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Thermal and Petroleum System Evolutions in SW Barents Sea - Impacts of Erosion, Oceanic Accretion and Volcanic Structures

Thermal and petroleum system evolution of the Veslemøy platform (Western Barents sea) have been modeled on two 600-700 km long geological sections with a specific interest on the effects of erosion and magmatic activity. Modeling was constrained by available geologic data, heat flow and hole temperature data, maturity index (R0) and Apatite fission tracks.

A sensitivity analysis shows that: - erosion can be detected from maturity indicators (R0, Tmax) only with significant overburial; - active or recent erosion is associated with a transient perturbation critical for modeling thermal evolution; - isolated dykes and sills as well as magma under accretion at the base of continental crust induce limited temperature perturbations at basin scale; - crustal scale intrusions have a more severe impact on maturity because of their more regional and durable effects.

In the case erosion is active or recent, as suggested for Western Barents sea as a consequence of glacial unloading, modeling history can be significantly "colder" than it would have been otherwise. This results in a transient increase of surface heat flow, which looks now higher than it really is. This is however probably not sufficient to prevent Jurassic source rocks from the risk of over maturation, because Cretaceous cover is rather thick and creates a thermal blanket, and because the close oceanic domain and the likely presence of crustal scale intrusions are causes for addition heat input at some time.