

Thermal history, that's what make a Basin Model a Petroleum Systems model. A best practice approach

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We build basin and petroleum systems models on a regular basis in the oil and gas exploration business and as well for academic purposes. The foundation of modeling and predicting hydrocarbon generation, expulsion, migration and accumulation during the basin's evolution is a solid thermal history. The biggest challenge is that most available thermal calibration data is often limited to the present day (wellbore measurements of temperatures) or at best the not too distant past (maturity indicators such as Vitrinite Reflectance). We present how to best develop the necessary geological observations and models to deploy the lithospheric evolution as a product of the basin forming mechanisms to produce a geologically calibrated temperature history that is consistent and will a solid foundation for a predictive petroleum systems model.

We will illustrate the reasoning, the thought process and the workflows in order to obtain a geological calibration of the thermal history in any basin using two different case studies: The passive margin of the Gippsland Basin, SE-Australia and the foreland basin of the Alpine Molasse Basin. Using a combination of publicly available data, isostatic principles subsidence histories and thermal modeling we are able to reconstruct the key basal heat flow drivers throughout the basin evolution.