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UC SANTA BARBARA  
Department of Earth Science

# Earth Science Colloquium

THURSDAY April 16th., 2020 • 2:00 PM

## Implications of volcanism in coastal California for the Neogene deformation history of western North America

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The geologic record of coastal California includes evidence of numerous volcanic centers younger than 30 Ma that do not appear to have erupted in an arc setting. By correlating these volcanic centers with specific slab windows predicted from analysis of magnetic anomalies on the Pacific plate, we add new constraints to tectonic reconstructions since 30 Ma. Our correlations, such as erupting the Morro Rock–Islay Hill complex south of the Pioneer fracture zone and the Iversen Basalt south of the Mendocino fracture zone, require larger displacements within western North America than advocated by most previous authors. Specifically, we infer at least 315 km of motion between the Sierra Nevada and rigid North America at an azimuth of about N60°W and at least 515 km between Baja California and rigid North America in a similar direction. A consequence of inferring a large displacement of Baja California is that the Pacific–North American plate boundary must have developed most of its current form prior to 10 Ma. We interpret a slab window developing between Cocos and Monterey plates after 19 Ma that reconstructs under nearly all of the southern California volcanic centers dated at 18–14 Ma. Most of the sedimentary basins associated with volcanic rocks show brief periods of rapid subsidence synchronous with volcanism, followed by slow subsidence of variable but often extended duration, consistent with rapid extension of cold lithosphere over recently introduced hot asthenosphere.