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Fluvial reservoir architecture characterization of maturing oilfields with seismic sedimentology method: take X Block of Gudong oil field as an example

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Reservoir architecture was generally characterized with outcrops and wells. But in petroleum reservoir study, it is found that interwell reservoir architecture is not clear even in maturing oilfields with dense well net. In this study, we develop a seismic sedimentology method for meandering river reservoir architecture characterization. There are 3 key problems: 1) thin bed *VS* seismic resolution limit; 2) resolution mismatch of different data including seismic data, well logs and dynamic oil production data; 3) geological meaning of seismic reflection in thin bed.

3D seismic data and 300 wells (include 5 drilling core wells) are used in this study. Our work is focused on three levels of reservoir architectures: sedimentary microfacies (point bar complex), single point bar and lateral accretion body. In characterization of the first and second levels, seismic interpretation technologies, such as seismic facies analysis, strata slice and multi-seismic attributes analysis, are used. For lateral accretion body characterization, seismic technologies, sedimentology analyzes methods and dynamic production data are integrated. Frequency decomposition, seismic attributes and slice interpretation can give a preliminary geological interpretation. Main lateral accretion boundaries are recognized in this result. And then they are verified with dynamic production data, such as water and tracers injection data. Quantitative formula for point bar architectures that developed in similar modern deposition studies are used in a further characterization.

Through this study, a point bar complex is recognized in the study area where it was thought to be a single point bar. It has two single point bars. Seven lateral accretion boundaries are recognized in seismic data. They are relatively low permeable boundaries in point bars and can influence the flow of oil during production. This characterization result can be used in prediction of remaining oil distribution.

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