

3D Density and Temperature Distribution at Passive Continental Margins –an Example from the North Atlantic

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The physical state of passive continental margins is controversial concerning the mode and level of isostatic compensation and the configuration of the lithosphereasthenosphere boundary. One of the few passive continental margins where the detailed structure of the crustal part of the system from the continental onshore, over the continental margin offshore and across the continent ocean transition to the oceanic part is well explored, is the Norwegian margin of the northern Atlantic. This provides constraints for the 3D conductive thermal field and the density distribution across the margin in the crust and in the lithospheric mantle. To evaluate which configuration of the lithosphere asthenosphere boundary is consistent with the observed crustal configuration and with measured temperatures in the sedimentary part of the margin, we test different scenarios. We use a present-day 3D structural model of the Vøring and Møre segments of the Norwegian margin which is constrained by seismic, well and gravity data. 3D gravity modelling and isostatic calculations revealed that the lithospheric mantle below the ocean is less dense than below the continent. Subsequently, we calculate the temperature distribution for the 3D structural model of the margin and compare the results to measured temperatures in deep wells on the margin and in two ODP wells on the oceanic crust. Our results indicate higher temperatures in the oceanic mantle than in the continental mantle.