Geophysical Research Abstracts
Vol. 18, EGU2016-3756, 2016
EGU General Assembly 2016

3D modelling of salt tectonics with a brittle overburden in an extensional regime

Philipp Eichheimer (1), Georg Reuber (2), and Boris Kaus (3)

(1) Institute of Geosciences, Johannes-Gutenberg Universität, Mainz, Germany (peichhei@students.uni-mainz.de), (2) Institute of Geosciences, Johannes-Gutenberg Universität, Mainz, Germany (greuber@students.uni-mainz.de), (3) Institute of Geosciences, Johannes-Gutenberg Universität, Mainz, Germany (kaus@uni-mainz.de)

Most previous numerical models of salt tectonics only considered 2D cases or did not taken a brittle sedimentary overburden into account, both of which are likely to be important in nature. To get insights into the dynamics of diapiric rise of salt we here present time-dependent high resolution 3D models of salt tectonics in the presence of a brittle overburden and sedimentation.
We focus on the internal deformation of an embedded anhydrite layer within a nonlinear viscous salt layer. As salt in nature tends to rise upwards to the surface along fault zones, the salt layer is overlain by a brittle overburden to simulate faulting. The resulting complex folding of the anhydrite layer obtained in our models is consistent with natural observations, e.g. Gorleben [1]. Regarding field examples we vary the shape of the anhydrite layer to understand different modes of deformation [2]. We test the effect of overburden rheology, extension and sedimentation rates on the 3D salt dome patterns and on its internal deformation.

[1] O. Bornemann. Zur Geologie des Salzstocks Gorleben nach den Bohrergebnissen. Bundesamt für Strahlenschutz (1991).

[2] Z. Chemia, H. Koyi, and H. Schmeling. Numerical modelling of rise and fall of a dense layer in salt diapirs. Geophysical Journal International 172.2 (2008): 798-816.