CRETACEOUS EVOLUTION OF THE LEBANESE MARGIN

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The Cretaceous sedimentary history of the Lebanese margin begins with the deposition of the Salima carbonate Formation of Valanginian age. This unit is only preserved in the half grabens of Central Lebanon under the erosive base of the Chouf sandstones, supposed of Barremian age. The Chouf sandstones represent a fluvial-deltaic prism trapped in Central Lebanon by the reactivation of a system of SW-NE trending normal faults. The sand comes probably from (?) Paleozoic sandstones exposed on the Rutbah high in Syria and Jordan. The depositional system is fluvial at base, then tide-influenced and becomes marginal marine at top, evidencing an overall transgressive trend supposedly controlled by an acceleration of subsidence.

The next two formations, namely the Jeita and the Jezzine Formations are both of early Aptian age. They are carbonate dominated in western Lebanon, but the lower one becomes more sand prone to the East. The Jeita Formation represent the transgressive half-cycle of the lower Aptien. It has an erosive base only in northern Lebanon probably due to the uplift of the volcanic hot spot situated in the southern part of the Syria coastal range. This formation is made of a number of shallowing-up, often emersive, small sequences, carbonate-prone in coastal Lebanon but increasingly sand-dominated to the east, especially east of the Yamouneh (Levant) fault. The Jezzine Formation is made of lagoonal carbonates everywhere. It represents the regressive half-cycle of the lower Aptian. Re-examination of well data of the Israel coastal plain suggests that an oolitic facies may have acted as a barrier insulating this lagoon, which is also present in northern Israel. This oolitic barrier is supposed to lay in present-day offshore Lebanon. The upper Aptian Dar el Beidar Formation is carbonate-dominated, rich in orbitolinids, in central Lebanon, but becomes purely sandy to the east. This formation is often strongly eroded under the base of the carbonate of Niha Formation, late Albian in age, which start with the so-called Knemiceras marls.

A hiatus covering the early and middle Albian is indeed recorded everywhere in Lebanon. This hiatus is associated with incised valleys, several hundred metres deep, especially in northern Lebanon where they cut down into Upper Jurassic limestones. The late Albian-Turonian interval is represented by the emplacement of an extensive system of platform carbonates passing to deeper-water mudstones in southern Lebanon. These shallow-water carbonates prograded and retreated several times from northern Lebanon and from the Syrian Rutbah High to the central deep located in southern Lebanon and northern Israel. A widespread deepening is recorded during the Coniacian, possibly starting in some places in the late Turonian. Chalky mudstones were then continuously deposited during the remaining of the Cretaceous and the earliest Caenozoic. A reminiscent of such a change is recorded both on the northern (France) and southern (Algeria, Tunisia) shores of the Tethys. It is interpreted as the first step of the Tethys closure in the Middle East but with « ripples » recorded well to the west along the margins of the ocean.

The basics of the Cretaceous history of Lebanon are thus as follows: the Lower Cretaceous history is made of a few number of marine floodings separated by widespread emersions that displaced the coastal prism into present-day offshore Lebanon, which may have some interest in oil exploration. Throughout the whole Cretaceous, central and southern Lebanon represented a paleogeographic low, which may have extended to northern Israel, north of the Carmel fault. This paleogeographic low may have been controlled by the fault network, namely at the junction of the south Palmyrides and the Carmel faults. An interesting association is also recorded throughout the Lower Cretaceous between transgressions and volcanic episodes, suggesting that transgressions were tectonically controlled.
Fig. 1 - N-S transect across north Lebanon, west of Yamouneh fault for the Valanginian-upper Cenomanian interval