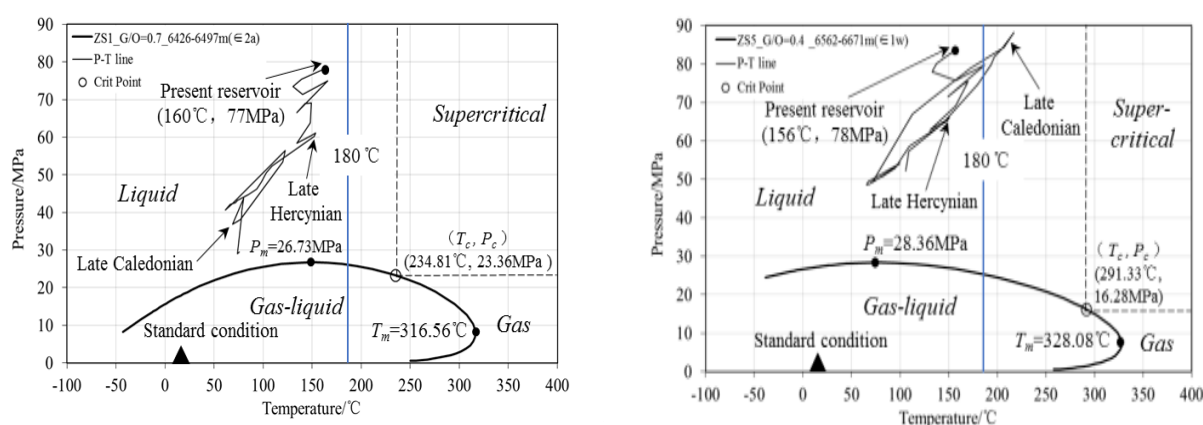


## RECONSTRUCTION OF THE EVOLUTION OF DEEP FLUIDS IN LIGHT OIL RESERVOIRS IN THE CENTRAL TARIM BASIN BY USING PVT SIMULATION AND BASIN MODELING

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To better understand the fluid phase state and its evolution in a deep environment, an integrated PVT simulation and basin modelling method for two light oil reservoirs in the Central Tarim Basin was proposed and applied. The fluid phase models were built using PVT simulation technology after successfully recovering the fluid compositions. The envelopes of fluid from either the Awatage Formation (€2a) for Well ZS1 or the Wusongar Formation (€1w) for Well ZS5 show the order from cricondenbar ( $P_m$ ), critical point ( $C_p$ ) to cricondentherm ( $T_m$ ), suggesting a single liquid phase for the present fluids in the Cambrian sub-salt dolomite reservoirs. The result of this study indicates that the two reservoirs did not experience phase changes, phase differentiation, or oil cracking and maintained a universal state of the liquid phase throughout the whole process by combining the evolutionary history of temperature and pressure derived from basin modelling (Figure 1). The fluid density and viscosity experienced relatively complicated fluctuation processes, and the fluctuations of fluid viscosity over geologic history are much more apparent than the variations in fluid density. The density and viscosity of the Awatage Formation (€2a) for Well ZS1 are found to be lower than those of the Wusongar Formation (€1w) for Well ZS5. The results reveal that the factors, including good trap conditions, a stable tectonic background, a low paleo-geothermal gradient (1.6–2.8°C/100 m), and the weak effect of thermal sulfate reduction (TSR) altogether act on the early-accumulated light oil and gas that has been preserved as a single liquid phase over time. These results are significant for future explorations of large-scale liquid petroleum in Cambrian sub-salt dolomite reservoirs of the Central Tarim Basin.



**Figure 1** The fluid phase diagram in the Awatage Formation (€2a, left) Wusongar Formation (€1w, Right) with a relevant P-T line of reservoir temperature and pressure.