

Advances in the Precise Placement of Wells in Reservoirs using Proactive and Reactive Methods

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Abstract

Reactive geosteering is a mature discipline with applications in most high angle and horizontal wells drilled, using methods deriving from the late 1980s, relying on the responses of shallow reading sensors to detect marker strata when crossed. In conjunction with model-compare-update techniques reactive steering is still relevant, though operators increasingly augment these methods with proactive geosteering techniques, especially since the advent of distance to boundary mapping technology (DTB) early in the last decade. Proactive techniques aim to preemptively steer to stay in a target without crossing target boundaries, using DTB or realtime image measurements to track stratigraphic distance and closure angle with respect to stratal boundaries.

Advances in the range, scale and quality of realtime LWD measurements reveal greater detail of properties, fabric and three dimensional geometry of the strata surrounding the bottom hole assembly. Going from such data to actionable information in a relevant time frame is the business of well placement. In tandem with the advances in downhole technology, great strides in interoperability of software bring an ecosystem of powerful interpretation techniques into the realtime domain.

Such wealth of streaming data, when expertly interpreted with modern workflows can support precise placement in increasingly narrowly defined targets, defined stratigraphically, compositionally and petrophysically. Methods of harnessing powerful new realtime interpretation techniques to enable steering in difficult targets will be discussed, highlighting multidisciplinary approaches where the whole exceeds the sum of the parts.