



Shallow seismic velocity structure around Bornholm Gat, Tornquist Zone from 2D streamer tomography

Yaocen Pan (1,3), Christopher Juhlin (1), Ari Tryggvason (1), Daniel Sopher (1), and Christian Hübscher (2)

(1) Department of Earth Sciences, Uppsala University, Uppsala, Sweden, (2) Institute of Geophysics, University of Hamburg, Hamburg, Germany, (3) BGP Marine, CNPC

The Bornholm Gat, situated between the mainland of southernmost Sweden (Scania) and Bornholm Island, has undergone a long period of deformation controlled by the complex strike-slip system of the Tornquist zone. The deep NW-SE and NE-SW trending fault system, originally generated during the Late Carboniferous / Early Permian, was reactivated by compression during the Late Cretaceous, which resulted in the significant erosion of sedimentary strata in some areas. The shallow structure in this region has previously been characterized, utilizing the deep seismic reflection profile BABEL, vintage exploration seismic grids and sparse well data from the surrounding sedimentary basins. In this study we utilize new multichannel seismic (MCS) data, which was acquired in 2016 during the cruise MSM52 of research vessel Maria S. Merian with a maximum offset of almost 3 km. We have used these data to derive a series of shallow P-wave velocity models using first break tomography. We selected 3 MCS profiles with fairly small feather angles and applied the PS-tomo travelttime tomography program. The longest profile, over 120 km, crosses the Tornquist Zone; two shorter ones extend to the Rønne Graben from the Bornholm Gat and Skurup Platform, cutting the major NE-SW trending fault. The shallow water depth allows refracted arrivals to be detected from very small offset on raw gathers. Preliminary results show models containing information down to over 700 m in the crust. Large lateral variations of the P-wave velocity over the fault zones delineate the main morphology of the shallow Precambrian basement as well as the top of the Lower Paleozoic strata. Combined with the processed MCS reflection profiles, it is possible to clearly identify, what is interpreted here to be the offshore extensions of the Vomb Trough and Colonus Shale Trough, within the Bornholm Gat.