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Subsidence analysis based on a 3D structural model of the Voring Margin

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We study the structural evolution offshore Norway using 3D structural modelling to achieve a better understanding of the implications with respect to the fate of hydrocarbons. The main goal of this work was to combine information on the geometry and properties of the sedimentary part of the system with data on the geometry and physical properties of the deeper crust, and to integrate both the continental and the oceanic parts of the margin into a consistent 3D structural model. This 3D structural model of the Vøring-Møre Margin images the geometry of the major basins and of the crystalline crust in both the continental and oceanic parts of the margin. It integrates the thickness of 6 sedimentary layers (Pre-Cretaceous, Pre-Turonian Cretaceous, post Turonian Cretaceous, Paleocene, Pre-Mid Miocene and Post-Mid Miocene) as well as the thickness of the crystalline crust and of a lower crustal High Velocity Body on the continental side. In the oceanic part, three crustal layers (2AB, 3A, 3B) are resolved below the Mid Miocene unconformity. The model is used as a base for backstripping and the analysis of the subsidence history. Preliminary backstripping results indicate that the sediment load played a major role for the subsidence in the Voring Basin which implies high sediment input enhancing continuously tectonic subsidence. Major extensional events are indicated for the beginning of the Cretaceous, for the Albian and for the Cretaceous-Tertiary boundary. However, section balancing shows that brittle extension of the upper crust is far too small to account for the tectonic subsidence observed at the continental margin, and other processes of crustal thinning have to be considered. Post-rift thermal subsidence and rapid loading by the sediment fill appear to be the dominating mechanisms of subsidence in the deep Vøring basins during large parts of the Cretaceous. The transition from Late Cretaceous to Paleocene was char-

acterized by uplift and extension at the westernmost edge of the continental margin, following a late Cretaceous phase of minor shortening in the southern part of the Vøring Margin. The Cenozoic was a period of passive infilling with only minor faulting and declining thermal subsidence.