

Paleotopography inferred from terrestrial stacking patterns in an intermontane basin setting, Paleogene Renova Formation, southwest Montana

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Integrated facies, paleoflow, and detrital zircon data from the Paleogene Renova Formation constrain paleodrainage evolution and paleogeography of the intermontane basins of southwest Montana. The Renova Formation is characterized by four depositional environments: alluvial, fluvial, lacustrine/paludal, and primary volcanoclastic. Paleogene alluvial fan facies flank modern uplifts, documenting radiating sediment dispersal away from the Pioneer Mountains, McCartney Mountain, and the Boulder batholith-Highland Range. Fluvial facies interfinger with distal alluvial facies and delineate Paleogene basin axes. Lacustrine facies occur in basin centers, while paludal facies are present along basin margins.

Progradational and aggradational stacking patterns reflect a rapidly subsiding environment where the rate of accommodation space generation either outpaced or was equal to the rate of sediment influx. High-energy Paleogene fluvial systems were marked by rapid aggradation, and coeval basin margin deposits preserve alluvial fan progradation. Syndepositional volcanism coupled with rapid denudation of Sevier-Laramide highlands provided abundant sedimentary detritus. Relatively short depositional hiatuses were marked by entisol and inceptisol development.

Data suggest a rugged paleotopography characterized the intermontane basin region during the Paleogene. Fluvial systems in the vicinity of the Boulder batholith were locally-sourced high-energy headwater systems that received substantial detritus from the surrounding uplands. Detrital zircons reveal local plutonic bodies, including the Pioneer batholith, McCartney Mountain pluton, Boulder batholith, and Tobacco Root batholith were partially unroofed and supplying detritus to the basins by Chadronian time, and possibly as early as Uintan time. Collectively, the data indicate that Paleogene paleotopography of the intermontane basin region was strikingly three dimensional.