

Sediment-dispersal Systems of the Mexican Interior Basin: Late Cretaceous-Paleogene Source-to-Sink Analysis of Northern and Central Mexico

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Abstract

The Mexican Interior Basin formed in early Late Cretaceous time as a narrow retroarc foreland basin developed on recently rifted continental crust of nuclear Mexico. It differs from the contemporary Cordilleran foreland basin to the north, with which it was coextensive, in having a dominant volcanic-lithic component in all of its sandstones. Petrographic analysis and detrital zircon data indicate that the dominant sediment source for all strata was the coeval continental margin arc of western Mexico. Temporal differences in zircon content indicate distant sediment sources in basement and derivative sedimentary rocks of southwestern Laurentia early and late in basin evolution, but that during intermediate stages (Coniacian- early Maastrichtian) stages of basin evolution, the Laurentian sources were absent and most pre-arc grains were derived from accreted rocks of western Mexico upon which the arc was built.

The initial basin possessed a narrow foredeep filled by sediment-gravity flow deposits characterized by dominantly axial sediment transport. Carbonate platforms of eastern Mexico supplied calcilithites to the foredeep during early stages of basin formation, indicating the importance of pre-foreland paleotopography on sediment fill.

The basin migrated eastward with time, ahead of an advancing orogenic wedge, and in northeastern Mexico, where the loaded continental crust was older, developed a shallow marine and continental succession of latest-Cretaceous-early Eocene age. Basin partitioning by inversion of Jurassic extensional basins in Santonian-Campanian time was probably important in isolating the central Mexico part of the foreland basin from Laurentian sediment sources. Large-scale submarine fans in the western Gulf of Mexico, if present, were likely tied to extensive dispersal systems with headwaters in southwestern Laurentia.