Middle to Late Miocene Thrust and Piggyback Basin Development in the External Betic Chain

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Several lines of evidence, surface geology, seismic lines and wells, show that the eastern and central external zones (east of 5º W) of the Betic chain have been affected by a piggyback sequence of thrusts in the later part of Middle Miocene and early Late Miocene (13-10 Ma).

The piggy back thrust sequence affects the previous Mesozoic and Cenozoic sedimentary sequences as well as a remarkable brecciated sedimentary sequence mainly nourished by Triassic, Cretaceous and Tertiary soft sedimentary rocks. This ubiquitous unit has been previously cited as Guadalquivir olistrostrome, Olistostromic unit, Chaotic Subbetic units, etc. More than three thousand samples allow dating this unit as Late Langhian to Early Serravallian (15-13 Ma). These units constitute the basement of many piggy back basins formed on the thrust hangingwalls, contemporaneously with the northwest movement of them.

Sediment deposited in these piggy back basins, forming the Castro del Rio unit show clear evidences of syn-sedimentary and coseismic deformation and in a general way show a fining and thickening upward sequence, from detrital or carbonatic to fine grained marly sediments. Abundant reworked fauna from Cretaceous to Early Tertiary make it difficult to date these sediments, with only a few samples providing a Late Serravallian-Early Tortonian age. The Castro del Rio Unit is also cut by thrusts that are finally sealed by Late Miocene sediments.