

# A petroliferous Ediacaran microbial-dominated carbonate reservoir play in the central Sichuan Basin, China: Characteristics and diagenetic evolution process

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Some of the largest gas accumulations in the central Sichuan Basin, south China are hosted in Ediacaran microbial-dominated dolomite reservoirs. However, recent exploration of the Secondary Member of the Ediacaran Dengying Formation ( $Z_2dn^2$ ) has been hampered by an overall lack of understanding of the microbial-dominated dolomite reservoir and its diagenetic evolution process due to its prolonged burial history and complex diagenetic alternation. On the basis of detailed petrographic and geochemical analysis, we have conducted an in-depth investigation on the characteristics, diagenetic sequence and pore evolution process of the microbial-dominated dolomite reservoirs. The main reservoir comprises thromatolitic dolomite, stromatolitic dolomite and straticulate dolomite. Six generations of cement are identified in the microbial dolomite lithofacies. Multiple dissolution, cementation, differential dolomitization, recrystallization and silicification are recognized. Based on elemental geochemistry, carbon and oxygen isotope characteristics, as well as fluid inclusion homogenization temperatures, cements are attributed to six diagenetic stages (Fig. 1). of the coupling of high-energy deposition, early supergene karsting and dolomitization processes are found to be critical to form some world-class favorable high-quality microbial-dominated dolomite reservoirs in  $Z_2dn^2$  In the central Sichuan Basin.

**Fig. 1** Diagenetic sequence of microbial-dominated dolomites in  $Z_2dn^2$ .

