British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

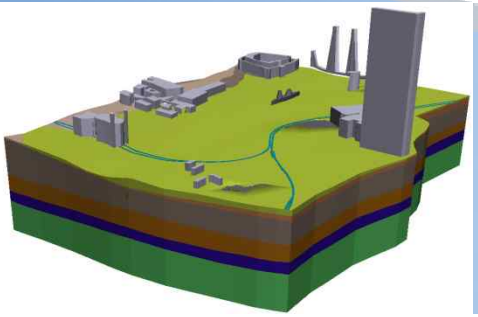
celebrating 175 years

Building the national geological model of Great Britain

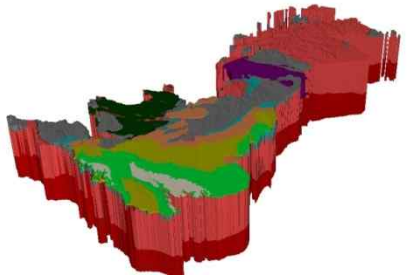
Holger Kessler, Steve Mathers, Benjamin Wood

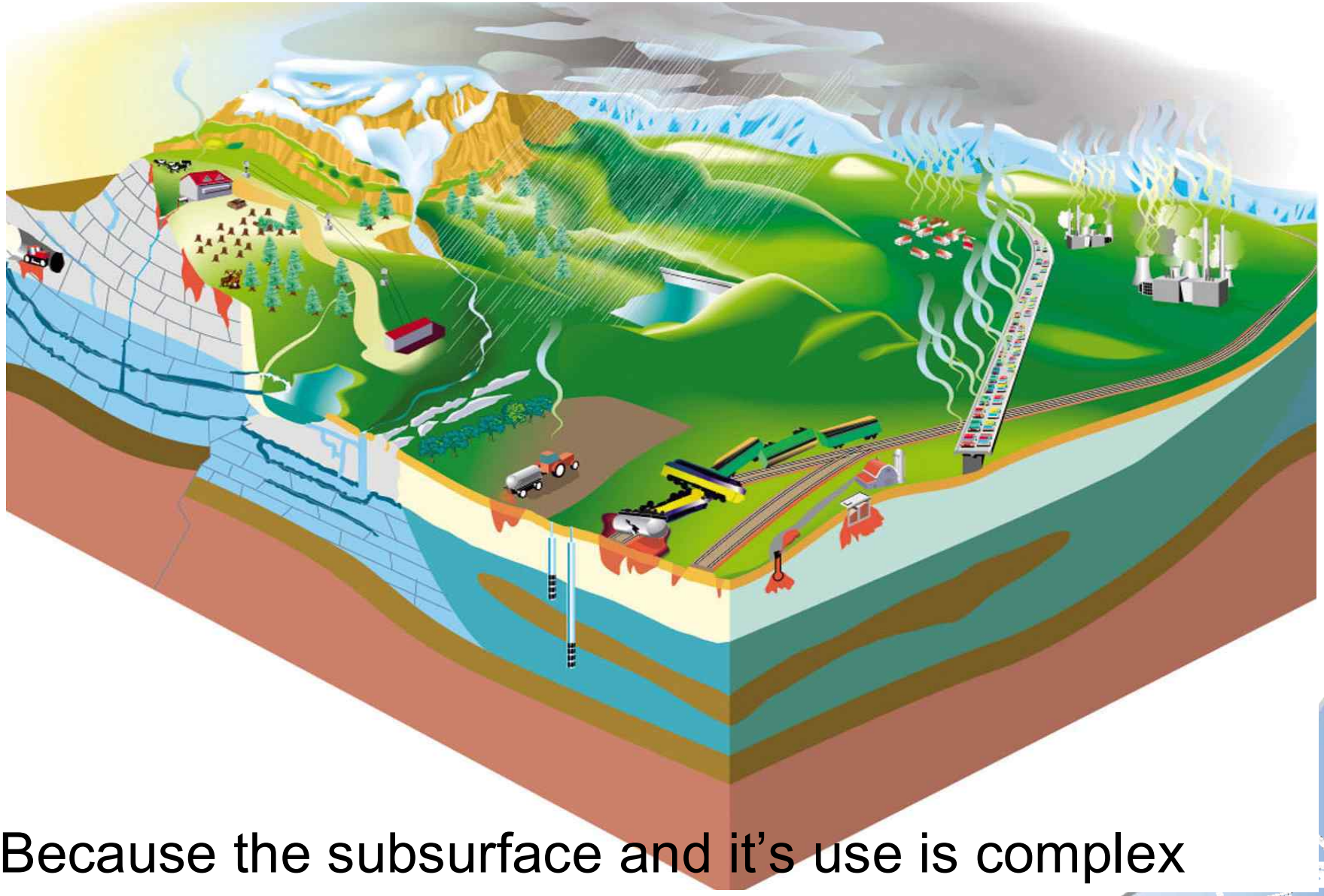
and many more staff at the BGS

9th Swiss Geoscience Meeting



November 2011
ETH Zürich



