

Stratigraphy and structure of the Miocene Bear Canyon conglomerate, Imperial County, SE California: Evidence for the episodic growth of the Chocolate Mountains anticlinorium.

Krista Muela

**Department of Geological Sciences, San Diego State University,
San Diego, CA 92182-1020 USA**

Abstract

Between Indian Pass and Picacho State Recreation Area crystalline basement is overlain by early Miocene (~23 Ma) volcanic rocks. These units are in turn unconformably overlain by undated alluvial sedimentary rocks of the informally recognized Bear Canyon conglomerate. On the north limb of the anticlinorium, three steeply dipping faults and associated splays cut this sequence of rocks consistently off setting them in a dextral sense while a fourth fault at Picacho transects both limbs of the anticlinorium. Where exposed, fault surfaces contain sub-horizontal slickenlines and offset hingelines of E-W trending folds. The three westernmost faults appear to tip out into the core of the anticlinorium. Hence, we speculate that the anticlinorium may have taken up the slip on these faults through tightening and growth. Over an ~15 km EW distance, the cumulative dextral offset on the four faults is ~3.5 - 4 km.

At Picacho, the Bear Canyon conglomerate lies on the northern limb of the anticlinorium. There the lower member of the Bear Canyon dips ~21° northward, and is unconformably overlain by the ~15° northward dipping middle member. In contrast, the unconformably overlying upper member is not tilted.

Between Carrizo Wash and Indian Pass, the Bear Canyon conglomerate lies on both the southern and northern limbs of the anticlinorium. North of the intersection between Carrizo Wash and Gatuna Wash, the Bear Canyon conglomerate dips ~17° NE. Northwest of Carrizo Wash, it dips ~10° - 27° SW. Just NW of Indian Pass, the Bear Canyon dips about ~8° - 12° southward and is interstratified with the basalts of Black Mountain. The basalts ~2 km SE of Indian Pass are transected by a major dextral strike-slip fault and dip ~20° - 57° SW. Published K-Ar data suggest an age somewhere between ~9.4 and ~13.6 Ma for the basalts of Black Mountain. Hence, our data imply that the anticlinorium was growing after ~9-13 Ma ago, and that it, and the dextral strike-slip faults that we have mapped, are the likely record of the development of a segment of the Eastern California Shear Zone.