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Evidences for progressive autochthonous bauxite cover dismantling and trapping in a karst during mid-Cretaceous. Example of in the Villeveyrac basin (Southern France)

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Under specific tropical and humid conditions, weathering leads to the formation of kaolinite and ferralitic/bauxitic soils. Southern France underwent such conditions from the Lower to Mid Albian time with bauxite deposits trapped on top of karstified Jurassic limestones. In the Villeveyrac basin (30km west of Montpellier city), one of the latest bauxite mines in France recently performed two complete cores (192 and 90m, respectively) that recovered the basal bauxite deposits, atop the karstified Jurassic limestone to the Upper Cretaceous clastic sediments. The sedimentary description and mineralogy analyses of these two cores provide evidences for reworked, allochthonous bauxite deposits and allow a better understanding of: 1) the genetic process and deposition of the bauxite and 2) the conditions of the switch toward a perennial detrital depositional system of its cover.

XRD analyses performed on the 6 meters thick bauxitic interval show that the lower and the middle parts are only composed of hematite and boehmite, whereas kaolinite appears in the upper part of the bauxitic sequence. The diffractograms of the silty claystone of the Upper Cretaceous cover show an upward decrease of kaolinite, and increase of smectite coupled with the appearance of quartz and feldspar in the Upper Cretaceous sediments.

The clay mineral changes with the coeval increase of the detrital fraction towards the top of the series argue for the progressive dismantling of the lateritic sequence and underlying source rock in the hinterland (upstream) whose detritals were trapped downstream, in the karstified limestone with a reverse stacking during a relative base-level rise.