CRS processing and depth migration of seismic reflection data from Northern Germany

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Within the priority program of the German Research Society on the "Dynamics of Sedimentary Systems" the influence of old deep rooted processes on basin formation and surface morphology is investigated. In this work we present new reprocessing results of seismic reflection datasets recently released by the industry. The data were collected in the late 1970ies and the 1980ies in the North German Basin with the main focus on the sedimentary structures. These datasets were recorded up to 15 s TWT and have a mean fold of about 20 which is very low compared to current acquisitions.

We reprocessed the datasets with the focus on imaging structures in the lower crust and withing the salt domes. During the reprocessing in time domain mainly the Common Reflection Surface (CRS) stack method was used, which is particularly suited for low-fold data. This technique shows a considerably improved imaging quality compared to the Common Midpoint (CMP) processing of the 1970ies and 1980ies. This applies not only to lower crustal features but also holds for the images of the sedimentary structure and the salt plugs. Also an interval velocity analysis was performed and the depth velocity model was built to apply the poststack and prestack depth migration.

In the reprocessed sections the image quality of the crustal reflections and the Moho was significantly improved. The results show an almost flat Moho discontinuity even in the area of the Glückstadt Graben where a lower crustal high density body was discovered. The interpretation is in good agreement with recent results from gravity modeling in this area. Besides the enhancement of crustal and Moho reflections which was the major target of the reprocessing, the CRS stack also improved the images of the salt plugs. Poststack depth migration of the CRS stack and prestack depth migration produced images of reflections within and below the salt, providing an improved continuity of reflectors not seen before.