Geosyntax: Formal Language for Analogue Models

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Stochastic modelling of geology for reservoir simulation can include information derived from analog models. The most popular method of including this information in a stochastic model has been by the use of marked point processes (mpp). Examples of programs which employ mpp include SESIMIRA and FLUVSIM. We present a new method of describing analog models based on the language structures used in syntactic pattern recognition, we call these languages Geosyntax. Not only is the method very simple and hence computationally very fast, it presents a holistic approach to creating a geological model in that all the elements (e.g. channel fills and overbank deposits) are produced together and so known spatial relationships between the objects can be reproduced.

We have developed a Geosyntax and a parser (a program to interpret the Geosyntax languages) with which we can simulate 2-D sedimentary successions. The aim of this project is to design a Geosyntax and parser capable of producing 3-D geological models. The languages include rules derived from outcrop descriptions. The rules are hierarchical in nature, they describe how a complex object is made up of simpler objects. For example, rules for describing a meandering channel system in cross-section might be given as:

System = LeftBank + Channel + Rightbank

Channel = leftMargin + axis + rightMargin

LeftBank = floodPlain + leftLevee

RightBank = rightLevee + floodPlain

The languages also include attribute information, such as shape and size of the objects.