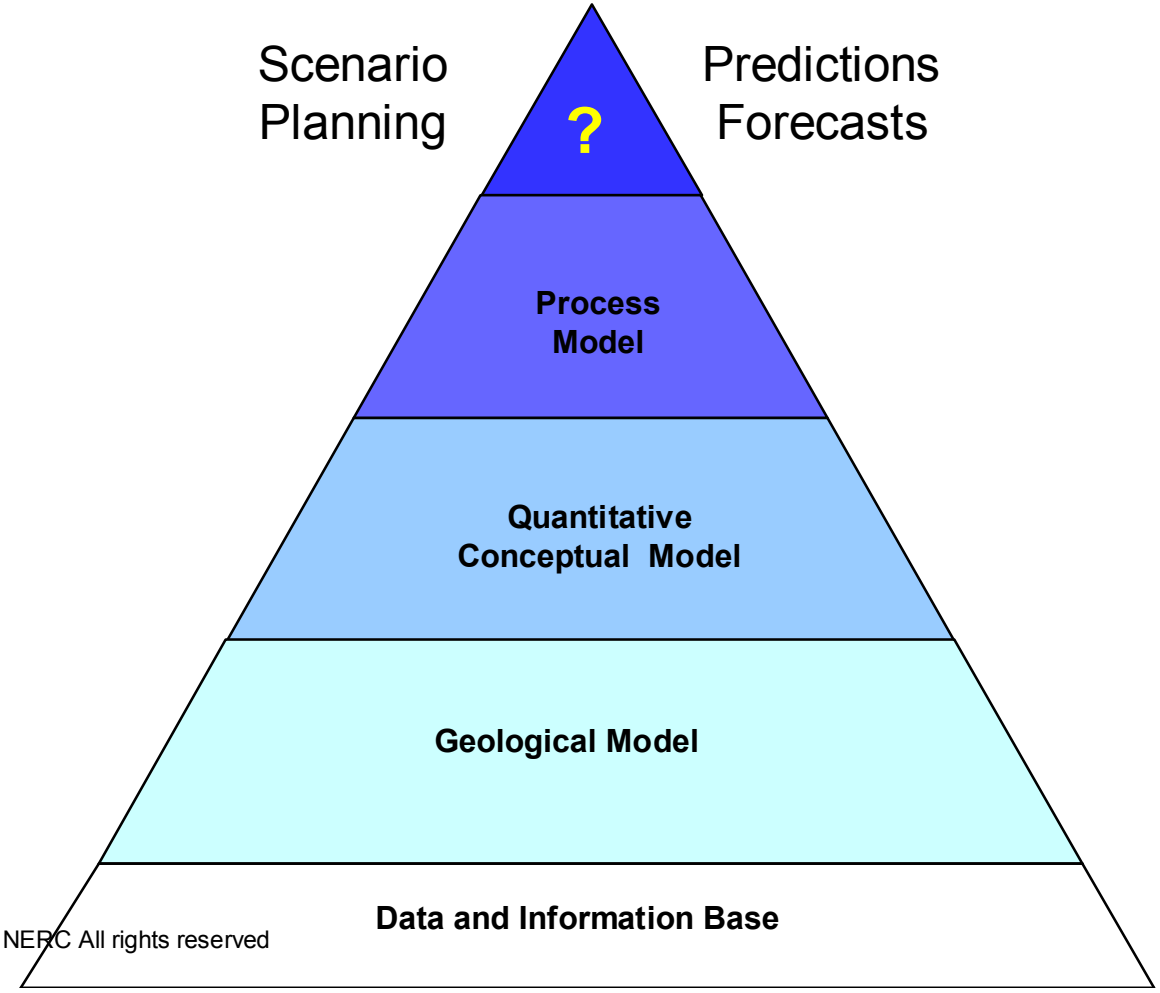


Because the subsurface and it’s use is complex

The vision: Environmental Modelling Platform

Linking Data, Knowledge, concepts with numerical process models (including socio economic)

Quantitative Understanding → Socio- Economic, ecological, optimisation and other models



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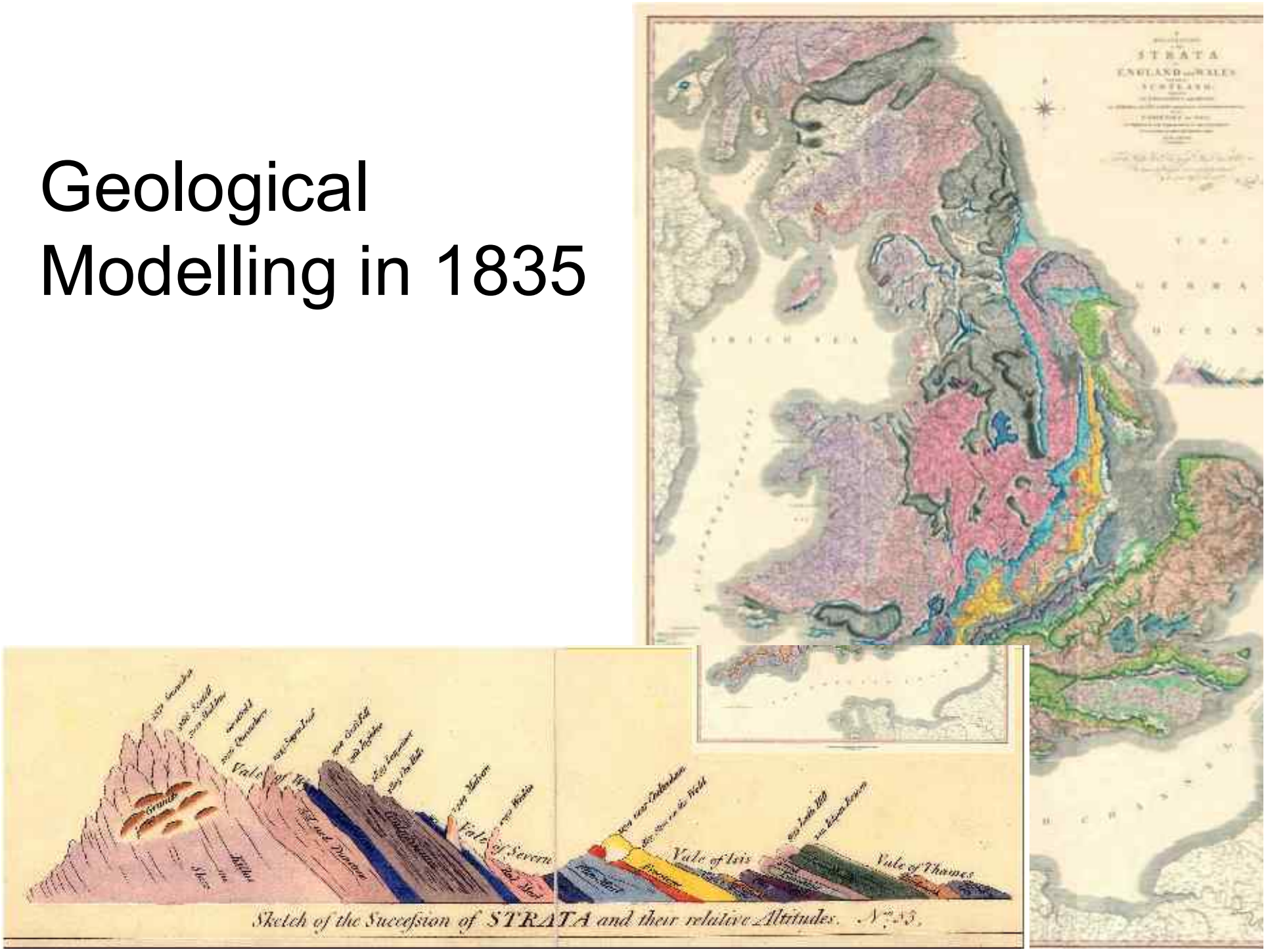
POLICY and Decision Making

