93-8 - DATING DEFORMATION IN THE ALAMO MOUNTAIN AND PIRU CREEK SHEAR ZONES: INSIGHTS INTO LATE CRETACEOUS TECTONICS IN SOUTHERN CALIFORNIA

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10:20 AM - 10:35 AM

304B (Anaheim Convention Center)

Abstract

Paleomagnetic data from the Insular superterrane and related terranes in the western Canadian and northern US Cordillera have been used to argue for large-magnitude (~4000 km), northward translations along the western margin of the North American Cordillera in the Late Cretaceous (the Baja-BC hypothesis). This model postulates that initial collision of the Insular superterrane occurred in southern California and/or northern Baja Mexico prior to dextral translation along the western North American margin from 85-55 Ma. A major unresolved problem with the Baja-BC hypothesis is that faults that could have accommodated large-magnitude translation in this southern area are missing or obscured by later Cenozoic faulting and/or sedimentary cover. Here, we investigate the deformation record of Late Cretaceous ductile shear zones in southern California with the goal of understanding the timing and kinematics of deformation at this time. We focus on the Alamo Mountain and Piru Creek shear zones in the central Transverse Ranges.

We report new field observations and twenty-one U-Pb LA-ICPMS zircon ages from deformed and undeformed host rocks and dikes with the goal of documenting the timing of deformation. Our data show that the Alamo Mountain and Piru Creek shear zones were active at ~76-72 Ma and possibly included an earlier (pre-Late Cretaceous) phase of deformation. Both shear zones record sinistral strike-slip to sinistral-normal motion in their present-day orientations. When Cenozoic block rotations are restored, we find that the Alamo Mountain and Piru Creek shear zones originated as NNW-SSE-striking, moderately ENE-dipping shear zones that formed at mid-crustal conditions (500-600°C and 12-15 km depth). Structural analysis of the shear zones indicates that the dominant component of motion was sinistral strike-slip and that the dip-slip component of motion was minor. The timing and kinematics of deformation in the Alamo Mountain and Piru Creek shear zones are similar to other Late Cretaceous shear zones in the Southern California Batholith. When palinspastic reconstructions are considered, these shear zones comprise an extensive, margin-parallel shear zone system over 200 km long. The presence of this sinistral shear zone system and the absence of dextral shear zones requires reevaluation of the Baja-BC hypothesis in southern California during the Late Cretaceous.

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