

Oligocene Volcanism in Texas, New Mexico and Southern Colorado

D.F.Parker (Dept. of Geology, Baylor University, Waco, TX 76798-7354, U.S.A., ph. 254 710 4418, fax 254 710 2673, don_parker@baylor.edu)

The southwestern United States were located along the northeastern margin of an Eocene continental arc created by subduction along the southwestern margin of North America in Mexico. This arc produced calcalkaline andesite and dacite in southern New Mexico and southwestern Texas during the period 45-37 Ma. Beginning at approximately 36 Ma, widespread, extensive silicic lava eruption and caldera volcanism began in southwestern Texas, and a period of widespread eruption of ignimbrites began in southern and southwestern New Mexico; in contrast, the activity that began in the San Juan Volcanic Field (SJVF) of south-central Colorado at approximately 35 Ma was dominated by andesitic volcanism associated with composite volcanoes of the Conejos Formation, although the nearby Grizzly Peak and Mt. Aetna cauldrons produced ignimbrites at 34 Ma.

Silicic volcanism, in part alkalic and part alkali-calcic, of southwestern Texas extended from 36-28 Ma; in general, these rocks lack an orogenic geochemical signature and have been successfully modelled by AFC processes involving large degrees of crystal fractionation. The youngest calderas and silicic lavas at 28 Ma mark a transition to basaltic volcanism associated with Basin and Range extensional faulting. In southern New Mexico, a transition from eruption of rhyolitic tuffs to basaltic andesite and andesite lavas occurred at 28.5 Ma; a volcanic lull lasted from 24-10 Ma, followed by eruption of basaltic lavas in the Rio Grande Rift beginning at 10 Ma. In the San Juan volcanic field, widespread eruption of large ignimbrites from 16 caldera complexes began at ~29 Ma; this voluminous eruption episode was followed by a transition to bimodal basalt-rhyolite volcanism (dominated by basaltic rocks) of the Hinsdale Formation beginning at 26 Ma and continuing to the present. In contrast to southwestern Texas, silicic rocks of the SJVF have been shown to contain significant crustal components.

In total, at least 43 caldera complexes in Texas, New Mexico and southern Colorado during the period 37-26 Ma erupted as many large ignimbrites. Streams washed pyroclastic debris to the Gulf Coast where it accumulated, forming the Catahoula Formation. Finally, coarse volcanoclastic conglomerate and sandstone of the Gueydan Formation, eroded from the youngest, mafic volcanic rocks of

southwestern Texas and adjacent Mexico, were deposited by the ancestral Rio Grande, which was beheaded as Basin and Range extension disrupted the source regions of the river.

This major episode of silicic volcanism obviously was of tremendous local importance; sufficient detailed $^{40}\text{Ar}/^{39}\text{Ar}$ dates now exist to help examine whether a corresponding effect may have been visited upon global climate.