

EXPLORING GEOCHEMICAL DATA USING NON-LINEAR PROJECTION METHODS

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Exploration, often using visualisation methods is a well established practice in statistics and geochemistry. However, most methods that have been applied to date are based on the concepts of 'linked plots, brushing and sample sets' or linear projection methods, typically principal components analysis or some form of multi-dimensional scaling.

In this work we show how non-linear projection methods, that preserve either the data topology ('Generative Topographic Mappings') or data geometry ('Neuroscale'), can be applied to geochemical data sets. For example we show how such 2 dimensional non-linear projections can be used to visualise, interpret and classify the similarities between oils from different wells using a range of geochemical properties. We contrast the non-linear methods to more traditional linear methods, discussing the strengths and weaknesses of each when applied to geochemical data, and in particular oil-oil and oil-source rock correlations in petroleum exploration. We show how to tackle the common problem of missing data in an optimal Bayesian framework and show the effect of this on visualisation. Finally we discuss how such a non-linear visualisation tool could be deployed in a commercial setting.