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Insights on Germany's west coast shelf architecture imaged by closely spaced high-resolution 2D multi-channel reflection seismics in the German sector of the North Sea

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Only sparse high-resolution reflection seismic data are available for the northeastern part of the German sector of the North Sea and thus the Neogene shelf architecture of this area is only poorly known. We acquired approx. 1000 km of 2D high-resolution multi-channel reflection seismic data close to Germany's west coast between the Amrum bank and the Eider valley during RV Alkor expedition Al496 in summer 2017. The survey grid spans 35 x 25 km. Based on these data, we aim to reconstruct the glacial processes that shaped the subbottom morphology in our survey area.

Despite a small acoustic source (Micro-GI Gun with a primary volume of 0.1 l) and a sandy shallow seafloor, penetration exceeds 350 meters below seafloor (mbsf) with vertical and lateral resolution in the meter range. The data clearly image several deep buried tunnel valleys (>2.5 km wide, >200 mbsf deep) cutting folded strata. All valley fills are well stratified and slightly inclined. Thrust features pointing towards the open sea characterize the shallow strata (<180 mbsf) in major parts of the northwestern survey area. The thrust features are imaged on top of undisturbed deeper strata. A dominant erosional surface is found in the relatively shallow subbottom (20 – 70 mbsf) in the whole survey area; this erosional surface was most likely formed during a pre-Weichselian glacial advance.

The identified features document the glacial history of this area. We traced the incised valleys and thrust features for a 3D visualization and interpretation of their location and shape. This will ultimately help to understand the high lateral heterogeneity in the survey area as well as the formation of the identified subbottom morphological features on the shelf. Further interpretation of the data will likely give insights on glacial dynamics as well as past sea-level change.