
Seismic Modeling of Kerogen Maturity for Source Rocks: Bakken Shale, Williston Basin, USA

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Thermal maturity of source rock measures the degree to which a formation has been exposed to high heat needed to break down the organic matter to generate hydrocarbons. The conversion of kerogen to oil/gas will build up overpressure. Overpressure is caused by conversion of solid kerogen to fluid hydrocarbons in a relatively fixed pore space. The excess pressure caused by kerogen maturity does have impact on the seismic elastic properties.

Source rock maturity yields oil/gas which develops overpressure (e.g., Meisner, 1978; Luo and Vasseur, 1996). It is important to understand how the maturity of kerogen will affect the seismic properties that are of interest to geophysicists. Immature source rocks are in the normal pressured regime and the pressure increases with maturity and over-matured source rocks will be in over-pressured regime. . The wave propagation, velocities, anisotropy and AVO effects by kerogen maturation have been obtained as a function of initial kerogen content (immature), excess pore pressure (mature) for Bakken shale from Williston basin, USA. ■