Delta Tmax and the Onset of the Oil Window in the Uinta Basin; Don't Forget the Pyrograms!

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Abstract

We introduce Delta Tmax analysis from a three well transect across the Uinta Basin that documents the time transgressive nature of the onset of the peak oil window. The use of Tmax (°C) from programmed pyrolysis to understand maturity in the Uinta Basin is challenged by the high paraffin content of Uinta crude and the unique kinetic characteristics of its Type I kerogen. We address this challenge via the Delta Tmax method, which relies on pyrogram shape analysis before and after solvent extraction to detect the onset of the peak oil window. Submature to immature strata are plagued by the Type I Tmax wall which ultimately show unrealistically high Ro values from Tmax in both As Received and DCM extracted cuttings. Additionally, As Received Tmax measurements from deeper, more mature strata of the peak oil window are challenged by low temperature S2 shoulders. The physical attributes of long-chain hydrocarbons of Uinta paraffin causes occlusion of porosity by lower maturity expelled oil that ultimately creates the low temperature S2 shoulder, broad S2 peak and resulting artificially low Tmax. These standard methods of maturity analysis can prove extremely frustrating to the Geologist studying them, however, comparison of the pyrogram character between As Received and DCM extracted cuttings samples document the onset of the peak oil window. This study represents a collaborative effort between Ovintiv, GeoMark Research, and XCL Resources.