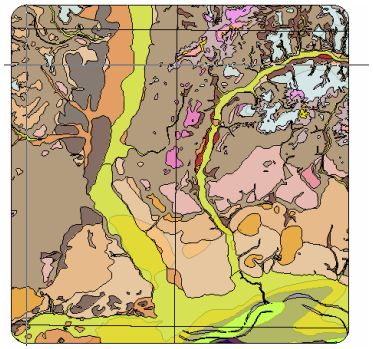
Geological Survey Evolution

- National Survey to support industry – since 1835
- Systematic coverage (at 50K scale) achieved - by 1990
- Conversion of data and processes from analogue to digital -1990s
- From maps to models to suit environmental needs - since 2000
- Simulation and prediction of earth processes to enable decision making to deal with environmental challenges - 2010+

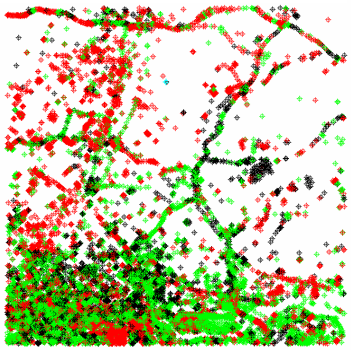
Geological Modelling in 1835



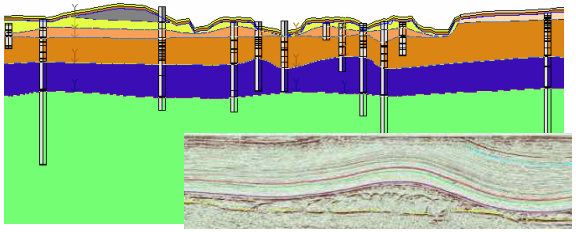
Geological Modelling in 2011



