Geophysical Research Abstracts
Vol. 18, EGU2016-9085, 2016
EGU General Assembly 2016

The role of mechanical heterogeneities in evaporite sequence during deformation initiated by basement fault activity

Marta Adamuszek (1), Marcin Dabrowski (1,2), and Stanisław Burliga (3)

(1) Polish Geological Institute - NRI, Warszawa, Poland (marta.adamuszek@pgi.gov.pl), (2) Physics of Geological Processes, University of Oslo, Norway, (3) Institute of Geological Sciences, University of Wrocław, Poland

Kłodawa Salt Structure (KSS) situated in the centre of the Polish Zechstein Basin started to rise above a basement fault in the Early Triassic. Geological studies of the KSS revealed significant differences in the deformation patterns between the PZ1-PZ2 (intensely deformed) and PZ3-PZ4 (less deformed) cycle evaporites. These two older and two younger cycle evaporite complexes are separated by the thick Main Anhydrite (A3) bed. We use numerical simulations to assess the impact of a thick anhydrite bed on intrasalt deformation. In our models, the overburden consists of clastic sediments. A normal fault located in the rigid basement beneath the salt is activated due to model extension. At the same time, the sedimentation process takes place. The evaporites consist of a salt bed intercalated with a thick anhydrite layer of varying position and geometry. To understand the role of anhydrite layer, we run comparative simulations, in which no anhydrite layer is present. In the study, we use our own numerical codes implemented in MATLAB combined with the MILAMIN and MUTILS numerical packages.
Our investigations revealed a significant influence of the anhydrite on deformation style in the evaporate series. The supra-anhydrite domain is characterized by weaker deformation and lower rates of salt flow in comparison to the sub-anhydrite domain. The highest contrast in the rate of salt flow between the two domains is observed in the case of the anhydrite layer situated close to the bottom of the salt complex. The thick anhydrite layer additionally diminishes the deformation rate in the supra-anhydrite domain and can lead to detachment of the basement deformation from its overlay. Our numerical simulations showed that the presence of the A3 Main Anhydrite bed could be the dominant factor responsible for the decoupling of deformation in the KSS salt complex.