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Paleosols in the Eocene Carroza Formation, La Popa Basin, Mexico: Indicators of Diapiric Tectonics and Depositional Environments

Composition, characteristics and stratigraphic position of paleosols can be important indicators of diapiric history in salt-basin provinces. Diapir-proximal paleosols are well preserved and exposed in the Eocene Carroza Formation within the La Popa basin, approximately 50 km northwest of Monterrey, Nuevo Leon, Mexico. The Carroza Formation was deposited in an asymmetrical, synclinal salt-withdrawal basin on the down-thrown block of the La Popa weld. During Carroza deposition, what is now the northwest-trending weld was probably an elongate, topographically elevated diapir analogous to the uplifted footwall of a half graben. Growth strata with several angular unconformities are found near the weld and sand-rich fluvial facies occur near the basin axis. The shallow rivers that deposited these sandy facies flowed parallel to the diapiric wall. Small alluvial fans derived from the elevated diapir intertongue with the fluvial-plain deposits in the basin. Sedimentation rates appear to have increased toward the basin axis, producing the observed thinning of strata near the diapir and associated increase in maturity of the paleosols. Paleosols are preserved in strata in both the alluvial fan and floodplain environments. The paleosols and other sedimentologic evidence indicate that the Carroza Formation was deposited in an arid to semi-arid environment. Accumulation of gypsum or calcium carbonate within paleosols adjacent to the salt diapir reflects the state of salt movement. For example, when the diapir was tectonically active and salt was exposed, the surrounding soils accumulated gypsum and other diapiric salts which are preserved in the paleosols.