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Structure and tectonic evolution of the Vøring Margin

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The Vøring Margin off mid-Norway formed in response to early Cenozoic continental breakup and subsequent opening of the Norwegian-Greenland Sea. The present-day structure of the Vøring Basin, covering a wide part of the margin, is a result of a series of post-Caledonian episodes of extension culminating with a complete continental separation in early Cenozoic time. It can be divided into a series of sub-basins, highs, grabens, domes and ridges, mainly reflecting differential vertical movements during the Late Jurassic–Early Cretaceous and Cenozoic extensional basin evolution. Mid-Cenozoic compressional deformation (including domes/anticlines, reverse faults and broad-scale inversion) is well documented on the Vøring margin, but its timing and role are debated. The main phase of deformation is obviously aged to Miocene, but some of the structures are believed to be initiated earlier in Late Eocene–Oligocene. Despite the number of studies on the Vøring Basin, some problems continue to hinder a satisfactory understanding of its evolution. Structural development of the Vøring Basin has very complex history, and thus many researchers have developed structural maps of the area. However, there is a significant gap between the last updated structural maps and ongoing studies, thus needs an updated structural analysis of the area. Another problem is the seismic interpretation of pre-Cretaceous sediments into the deepest parts of the Vøring Basin. The increasing of rates of accommodation and thickness of Late Mesozoic- Cenozoic rocks to westward direction as well as wide distribution of intrusive and effusive bodies lead to decreasing of imaging quality of underlying pre-Cretaceous sediments and its wrong interpretation. Generally, results from recent wells provide more precise age constraints on the Cretaceous succession in the western Vøring Basin. The new seismic data provides more rigorous imaging of the deep pre-Cretaceous basin configuration. These results have been integrated to update existing and construct new regional 2D transects for tectonic modeling. The regional 2D transects and refined time-structure and time-thickness maps are used to illustrate the structure and evolution of the margin with particular focus on the deep Vøring Basin. We compared the observed geometry of crustal thinning in the frame of tectonic modeling conducted to quantify the pre-drift extension across the margin.