



## **Origin of Carbonate Cementation and Secondary Dissolution Porosity in Sandstones near the Overpressured Top Seal in Niuzhuang Sub-sag of Bohai Bay Basin, China**

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**Abstract:** The carbonate cementation and the secondary dissolution porosity in the sandstones near the overpressured top surface (present-day depth: 2500~2900m) in Niuzhuang Sub-sag are closely related to the overpressure fluid activity. The periodic changes of pore pressure and hydrochemical environment in the sandstones near the overpressured top surface which are caused by overpressure sealing and releasing can lead to the alternation of carbonate precipitation and soluble minerals dissolution. According to the comprehensive research on the diagenesis of sandstones, the content of carbonate cements, the reservoir property, the carbon and oxygen isotope of carbonate cements and the simulation of thermal evolution of hydrocarbon source rocks near the overpressure top surface, the results show that: The iron-containing carbonate cements are the main cementation component, the secondary dissolution porosity of feldspar compositions is the main type of reservoir space, the depth range of carbonate cements with 12% ~ 45% content is about 200 meters up and 500 meters below the overpressured top surface, the high value zone with carbonate cements content greater than 30% is distributed in the depth range of 300~ 400 m, the depth of the high value of carbonate cements content in the sandstones near the overpressured top surface is also the range of secondary dissolution porosity (porosity 15% ~ 25%) development zone. Due to the hydrocarbon boosting effect of organic matter in the Es4 formation, cause the frequent activity of deep carbonate-rich overpressure fluids in the late diagenesis stage of sandstones near the overpressured top surface, the formation of carbonate cements is influenced by the significant overpressure heat flow and the organic decarboxylase on the deep hydrocarbon-generating pressure; The overpressure fluid is discharged repeatedly through the overpressured top surface, which causes the sandstones near the overpressured top surface suffer from the acidic fluid dissolution and form the secondary dissolution pore zone.

**Key words:** Carbonate cementation; Secondary Dissolution Pore; Overpressured Top Surface Niuzhuang Sub-sag;