



British Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL

Gateway to the Earth

Environmental Baseline Monitoring



Professor Rob Ward
Director of Groundwater Science
British Geological Survey

Project Partners



12th October 2015



The British Geological Survey (BGS)

- A world-leading geological survey (since 1835)
- Delivers public-good science for government, society to understand earth and environmental processes.
- Objective and authoritative geoscientific data, information and knowledge enable to:
 - Responsible use of natural resources
 - Understand impacts of environmental change
 - Resilience to environmental hazards
- Works with partners (UK and abroad) to maximise quality and impact of UK science

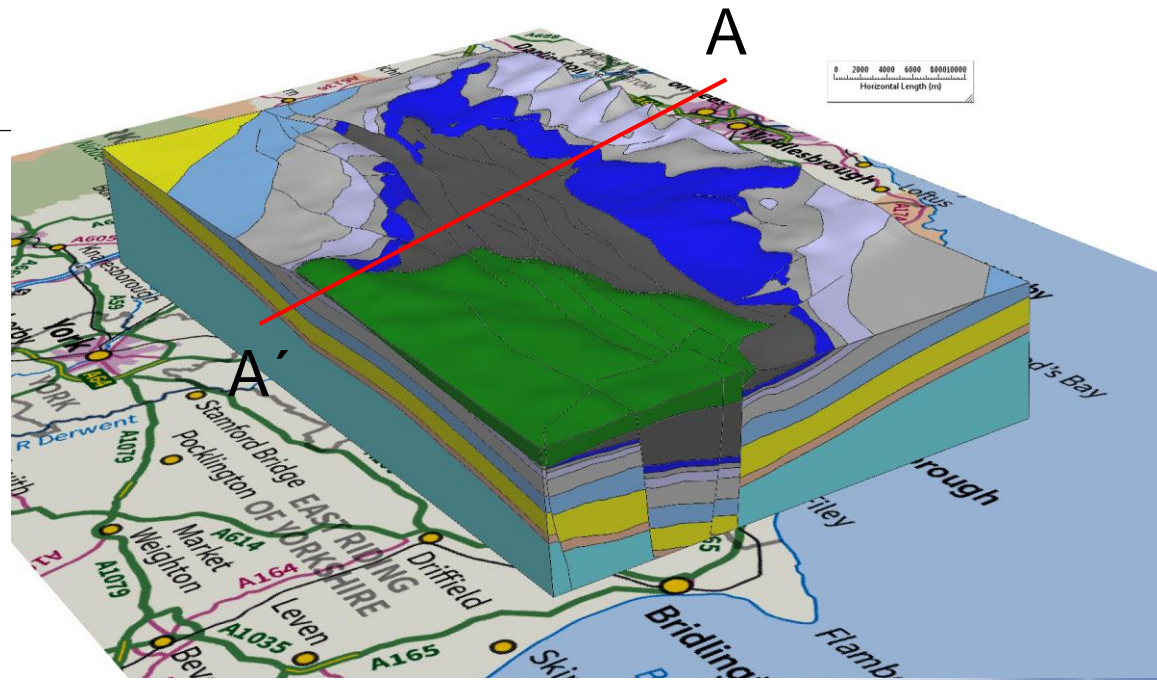
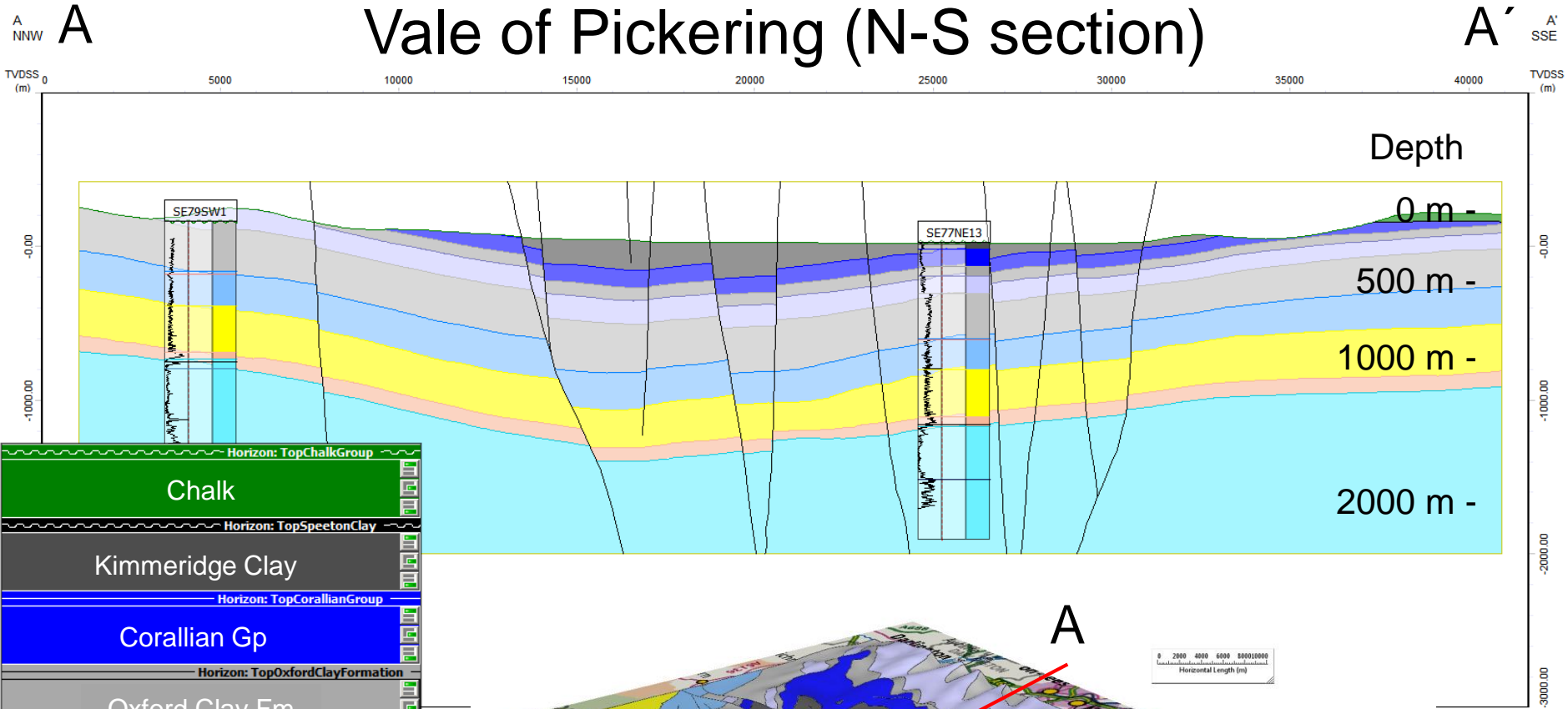
Vale of Pickering project objectives

