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Outbank Trigger Mechanisms of the Eocene Carbonate Debris Sheets in the South Central Pyrenean Foreland Basin

From Early Ypresian to Late Lutetian, the western part of the South-central Pyrenean (Jaca) Basin stayed as an underfilled foreland, with deep terrigenous turbidites and carbonate debris sheets in their basin trough, and carbonate platforms in their craton margin. The carbonate debris sheets provenance, from the southern foreland platforms, are well established by their own composition and geometry. The terrigenous turbidites come laterally from the eastern part of the South-central (Trempe-Graus) Basin; a piggy back basin over the south-central structural unit.

The basin architecture consists of three backstepped stratigraphic sequences. Each lasts 4,5 to 5 MY and they are well defined by the stratigraphic structure of their correlative carbonate platforms. The carbonate platforms have a ramp type geometry, with macroforaminiferal limestones in their inner shallow facies, and nodular marnocalcareous facies and debrites in their outer deep facies.

Two trigger mechanisms could be invoked to induce the catastrophic failure of the carbonate margin: 1) The platform margin flexure linked to the tectonic subsidence rise in the basin trough; 2) The intersection of the frontal advance of a piggy back blind thrust sequence, developed laterally to the South-central structural unit, with the carbonate platform margin.

Outcrop based evidences of the influence of both mechanisms in the origin of the South-Pyrenean carbonate margin collapse, are found. Moreover, the differences in the structure and composition of the carbonate debris sheets bring an exceptional picture of the close relationship between subsidence, surface deformation and carbonate margin collapse.