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The Lower Cretaceous corresponds, in northwestern Europe, to a period of significant extension with the rifting of the Bay of Biscay and its eastern prolongation, the Parentis Basin. This basin has a long history of rifting and several important discontinuities between the uppermost Jurassic and the Albian (at the top of the Jurassic, top of the Barremian and at the Aptian-Albian boundary).

North of this basin i.e. the Aquitaine Platform, the sedimentation is very patchy, the few known Lower Cretaceous deposits suggest continental conditions during this period. Preliminary work carried out on some deep boreholes located on the Aquitaine platform reconstructed temperatures by thermochronology (apatite fission track on Triassic and Permian samples). The preliminary results show that these samples are not in equilibrium with the current sedimentary thickness taking into account a conventional geothermal gradient (35°/km). All these the samples then show a significant cooling at the end of the Lower Cretaceous consistent with a regional erosion event.

This preliminary work leads us to make two hypothesis:

- The deposition of a Lower Cretaceous sedimentary thickness that was then eroded form the Aptian. This hypothesis is in agreement with study carried out further east (French Massif Central) but not with the first order sedimentary outcropping characterization on the Aquitaine platform.
- The high palaeotemperatures recorded are controlled by an increase in the geothermal gradient (a gradient of 50°/km must be considered) during the Upper Jurassic and Lower Cretaceous. This model does not consider the deposition and the erosion of a thick Cretaceous cover. This hypothesis is difficult to explain over such large area without significant crustal thinning.

These two-hypothesis lead to very different palaeogeographical situations and to very different vertical displacement. The answer to these questions is a key in order to understand the periods of karstification of the Jurassic carbonate platform and therefore to have a better knowledge of the water reservoir.

We presented in this work the results of an integrated study. The results are based on a combination of field study and the interpretation of subsurface data (boreholes and seismic). A wide range of methods has been applied to this dataset (sedimentology, sequence stratigraphy, well correlation, isotopic and geochemical analysis of carbonate, sand and clay and thermochronology).