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**A Model of Shallow Calcite Cementation in Alluvial Fans: An Example from the Burdigalian Sediments of the Valles-Penedes Half-Graben (Northeast Spain)**

The Vallès-Penedès half-graben developed during a Neogene extensive period that caused the collapse of the Catalan Coastal Ranges and the formation of the Valencia Trough. The Neogene of the Vallès-Penedès half-graben has been divided into three lithostratigraphic complexes. From base to top: 1) lower continental complexes of Burdigalian age; 2) continental and transitional complexes with reefal carbonate platforms of Langhian age and 3) continental and transitional complexes of Lower Serravallian age. This study is focused on the lower complexes which are constituted by red beds deposited in alluvial fan environments.

The cementation of the studied materials is characterized by one single stage of calcite precipitation, associated with a circulation of shallow meteoric fluids through the sediments. Nevertheless, geochemical features of the calcite cement vary according to the sedimentary environment. These differences allowed to develop a model of fluid circulation within an alluvial fan.

Thus, in proximal alluvial fan environments, fluids were very oxidizing and precipitated trace element-poor calcite. In medium to distal alluvial fan environments the increase in the residence time of the meteoric fluids resulted in a decrease in their oxidizing state precipitating Mn-rich calcite. Finally, the distal alluvial fan and lacustrine environments were characterized by the presence of reducing fluids from which Mn and Fe-rich calcite precipitated.

Moreover, the progressive Mn and Fe enrichment of calcite cement can be correlated with the presence of blue spots in the red beds, indicating that leaching of these rocks might be the source for these elements.