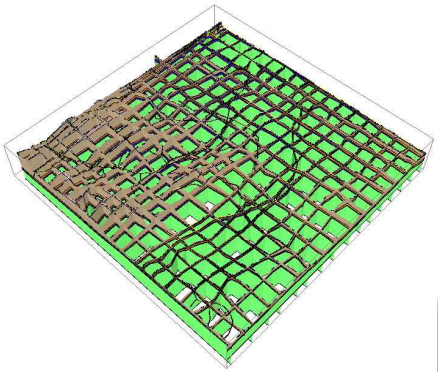
Map and DTM



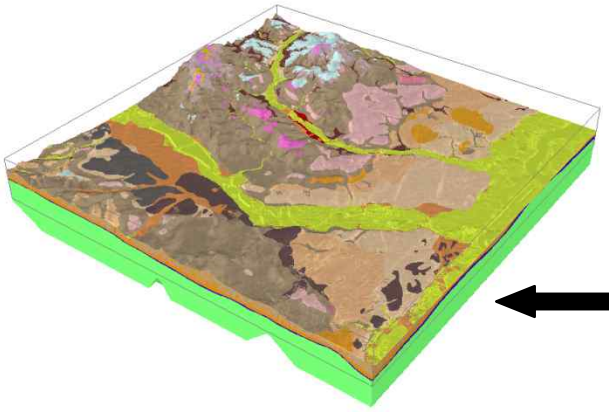
Boreholes



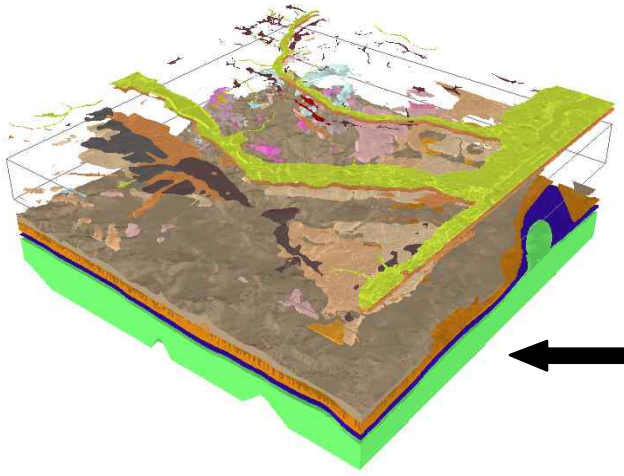
Cross-sections



Fence diagram



Geological Block model

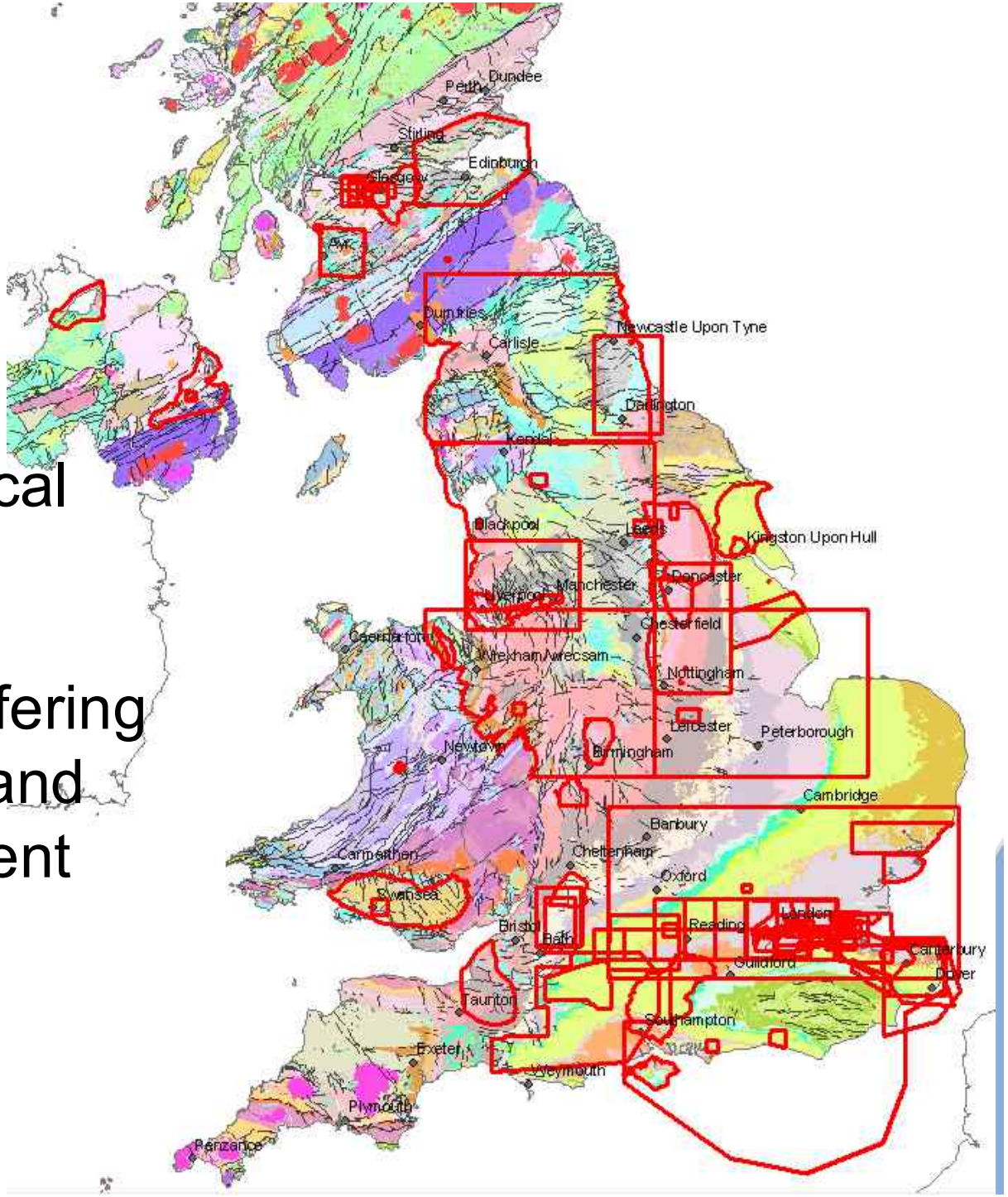


Exploded model,
synthetic sections, etc.

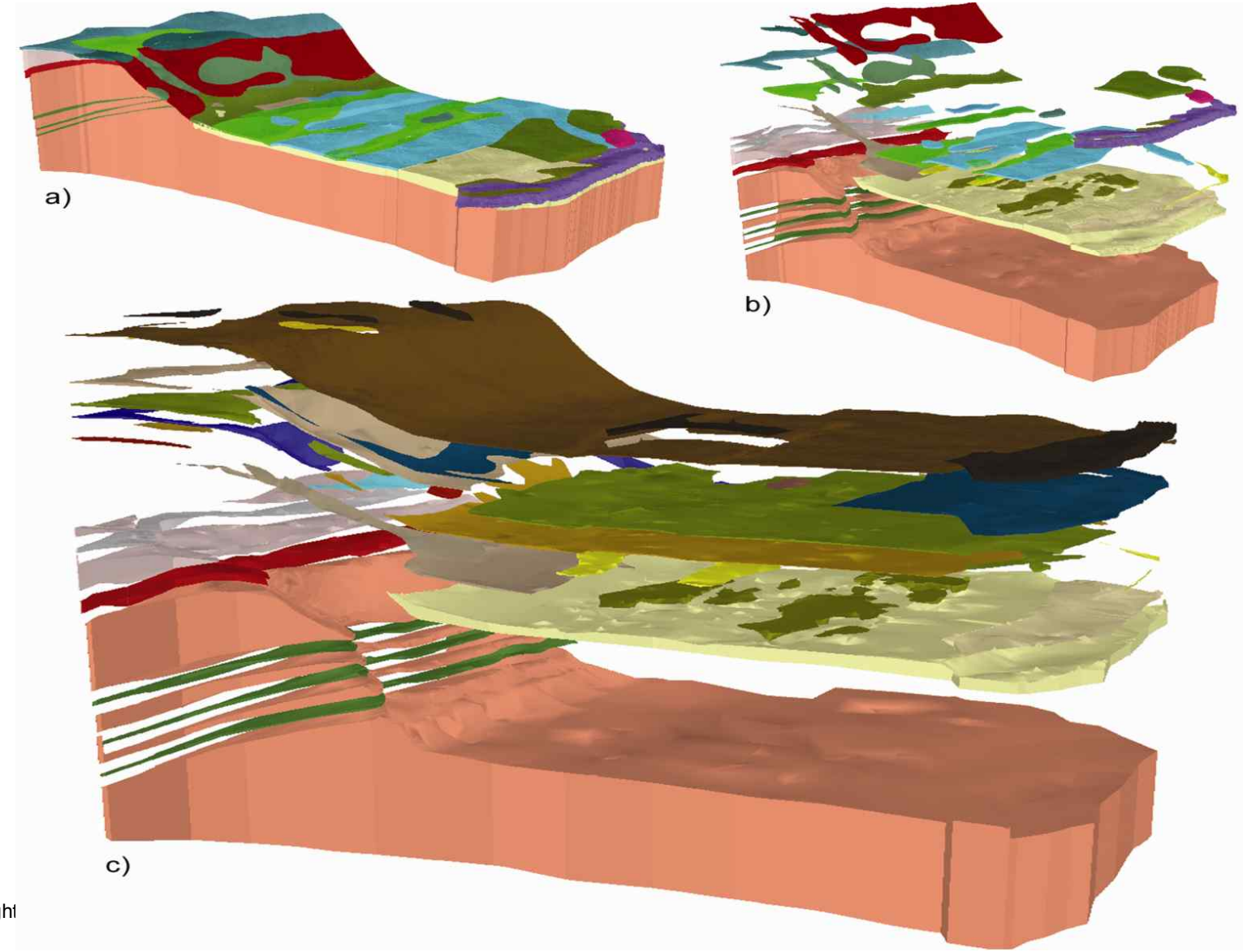
Kessler, H., Mathers, S.J. & H.-G. Sobisch. 2009. The capture and dissemination of integrated 3D geospatial knowledge at the British Geological Survey using GSI3D software and methodology. Computers & Geosciences, 35, 1311–1321