- Respond to public concerns and need for good practice
- Extends national baseline monitoring
- Establish independent monitoring programme
- Provide high resolution data, knowledge and scientific results to:
 - Inform public, industry, regulators of environmental baselines and their variability
 - Assist in shaping regulatory monitoring and good practice
 - Improve understanding to avoid issues encountered in North America
 - Enable new monitoring technology
 - Deliver an effective partnership to build UK capability

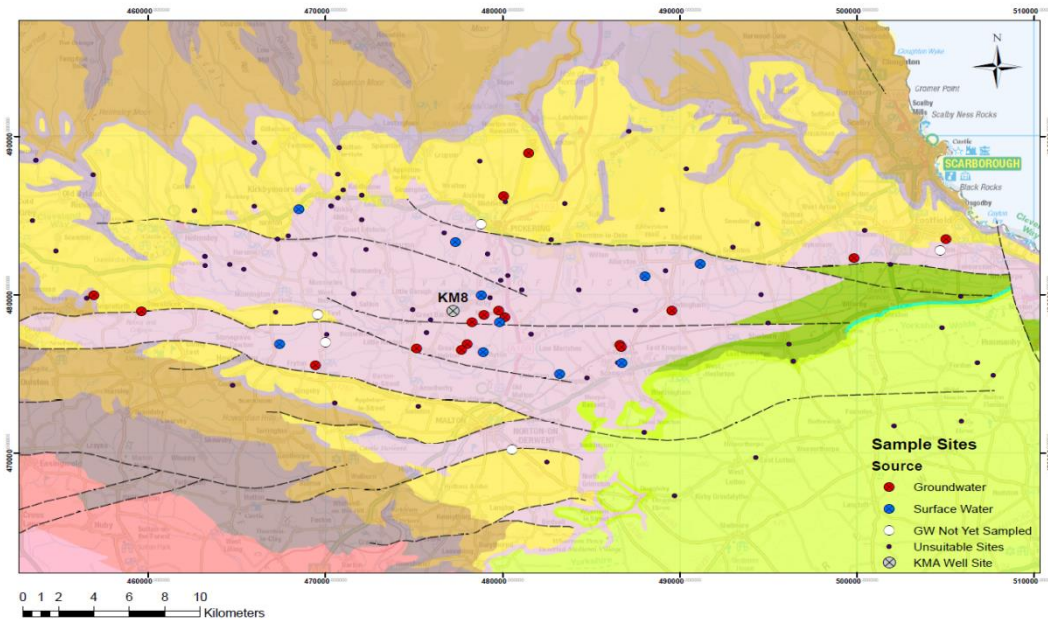
Monitoring activities

- Water quality (groundwater/surface water)
- Seismicity
- Ground motion (BGS)
- Air composition
- Radon
- Soil gas

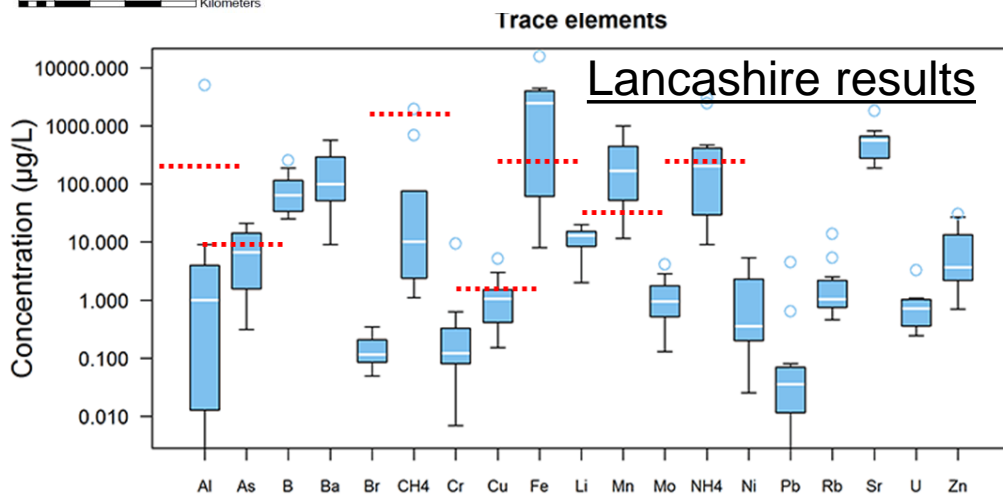
Vale of Pickering (N-S section)



