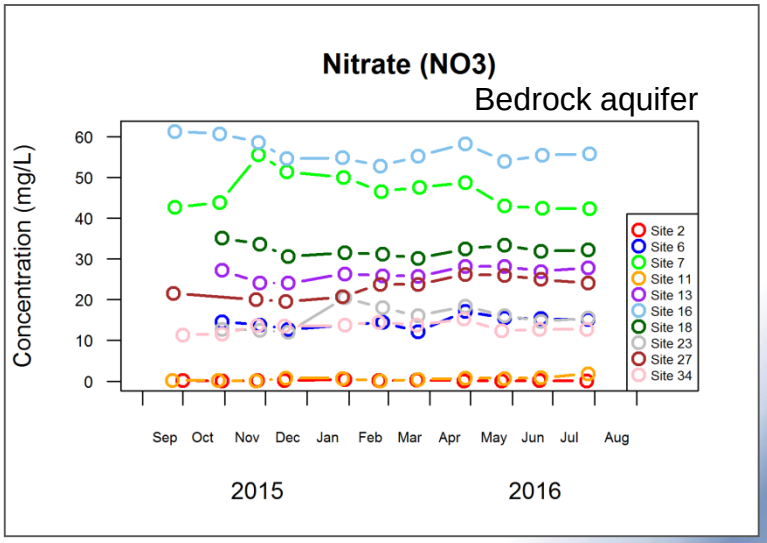
Trends in groundwater quality



Nitrate:

- Anthropogenic source(s)
- High in Corallian Lst (outcrop)
- Low in Superficial aquifer
  Evidence of denitrification





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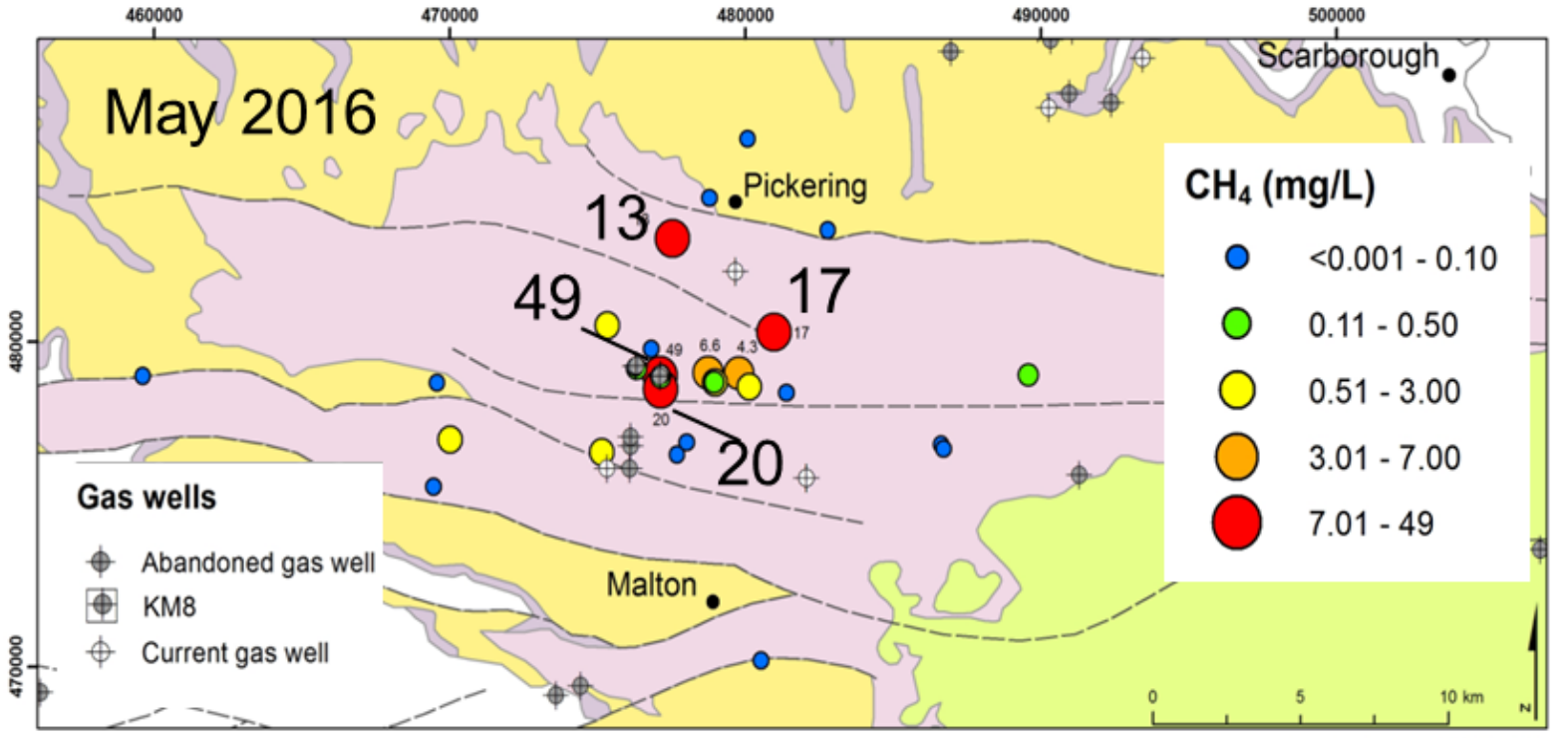
Methane in groundwater



