



## Understanding Paleo-histories from Non-unique Stratal Geometries

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Basin-scale stratal geometries are determined through the interaction of multiple controls; in particular subsidence, sediment supply and eustasy. However, the interpretation of stratal patterns is non-unique since identical geometries could be produced by more than one combination of these controls. In this paper, we show how to transform a single interpretation into an infinite number of others that leave the stratal geometry unchanged.

We demonstrate the transformation using a simple stratigraphic forward model controlled by sediment supply, relative sea-level and subaerial erosion. We first make a tiny change to one of the parameters, and then calculate the change required in the other controls to reproduce the original model. By repetitive application of this procedure, all possible interpretations can be found.

This model-inversion approach has several significant advantages:

1. Calculation of multiple solutions allows properties common to all solutions (and hence to the unknown correct solution) to be found.
2. The procedure can begin with a simple solution (e.g. one that assumes no erosion) which can then be altered into a more realistic solution (e.g. one with a plausible erosion rate).
3. Because sediment supply rate must be non-negative, upper-bounds can be placed upon the height of sea-level above an erosional surface and upon the associated subaerial erosion rate.

Currently, we are adapting the proposed method to a more sophisticated model which incorporates differential subsidence. This will be used to interpret the Baltimore Canyon Neogene stratigraphy and we aim to present the results, of this application to a real-world problem, at this meeting.