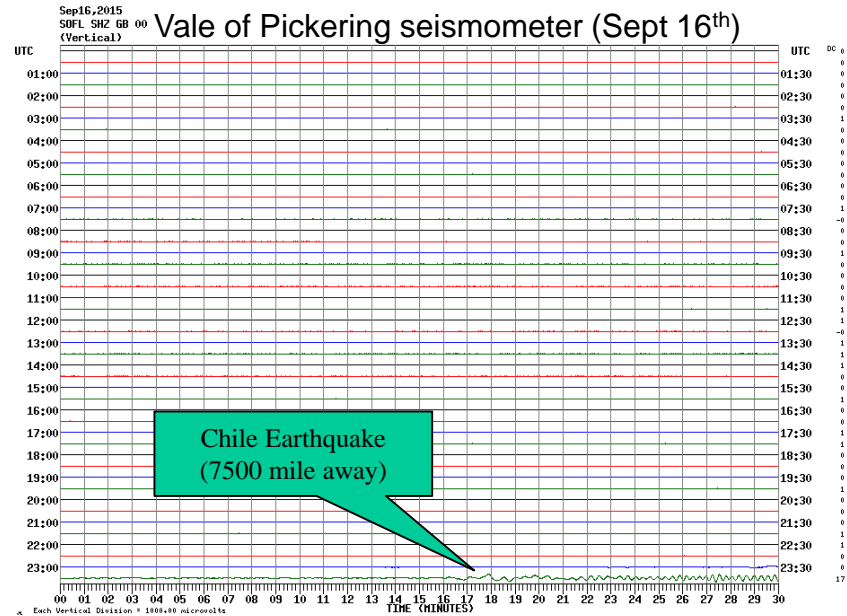
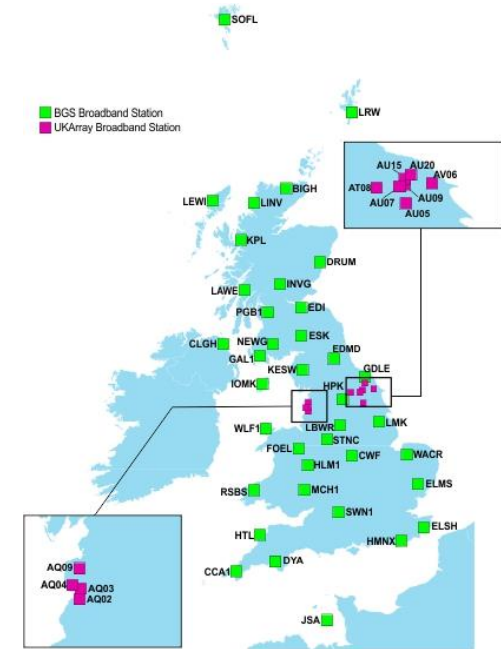
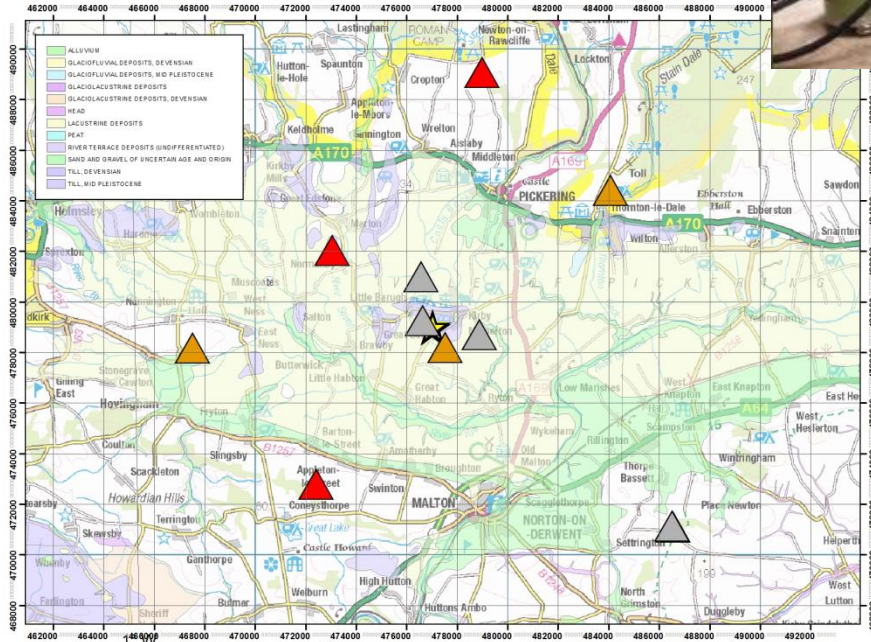
Water quality monitoring



