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The Way from Thickness Maps to Complex 3D Backstripping Models

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To understand the history of sedimentary basins, 3D digital models are suitable resources in combination with backstripping techniques. Backstripping involves the calculation of load-induced subsidence and decompaction to determine the depth position of the basement through time under consideration of isostatic compensation.
To construct complex 3D backstripping models, a number of structural and physical properties must be compiled and validated. The most important data describing different types of sedimentary basins are thickness maps and their location in the system of the basin. Together with seismic information, well logs and data of possible fault systems, the 3D structure can be built by applying appropriate interpolation algorithms. In addition, the consideration of the physical processes requires the implementation of physical properties of the diverse rock types. Another requirement for the backstripping procedures is the establishment of an adequate crustal or lithosperic model. We use an integrated approach concentrated in the Geological Modelling System (GMS), a software suite developed at the German Research Centre for Geosciences. A multi step compilation merges the data by avoiding surface crossing.
With this study we want to present a modelling approach which leads to physically reasonable paleo-structural models applying a number of geophysical concepts. The resulting grid based 3D model contains all collected structural and physical properties. To achieve an applicable backstripping model, various geophysical models and mathematical methods to calculate for instance decompaction, thermal subsidence, thermal field, salt redistribution (Scheck et al., 2003) or load distribution have to be taken into account.

References:
Scheck, M.; Bayer, U. and Lewerenz, B.: Salt redistribution during extension and inversion inferred from 3D backstripping. Tetconophysics, 373: 55 – 73