



RMSRo: A vitrinite reflectance model consistent with the temperature-apatite fission track system

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Observed temperature, vitrinite reflectance and apatite fission tracks provide different but related information regarding temperature history. Their combined use in borehole heat flow determination as well as thermal and tectonic reconstruction requires a set of predictive models which are internally consistent. While the temperature-fission track system seems well-calibrated, several different vitrinite reflectance models exist. Although variability in vitrinite reflectance values is related to natural variations in the organic material such as; initial composition, depositional environment, degree of oxygenation etc., the most important factor affecting the construction of vitrinite reflectance models is bias in the geological temperature history of the samples used for calibration. Here we add to the vitrinite reflectance calibration data set of Suggate (1998) with more borehole data and construct a kinetic vitrinite reflectance model by minimizing the root mean square (RMS) distance between the calibration data set and model predictions. We validate this kinetic model on wells in the North Sea which have maximum temperature at the present day, and on two wells in the eastern North Sea, which have experienced cooling since the early Eocene thermal maximum. The two latter wells have unusually high quality temperature, vitrinite reflectance and fission track data, and it appears that the independently derived RMSRo-model is consistent with the temperature-apatite fission track system.

Keywords: vitrinite reflectance, basin analysis, thermal history, hydrocarbon exploration, apatite fission tracks

Suggate, R.P., 1998. Relations between depth of burial, vitrinite reflectance and geothermal gradient. *Journal of Petroleum Geology*, v. 21(1), January 1998, 5-32.