- Existing boreholes
 - Public/private water supply boreholes, EA boreholes
- New boreholes
 - 6 x pairs shallow (<40m) and 2 x deep (c 250 m)
 - Third Energy monitoring boreholes?
- Sampling/analysis for:
 - Inorganic and organic chemistry,
 - Dissolved gases (incl. CH₄, noble gases)
 - Stable isotopes and residence time indicators tracers
 - NORM

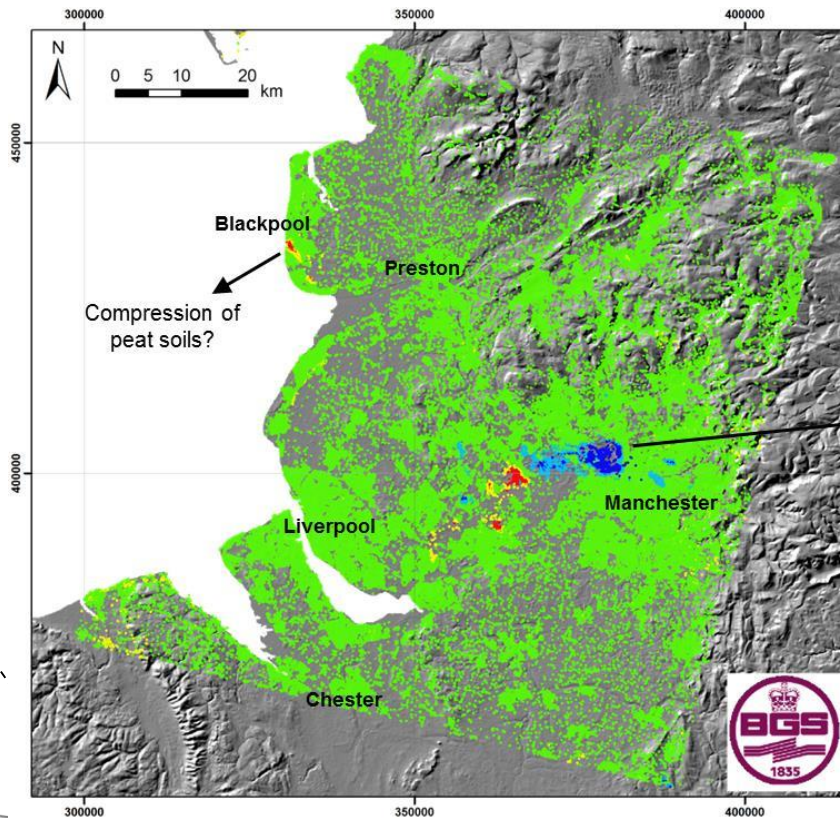
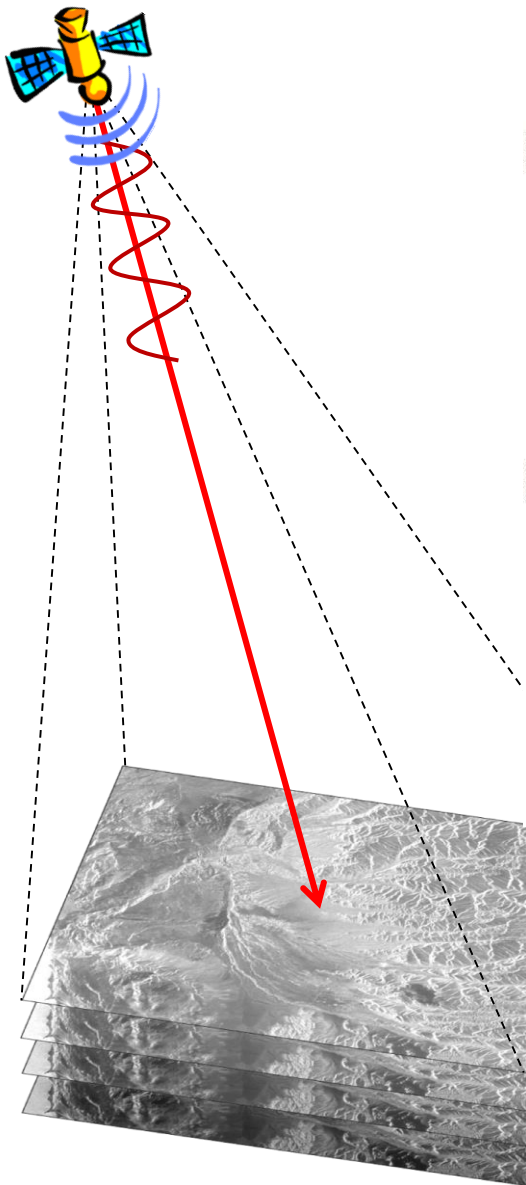


