

248-7 - STYLES AND HISTORY OF CONVERGENT MARGIN DEFORMATION IN THE SOUTHERN CALIFORNIA BATHOLITH DURING THE LATE CRETACEOUS BEGINNING OF THE LARAMIDE OROGENY



Wednesday, 18 October 2023



8:00 AM - 5:30 PM



Hall B (2, David L Lawrence Convention Center)

Booth No. 273

Abstract

In the eastern San Gabriel Mountains, located north of Los Angeles, California, the late Cenozoic Cucamonga thrust has uplifted and exposed the lower crustal root of the Mesozoic Southern California Batholith. We use structural data and U-Pb zircon analyses from these exposures to document changes in the style of intra-arc deformation in the batholith as the Laramide Orogeny began during the Late Cretaceous (at or after ~90 Ma).

At the base of the uplifted section, a 4 km-thick package of metasedimentary rock records the intrusion of amphibolite, charnockite and other dikes of probable Jurassic to Early Cretaceous age. The oldest gneissic fabrics (S1, S2) in these rocks record Early Cretaceous partial melting, granulite-facies metamorphism, and top-to-the-S and -SE (present day reference frame) reverse motion on surfaces that dip moderately to the N and NW. These structures define a D1/D2 thrust system that formed on the trench side of the arc and was active during the Early Cretaceous. From 89-77 Ma this thrust system was reactivated by oblique-slip shear zones (D3) that record sinistral-reverse displacements on N- and NW-dipping surfaces. The timing of deformation in these latter shear zones is indicated by the age of 90-85 Ma syn-kinematic intrusions of the Tonalite of San Sevaine Lookout. After emplacement of the tonalite, the lower crustal section was deformed by a series of S-vergent, overturned folds. The emplacement of granodioritic dikes into the axial planes of some of these folds suggests that they formed during the latest stages of D3 transpression and tonalite emplacement. Superimposed on all these structures are a series of ductile-to-brittle thrust faults and folds that appear to be related to formation of the late Cenozoic Cucamonga thrust fault at the southern edge of the San Gabriel mountains.

These data show that the Southern California Batholith in the San Gabriel Mountains records a tectonic transition from Early Cretaceous reverse faulting and crustal imbrication on the trench side of the arc to Late Cretaceous transpression and oblique sinistral-reverse deformation during a magmatic flare-up from 89-77 Ma. Another major episode of shortening and crustal imbrication occurred during the late Cenozoic when the Cucamonga thrust uplifted the San Gabriel block.

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