

2006 GSA South-Central Section meeting in Norman, OK

The Peninsular Ranges batholith: A link between the western and southern margin of North America

Alsleben, H.¹, Wetmore, P.H.², Schmidt, K.L.³, Gehrels, G.E.⁴, and Paterson, S.R.⁵, ¹Department of Geology, Texas Christian University, TCU Box 298830, Fort Worth, TX 76129, ²University of South Florida, Tampa, FL 33620, ³Lewis-Clark State College, Lewiston, ID, 83501, ⁴Dept. of Geosciences, University of Arizona, Tucson, AZ 85721, ⁵Department of Earth Sciences, University of Southern California, Los Angeles, CA 90089.

The Peninsular Ranges batholith is composed of NW-trending litho-stratigraphic basement assemblages that extend from ~34°N latitude in southern California to ~28°N latitude in central Baja California. Assemblages include from west to east: (1) in situ and accreted Cretaceous arc units related to Cretaceous magmatism and accretion of terranes along the Cordilleran North American margin; (2) Mesozoic sedimentary basin assemblages; (3) and Paleozoic passive margin strata.

Paleozoic units are subdivided into shallow-water and deep-water strata to the north and south of ~30°30'N latitude, respectively, separated by a cryptic, E-W trending contact. These units are thrust over and locally overthrust by Triassic-Jurassic basin assemblages that lie to the west. Analyses of detrital zircons from Paleozoic units suggest Ordovician depositional ages and similar sediment sources as miogeoclinal units in southwestern North America. Detrital zircon analyses of Triassic-Jurassic units support reworking of mostly proximal detritus. However, Permian detrital grains, for which local sources are absent, require contributions of detritus from distal sources. Structurally, Paleozoic shallow-water units are dominated by E-W structural trends, whereas deeper-water units show complex deformation including obliteration of primary structures, tight refolding of isoclinal folds, and development of NW-SE trending crenulation cleavage. The latter structural trends are also dominant in Triassic-Jurassic units and Cretaceous strata to the west.

Based on these data, we suggest deposition of Paleozoic rocks on the North American passive margin. E-W-trending structures in these units resulted from deformation along the southern margin of Laurentia likely during the Permo-Triassic. Younger units were derived by reworking of Paleozoic strata with Permian zircons derived from arc assemblages possibly in eastern Mexico. NW-SE-structural trends formed during Jura-Cretaceous deformation related to tectonism along the western margin of North America causing strong transposition locally. In summary, Paleozoic and early Mesozoic units formed along the southwestern edge of North America and display characteristics that can be linked to both the Cordilleran and southern margin of the continent through time.