Seismicity



- 10-12 surface geophones
- 4 down-hole seismometers
- Real-time monitoring/data display on earthquakes.bgs.ac.uk

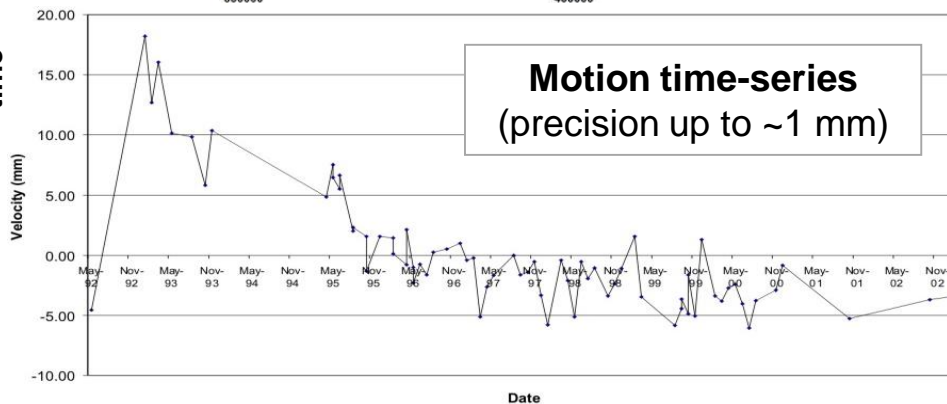
Ground motion (InSAR)