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Source(s) of methane

- A number of potential sources:
  - In-situ biogenic production (e.g. peat)
  - Anthropogenic sources – landfill, septic tanks, leaking gas pipes/wells
  - Migration from depth
- Investigation of geochemistry and Kimmeridge Clay
  - Stable isotopes
  - Rock-Eval pyrolysis

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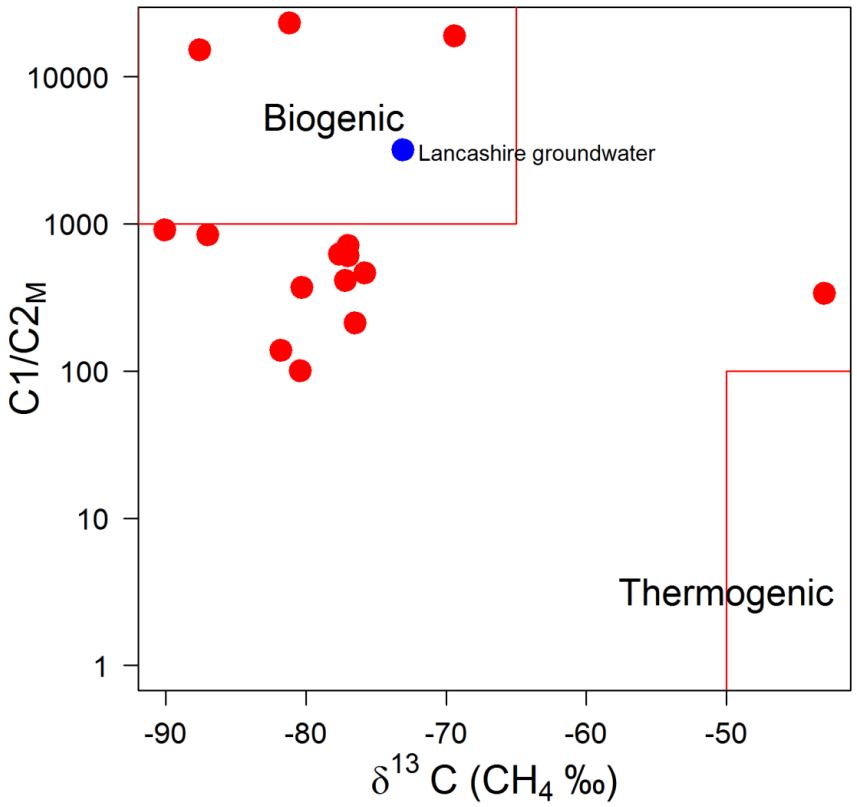
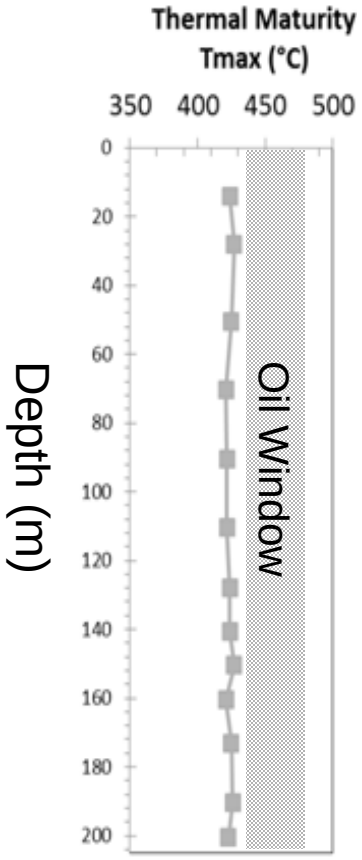
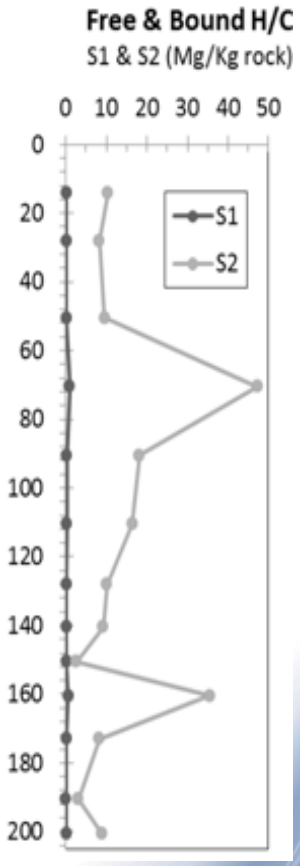
Isotope and Rock-Eval







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Conclusions

- Effective baseline characterisation/monitoring is essential
- Needs to be planned and implemented effectively

- The role of monitoring must not be underestimated:
  - Investigation and understanding of natural influences and anthropogenic impacts
  - Support for regulatory compliance/impact detection
  - Public reassurance

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Thank you

More information at:
www.bgs.ac.uk/valeofpickering

Groundwater Science at BGS

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Living With Environmental Change

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