

Precise Dating and Sequence Reconstruction of Multiple Generations of Authigenic Calcite in the Ordovician Carbonate Reservoirs of the Chengdao-Zhuangxi Buried Hill Belt in the Jiyang Depression

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Abstract: Based on core observation, thin section identification, cathode luminescence analysis, fluid inclusion analysis, laser in situ U-Pb isotope dating, trace element composition analysis and other techniques, combined with the history of burial evolution and hydrocarbon charge, the characteristics, formation times and related diagenetic fluid characteristics of multi-stage calcite cements filling fractures and breccias in Ordovician carbonate reservoirs in Chengdao-Zhuangxi buried hill belt of Jiyang Depression were studied. The results show that there are six stages of calcite cement between fractures and breccia in this area, and the first stage is early intergranular non-luminescent calcite. The second stage is the orange-red bright calcite cement formed 259.9 ± 6.7 Ma ago. The third stage is the orange bright calcite cement in the fracture, formed 211.6 ± 3.5 Ma ago. Stage IV is a brown light-colored calcite cement that occurred in fractures and breccia between 171.7 ± 2.2 Ma— 180.1 ± 4.7 Ma; Stage V is a dark-colored calcite cement in fractures before 140.0 ± 29 Ma ago; Stage VI is an orange light-colored calcite cement in fractures 36.7 ± 8.4 Ma ago. The change of diagenetic fluid is: atmospheric fresh water - buried diagenetic transformed water - atmospheric fresh water - buried diagenetic transformed water - hydrocarbon fluid.

Keywords: Jiyang Depression; Chengdao-zhuangxi buried hill belt; in situ U-Pb isotope dating; Carbonate; calcite cement; diagenetic fluid