The Thermal Field Below Permafrost - A Crustal Model of the Beaufort Mackenzie Basin (Arctic Canada)

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The Beaufort-Mackenzie Basin is a petroliferous province in northwest Arctic Canada and one of the best-known segments of the Arctic Ocean margin due to decades of exploration. Our study is part of the programme *MOM* (Methane On the Move), which aims to quantify the methane contribution from natural petroleum systems to the atmosphere over geological times. Models reflecting the potential of a sedimentary basin to release methane require well-assessed boundary conditions such as the crustal structure and large-scale temperature variation. We focus on the crustal-scale thermal field of the Beaufort-Mackenzie Basin. This Basin has formed on a post-rift, continental margin which, during the Late Cretaceous and Tertiary, developed into the foreland of the North American Cordilleran foldbelt providing space for the accumulation of up to 16 km of foreland deposits. We present a 3D geological model which integrates the present-day topography, published tops of Tertiary and Upper Cretaceous units, as well as tops of deeper Mesozoic formations derived from wells and 2D reflection seismic lines. Physical and thermal rock properties have been included based on published geophysical data compilations and the sequence stratigraphic framework established for the region. To determine the position and geometry of the crust-mantle boundary, an isostatic calculation (Airy´s model) is applied to the geological model. Finally, we present calculations of the steady-state 3D conductive thermal field and their relevance for the formations below the base of permafrost.