Completed geological models in the UK

Many models of differing scales and quality and often built for different purposes

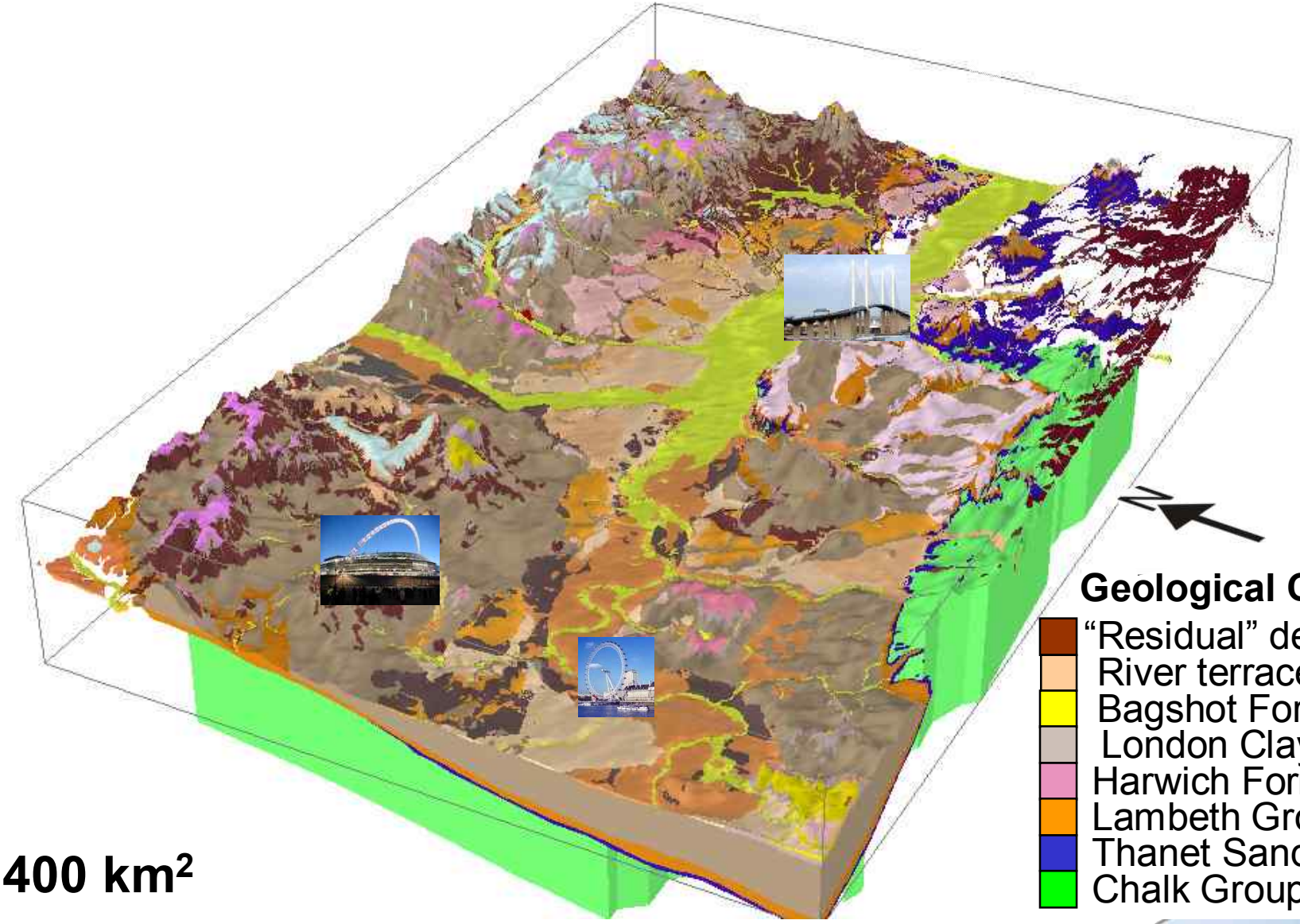


Soil horizon modelling at Shelford near Nottingham



Artificial Ground modelling in Manchester

Geological framework model of Greater London

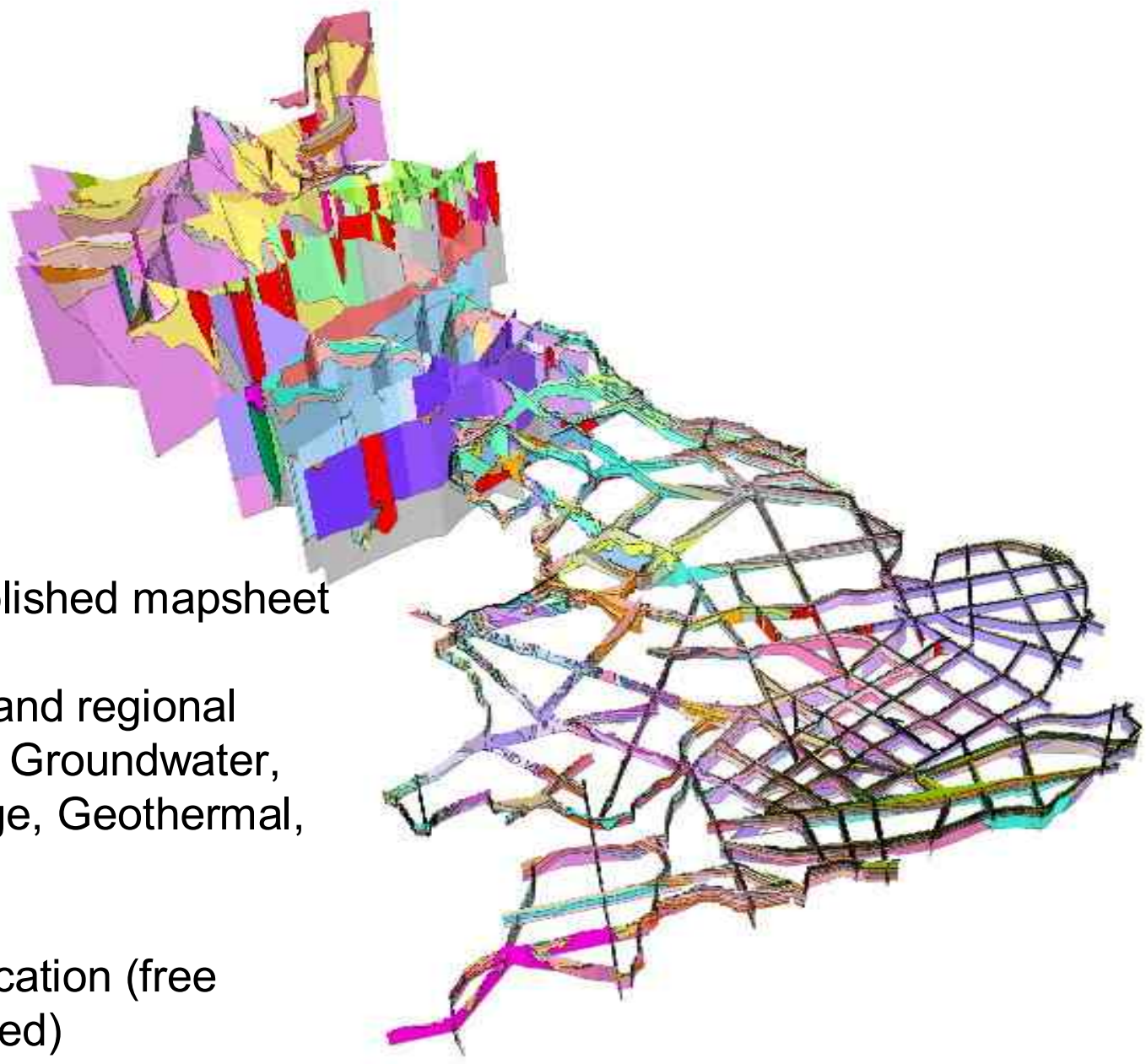


Geological Column

- "Residual" deposits
- River terraces
- Bagshot Formation
- London Clay Fm
- Harwich Formation
- Lambeth Group
- Thanet Sand Fm
- Chalk Group

