

Migration of Synorogenic Cenozoic Depocenters Due to Multi-phase Inversion of the Eastern Cordillera of Colombia

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In the Northern Andes, inversion of Mesozoic extensional structures controlled location of synorogenic successions and dispersal of detritus since Paleocene time. Reactivated structures bounding and along the axial zone of the present Eastern Cordillera of Colombia were active at different phases of deformation, as interpreted from detailed geologic mapping, tecto-sedimentological studies using provenance (petrography, heavy minerals, geochronology), biostratigraphy and termochronological data.

In the Paleocene to early Eocene, reverse reactivation of western extensional structures of the former extensional basin broke the foreland basin into two depocenters. The western depocenter was bounded to the west by uplifts and magmatic arc along the Central Cordillera and to the east by reactivation of former normal faults (present western margin of the Eastern Cordillera). Terrigenous and magmatic detritus filling the western depocenter were derived mainly from the Central Cordillera. The Eastern depocenter extended up to the present Llanos basin with minor uplifts, and detritus derived from sources to the west and south included: reworking of the western synorogenic clastic wedge and erosion of the Cretaceous sedimentary cover.

During middle Eocene to Oligocene time, composition and dispersal of sediments changed abruptly because active structures included the Eastern side of the former extensional basin. As result of this new structural activity, the Eastern depocenter split into an axial depocenter and the Eastern foothills depocenter. Sandstone composition is quartzose in both depocenters, metamorphic and volcanic fragments are almost absent, paleocurrent indicators in the axial depocenter indicate a northward and westward dispersion of sediments. The clastic wedge in the eastern foothills depocenter thins abruptly toward the Llanos basin, the clastic wedge in the axial zone is thick near reactivated structures, and the clastic wedge in the western depocenter thins westward.

Since late Miocene time, the strong inversion of the Eastern Cordillera involved both the eastern and western extensional structures, and synorogenic sediments only accumulated in the western depocenter and the Eastern foothills depocenter, whereas in the axial depocenter the record is this phase is absent.