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# Mineralogical and microstructural investigations of fractures in Permian z2 potash seam and surrounding salt rocks

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Fractures occur locally in the z2 potash seam (Kaliflöz Staßfurt). Most of them extend several centimeter to meter into the surrounding salt rocks.
The fractures are distributed on all levels in an extremely deformed area of the Morsleben salt mine, Northern Germany. The sampling site is located within a NW-SE trending synclinal structure, which was reverse folded (Behlau & Mingerzahn 2001). The samples were taken between the -195 m and - 305 m level at the field of Marie shaft. In this area, more than 200 healed fractures were mapped. Most of them show opening widths of only a few millimeters to rarely 10 cm. The fractures in rock salt are filled with basically polyhalite, halite and carnallite. In the potash seam, the fractures are filled with kainite, halite and minor amounts of carnallite and polyhalite. In some cases the fracture infill changes depending on the type of surrounding rocks.
There are two dominant orientations of the fractures, which can be interpreted as a conjugated system. The main orientation is NE-SW trending, the dip angles are steep (ca. 70°, dip direction NW and SE, respectively).
Subsequent deformation of the filled fractures is documented by a strong grain shape fabric of kainite, undulatory extinction and subgrain formation in kainite, and several mineral transformations. Subgrain formation in halite occurred in both, the fracture infill and the surrounding salt rocks.
The results correlate in parts with investigations which were carried out at the close-by rock salt mine Braunschweig-Lüneburg (Horn et al. 2016). The development of the fractures occurred during compression of clayey salt rocks. However, the results are only partly comparable due to different properties (composition, impurities) of the investigated stratigraphic units.
Further investigations will focus on detailed microstructural and geochemical analyses of the fracture infill and surrounding salt rocks. Age dating of suitable minerals, e.g. polyhalite (Leitner et al. 2013), could help to reconstruct the formation conditions.

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