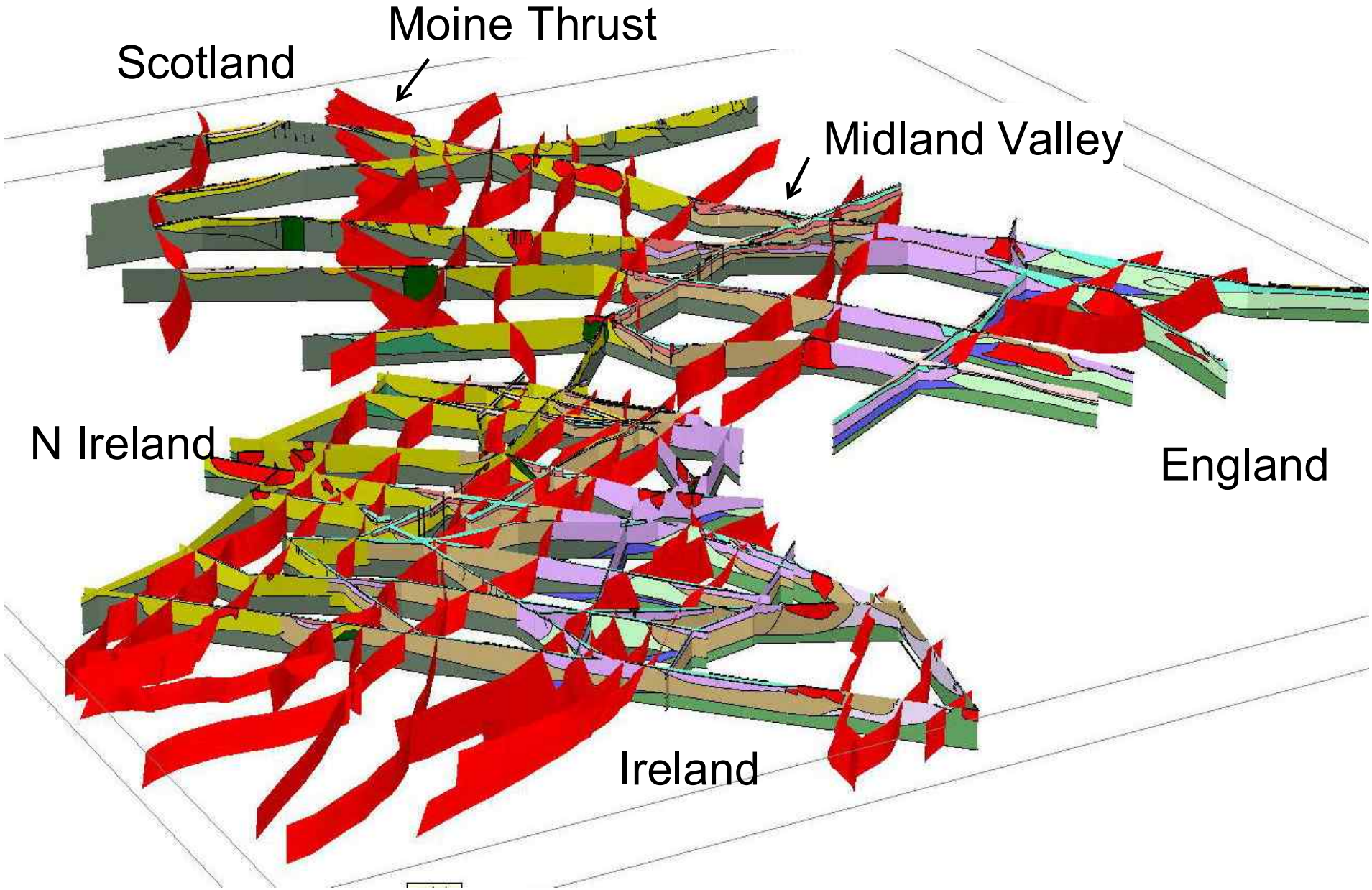
2400 km²

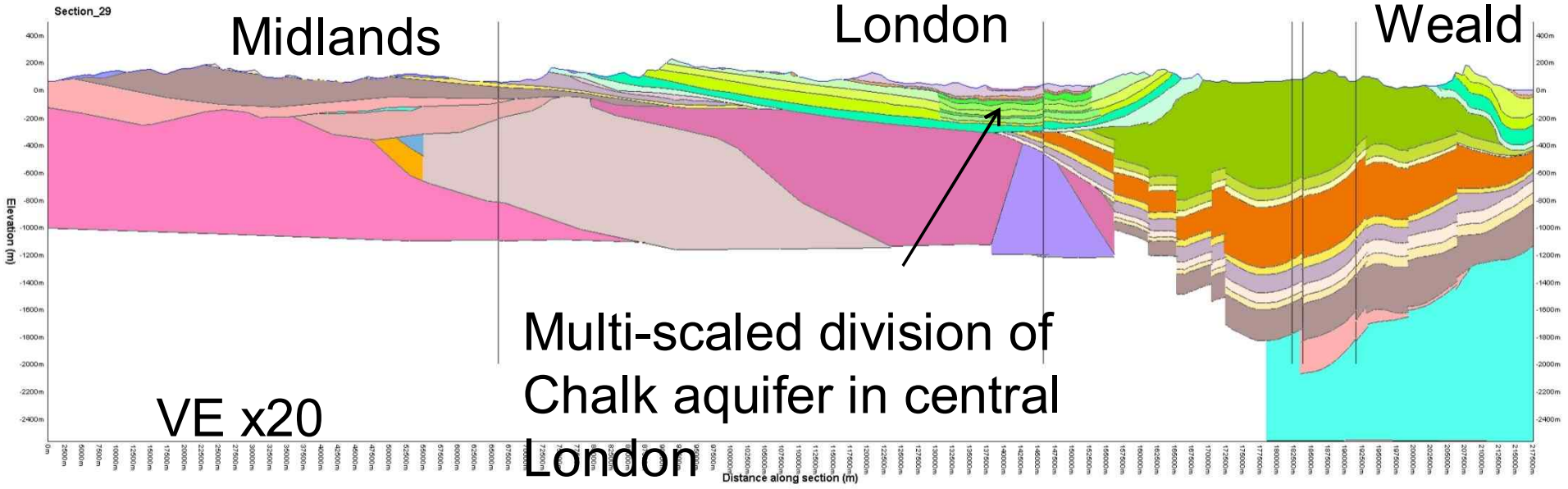
The National Fence Diagram



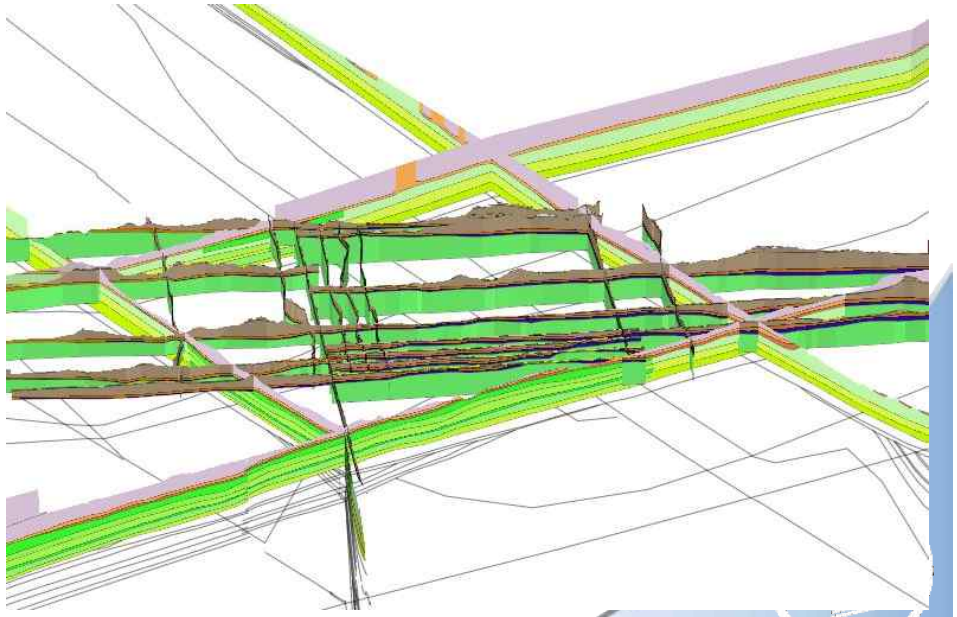
- Fits the 625K published mapsheet
- Use for national and regional assessments for Groundwater, Radwaste storage, Geothermal, CCS…
- Geoscience Education (free download intended)

