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# Microfabrics and deformation mechanisms of rheologically stratified salt rocks: Constraints from EBSD-analyses of anhydrite and halite of Upper Permian salt rocks

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Salt rocks of the Leine Unit (z3), Upper Permian German Zechstein, are characterized by locally changing amounts of anhydrite. The interbeds of the more competent anhydrite layers may be affected by folding or boudinage. The present study is focusing on the texture of deformed halite and anhydrite. The samples for EBSD studies were collected from Anhydritmittelsalz (z3AM) of the Morsleben salt mine, which is affected by folding and boudinage of anhydrite in rock-salt matrix due to diapiric emplacement and subsequent horizontal shortening (Behlau & Mingerzahn 2001).
Anhydrite is characterized by small grain size ($\leq 50\ \mu$m) and high amounts of opaque and less soluble components (magnesite, quartz, phyllosilicates). Small fractures are filled with halite. For EBSD, line scans were performed with a step size of $50\ \mu$m. The results do not show any crystallographic preferred orientation of anhydrite.
The grain size of halite ranges from 1-3 mm, grain boundaries are lobate and decorated with both fluid inclusions and small anhydrite crystals. Halite subgrains have a size of $\sim$70-90 $\mu$m. For EBSD analyses, map scans were performed with different size and step size, dependent on the magnification. The misorientation angles between single subgrains are very low (1°-2°), only subordinate misorientation angles of 5°-7° occur. Bending of some halite crystals is documented by misorientation angles of max. 3° within a single grain. The misorientation index M (Skemer et al. 2005) for whole rock analyses yielded values $< 0.09$, which represents a random misorientation distribution in halite rocks.
The small grain size of anhydrite, the lack of a preferred orientation and the development of opaque seams suggest solution-precipitation creep is the most important deformation mechanism in fine grained anhydrite rocks. Brittle deformation is documented by subsequent developed fractures, which are filled with halite.
For halite, subgrain formation and solution-precipitation creep are the dominant deformation mechanisms. No lattice preferred orientation was observed, documented by a low misorientation index.
The results for halite and fine grained anhydrite are in line with previous studies (e.g. Thiemeyer et al. 2016). Further investigations will focus on coarse grained anhydrite rocks, where different deformation processes could be active.

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