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# A MATLAB®-based program for 3D visualization of stratigraphic setting and subsidence evolution of sedimentary basins: example application to the Vienna Basin

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In recent years, 3D visualization of sedimentary basins has become increasingly popular. Stratigraphic and structural mapping is highly important to understand the internal setting of sedimentary basins. And subsequent subsidence analysis provides significant insights for basin evolution. This study focused on developing a simple and user-friendly program which allows geologists to analyze and model sedimentary basin data. The developed program is aimed at stratigraphic and subsidence modelling of sedimentary basins from wells or stratigraphic profile data.

This program is mainly based on two numerical methods; surface interpolation and subsidence analysis. For surface visualization four different interpolation techniques (Linear, Natural, Cubic Spline, and Thin-Plate Spline) are provided in this program. The subsidence analysis consists of decompaction and backstripping techniques. The numerical methods are computed in MATLAB® which is a multi-paradigm numerical computing environment used extensively in academic, research, and industrial fields.

This program consists of five main processing steps; 1) setup (study area and stratigraphic units), 2) loading of well data, 3) stratigraphic modelling (depth distribution and isopach plots), 4) subsidence parameter input, and 5) subsidence modelling (subsided depth and subsidence rate plots). The graphical user interface intuitively guides users through all process stages and provides tools to analyse and export the results. Interpolation and subsidence results are cached to minimize redundant computations and improve the interactivity of the program. All 2D and 3D visualizations are created by using MATLAB plotting functions, which enables users to fine-tune the visualization results using the full range of available plot options in MATLAB.

All functions of this program are illustrated with a case study of Miocene sediments in the Vienna Basin. The basin is an ideal place to test this program, because sufficient data is available to analyse and model stratigraphic setting and subsidence evolution of the basin. The study area covers approximately 1200 km2 including 110 data points in the central part of the Vienna Basin.