



Forward stratigraphic simulations and basin modeling - a case study in the southern Vienna Basin

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Stratigraphic simulation and basin modeling combines unique effects of process parameters to reproduce lithologies and geometries that characterize a basin. In this study, we used cellular automata and fuzzy logic models to simulate sedimentation in parts of the southern Vienna Basin. The input data was derived from a 3D seismic profile interpretation of the Vienna Basin (3D-seismic data of the Moosbrunn block, provided by OMV AG) from Strauss et al (2006). The oldest Neogene deposits found in the seismic block are interpreted as equivalents of the fluvial Upper Karpatian Aderklaa Formation, disconformably overlain by the coarse clastics of the lowermost Middle Miocene Aderklaa conglomerate (first Badenian sequence). During the following HST a carbonate platform was formed on a horst. The second Badenian sequence displays a distinct low stand wedge and a well-developed transgressive wedge and a prograding HST. The third Badenian sequence records a major sea-level drop followed by a transgression in nannoplankton zone NN6. The Sarmatian sequence corresponds to the global TB 2.6. cycle and the Pannonian to the TB 3.1. cycle.

The input data was combined with calibrated process parameters in two simulation engines, PHIL (Process and History Integrated Layers) and FUZZIM. Both softwares reproduced the geological features that make-up the basin in slightly different approaches. In one case the global water level history of Haq et al (1988) was used explicitly while in the other a variant was applied. We were able to model the original geometry of the basin in general.

With PHIL, deposition of carbonate succeeded after the limiting siliclastic sedimentation rate was taken into consideration. Subsidence was also induced by specifying different rates for some parts of the Basin.

In FUZZIM, the nature and type of sediments were defined by applying fuzzy logic to their distribution. Here subsidence could not be specified as in the previous case but was achieved through adjusting the sedimentary load and the hinge position.

The process parameters were unique such that no two combinations of parameters produced the same features. Excellent results were obtained especially in the area of carbonate production after a limiting siliclastic rate was applied in the cellular automata process. The reproduced geometry and most lithologies of the basin gave a good match when compared to the 3D seismic profile interpretation.

STRAUSS, P.E., HARZHAUSER, M., HINSCH, R. & WAGREICH, M. (2006). Sequence stratigraphy in a classic pull-apart basin (Neogene, Vienna Basin) – a 3D seismic based integrated approach. *Geol. Carpathica*.