



## **Lithostratigraphy does not always equal lithology: lessons learned in communicating uncertainty from stochastic modelling glacial and post glacial deposits in Glasgow U.K.**

Tim Kearsey (1), John Williams (2), Andrew Finlayson (1), Paul Williamson (2), Marcus Dobbs (2), Andrew Kingdon (2), and Diarmad Campbell (1)

(1) British Geological Survey, Edinburgh, United Kingdom (timk1@bgs.ac.uk), (2) British Geological Survey, Keyworth, United Kingdom

Geological maps and 3D models usually depict lithostratigraphic units which can comprise of many different types of sediment (lithologies). The lithostratigraphic units shown on maps and 3D models of glacial and post glacial deposits in Glasgow are substantially defined by the method of the formation and age of the unit rather than its lithological composition. Therefore, a simple assumption that the dominant lithology is the most common constituent of any stratigraphic unit is erroneous and is only 58% predictive of the actual sediment types seen in a borehole. This is problematic for non-geologist such as planners, regulators and engineers attempting to use these models to inform their decisions and can lead to such users viewing maps and models as of limited use in such decision making.

We explore the extent to which stochastic modelling can help to make geological models more predictive of lithology in heterolithic units. Stochastic modelling techniques are commonly used to model facies variations in oil field models. The techniques have been applied to an area containing >4000 coded boreholes to investigate the glacial and fluvial deposits in the centre of the city of Glasgow. We test the predictions from this method by deleting percentages of the control data and re-running the simulations to determine how predictability varies with data density.

We also explore the best way of displaying such stochastic models to and suggest that displaying the data as probability maps rather than a single definitive answer better illustrates the uncertainties inherent in the input data. Finally we address whether it is possible truly to be able to predict lithology in such geological facies.

The innovative Accessing Subsurface Knowledge (ASK) network was recently established in the Glasgow area by the British Geological Survey and Glasgow City Council to deliver and exchange subsurface data and knowledge. This provides an idea opportunity to communicate and test a range of models and to assess their usefulness and impact on a vibrant community of public and private sector partners and decision makers.