Ireland joined up with Scotland

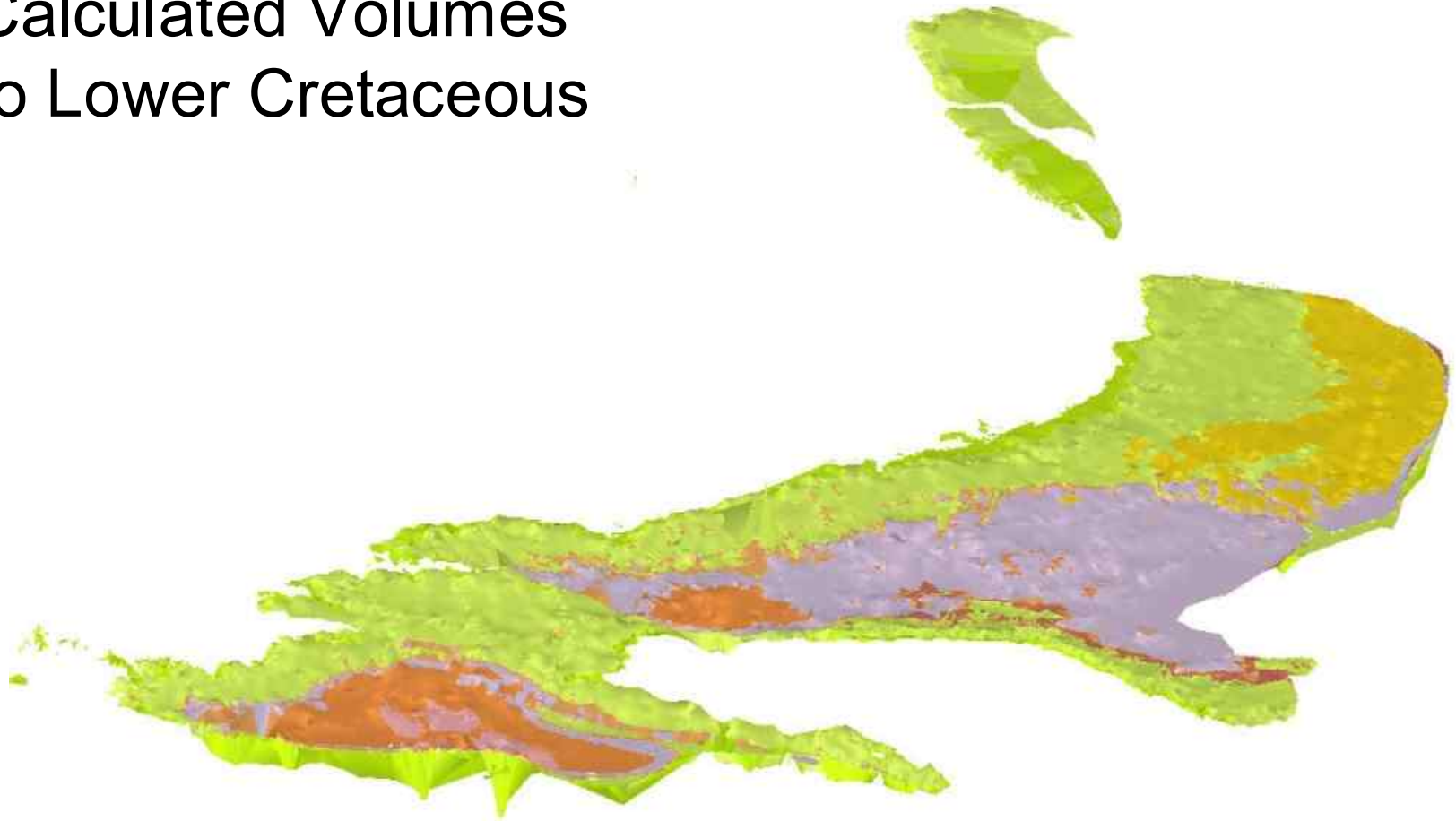


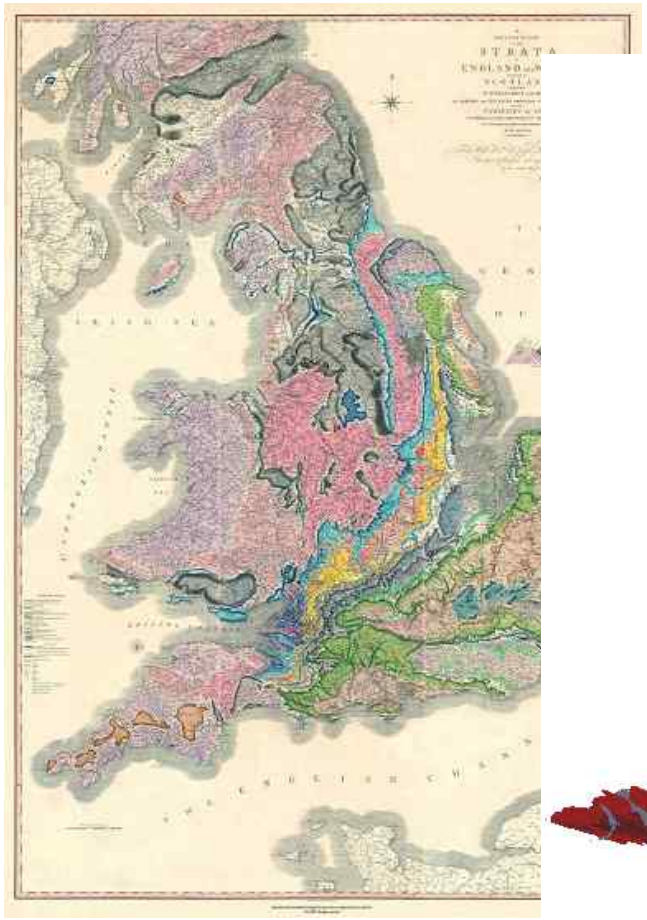


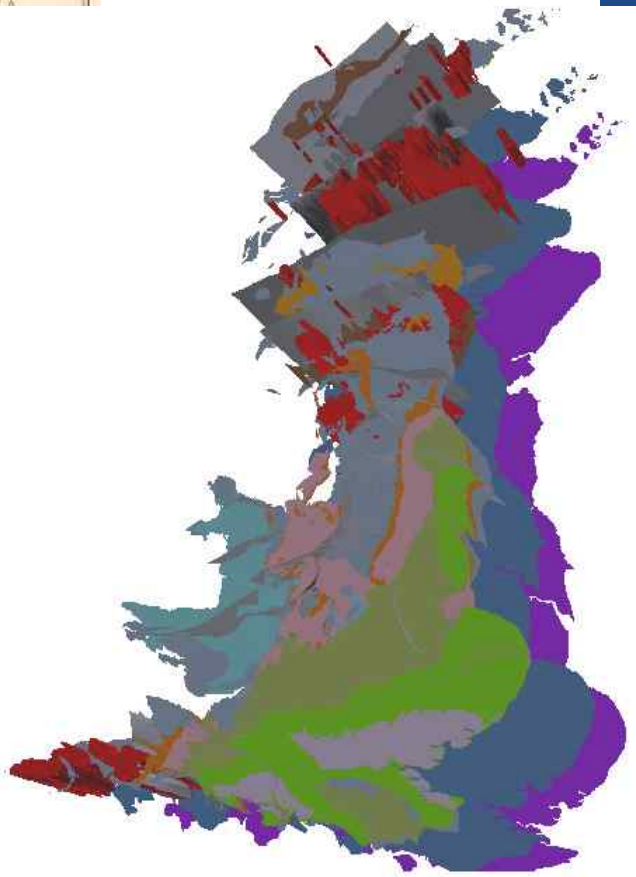
Gradual incorporation of all models into the National Geological Model



Calculated Volumes to Lower Cretaceous







From maps…

…to models…

…to forecasts