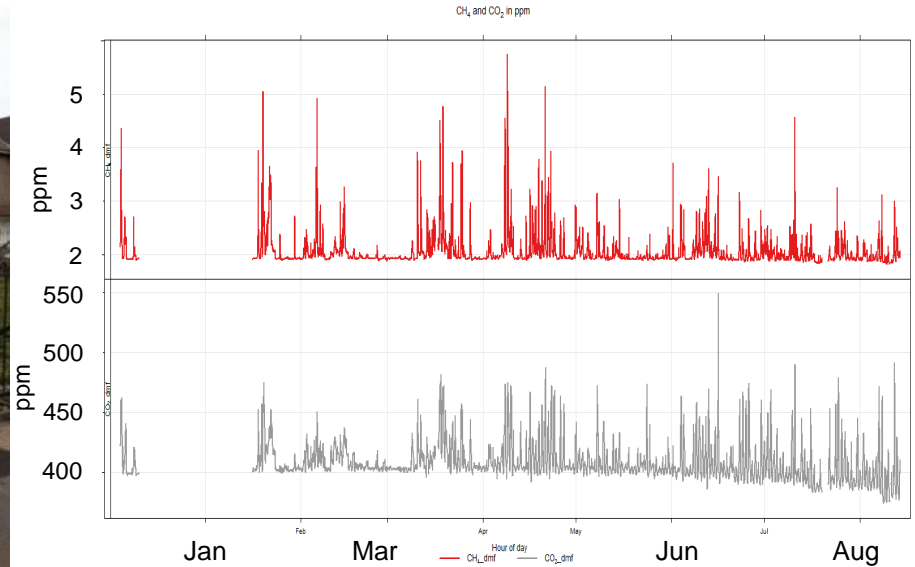
InSAR results 1992-2000

Average ground motion velocity [mm/yr]

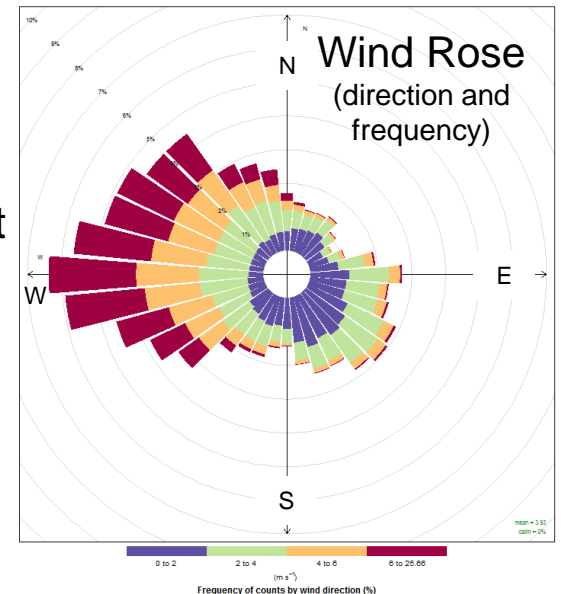
- -12.3 - -4.0 → Subsidence (-)
- -3.9 - -2.0
- -1.9 - 2.0
- 2.1 - 4.0
- 4.1 - 13.9 → Uplift (+)



Air composition



- Continuous measurement of:
 - GHGs in air, PM_{2.5}, CO, O₃, NO_x and wind/meteorology
- Regular timed-release sampling/monthly measurement of NMHCs, VOCs, H₂S, benzene
- Isotopic analysis of CH₄ and CO₂ – source apportionment
- Correlation with DEFRA national AQ network
- Development of best practice





Radon monitoring

- Outdoor radon monitoring
 - Measure current outdoor radon concentrations
 - Multiple measurement points across Vale of Pickering
 - Detectors placed in small weather-proof plastic pods for 3 and 6 months
- Indoor radon monitoring
 - Measure indoor radon distribution
 - Householders invited to participate in monitoring
 - Detectors deployed for two consecutive periods of 3 months plus a longer period



Key points

- Understanding the baseline is essential – current conditions, natural variability and human influences
- We are addressing one of the critical failures in North America
- BGS and partners have considerable experience
- Community support is essential
- Accessible data and information will provide an independent evidence base

Thank you



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL



Public Health
England



**NERC Centres for
Atmospheric Science**
NATURAL ENVIRONMENT RESEARCH COUNCIL

THE UNIVERSITY of *York*



UNIVERSITY OF
LIVERPOOL



UNIVERSITY OF
BIRMINGHAM



University of
BRISTOL

MANCHESTER
1824

The University of Manchester

For further information go to:

www.bgs.ac.uk/valeofpickering

www.bgs.ac.uk/research/groundwater

Email:

enquiries@bgs.ac.uk

Follow us on Twitter : 

[@BGSGroundwater](https://twitter.com/BGSGroundwater)

