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# 3D thermal modelling within the Lofoten-Vesterålen segment of the Mid-Norwegian continental margin

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A lithosphere-scale 3D structural model has been constructed based on the available structural data to reveal a deep structure of the Lofoten-Vesterålen segment and the northern part of the Vøring segment of the Mid-Norwegian continental margin. The constructed model covers the Vestfjorden, Ribban and Røst basins, the northern parts of the Vøring Basin and the Trøndelag Platform. The model also extends from the Fennoscandian Shield to the north-eastern part of the North Atlantic Ocean.
The initial 3D structural model has been refined using a 3D gravity modelling over the whole study area. The final gravity-consistent model has been used as a structural base for a further 3D thermal modelling, which has been made by use of commercial software package COMSOL Multiphysics. As an upper thermal boundary condition, time-dependent temperature at the Earth's surface and sea bottom has been set, considering palaeo-climatic changes due to the last two Europe-scale glaciations (the Saalian and Weichselian glacial periods). The lithosphere-asthenosphere boundary has been used as a lower thermal boundary which corresponds to the 1300 °C isotherm. In addition to the above-mentioned paleoclimatic scenario, the effects of late Cenozoic erosion onshore and sedimentation offshore have been taken into account during the 3D thermal modelling.
Results of this thermal modelling indicate that the continent is generally colder than the basin areas within the upper part of the 3D model. In particular, considering the transient perturbations in the near-surface thermal regime, as a result of the post-Paleogene erosion and sedimentation, helps us to understand additional details of subsurface temperature distribution within the study area. The thermal effects of the simultaneous erosion over the mainland and deposition within the basin areas indicate that a positive thermal anomaly should exist onshore, whereas the negative one must occur in the offshore part. These two thermal anomalies are associated with the relatively high erosional and depositional rates within the area under consideration. Moreover, the thermal influence of early Cenozoic continental breakup is clearly recognizable within the western part of the continental margin.
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