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Karsts of NE Aquitaine basin : the complex structure of karstic reservoir from a polyphase geological history

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The Mesozoic carbonate margin northeast of the Aquitaine basin has undergone several major alteration phases alternating with erosion episodes. The result is a complex and multiphase karst system that can be grasped by integrating various notions of karstology, geomorphology, geology and hydrogeology. An inventory of various researches on karst coupled with field observations allows different types of karstification to be attributed to different periods. The Lower Cretaceous, Paleocene and to a lesser extent the Oligocene are periods of alteration suitable for the development of cryptokarstification and ghosting.

These phenomena generate a karstification affecting large volumes, at the origin of a large organization of the reservoir. These alteration periods alternate with periods of erosion attributed to the Lower Cretaceous, Eocene and Miocene to the Present, during which the decline of the surface alteration cover and the declogging of rock ghosts within the reservoir control the gravitational functioning of the karsts. From these data, a conceptual model of karstification evolution since the Lower Cretaceous affecting the Northeastern edge of the Aquitaine Basin is proposed.

Crossed with hydrogeological data, this conceptual model makes possible to better understand the hydrogeological functioning of the current karstic systems and to explain the origin of three distinct behaviors: (i) large karstic systems, mainly in free aquifers, within the Jurassic formations, outcrop on the extreme eastern edge of the basin, (ii) smaller aquifer systems partly captive in the Cretaceous formations, and (iii) semi-captive aquifers, also of great extent, within the Jurassic formations under Cretaceous cover.