

# **POINT LOBOS AND POINT REYES: EVIDENCE OF ~180 KM OFFSET ON THE SAN GREGORIO/NORTHERN SAN ANDREAS FAULT**

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## **ABSTRACT**

Virtually identical suites of distinctive felsic volcanic and granitic conglomerate clasts, together with other shared characteristics, indicate that the Paleocene or Eocene Point Reyes Conglomerate and the Carmelo Formation (at and near Point Lobos), were originally deposited in the same submarine canyon system. Essentially all of the abundant, and several of the rare, clast varieties at each location appear in the other location, matrix of the two conglomerates is indistinguishable, and the same species of a rare trace fossil occurs in both formations. Petrography, petrology, microprobe geochemistry, and SHRIMP zircon U/Pb dating suggest mutual parent rocks, depositional history, and diagenesis, indicating that the Point Reyes Conglomerate is a displaced segment of the Carmelo Formation.

Although the basement granodiorites of Point Reyes and of Point Lobos are similar enough to be zones of a single pluton; petrography, petrology, and microprobe geochemistry show the unusual Porphyritic Granodiorite of Monterey near Point Lobos is the best candidate for origin of certain boulders within the Point Reyes Conglomerate.

None of the fourteen other Cretaceous and Paleogene conglomerates considered in this study share the Point Reyes/Point Lobos suite of clasts.

This paleogeography has proved to be predictive. Since its first introduction in April 1998, other authors have reported five additional geological and geophysical correlations which are consistent with this model. Thus thirteen pairs of correlative features have now been documented which are juxtaposed across the San Gregorio/northern (north of Bolinas) San Andreas fault by a single post-middle Miocene dextral offset of  $180 \pm 5$  km.

## **Biography**

I grew up in a former coal mining district of southern Iowa. My siblings and I spent hours searching for crinoid and brachiopod fossils eroding from the Pennsylvanian limestone in our family's pasture. My first geology course was taken at the University of New Mexico, Albuquerque, but I got my real start in geology via Merritt College field courses led by the late George S. Hilton. These courses were so valuable and fun that I continued to attend Merritt College geology field courses while I was attending Sonoma State University. I earned my bachelor's in geology from Sonoma State University, and a Masters in geological and environmental sciences at Stanford University. I now do independent research in Cretaceous and Paleogene conglomerates of the California Coast Ranges as clues to fault offset and paleogeography.

## Publications:

Burnham, K., 2006, Predictive Upper Cretaceous to Early Miocene paleogeography of the San Andreas fault system derived from detailed multidisciplinary conglomerate correlations, *in*: Girty, Gary H., and Cooper, John D., eds., *Using Stratigraphy, Sedimentology, and Geochemistry to Unravel the Geologic History of the Southwestern Cordillera: a Volume in Honor of Patrick L. Abbott*: Pacific Section, Society for Sedimentary Geology (SEPM), v. 101, p. 145-178.

Burnham, K., 2005, Point Lobos to Point Reyes: Evidence of ~180 km Offset of the San Gregorio and Northern San Andreas Faults, *in*: Stevens, C. H., ed., *Cenozoic Deformation in the Central Coast Ranges, California*: Pacific Section, Society for Sedimentary Geology (SEPM), v. 97, p. 1-29.

Burnham, K., 1999c, Stop 4 -- Point Lobos, Comparison and correlation of Cretaceous and Paleogene rocks of Point Lobos and Point Reyes *in*: Clark, Joseph C., Weber, Gerald E., Rosenberg, Lewis I., and Burnham, Kathleen, *Neotectonics of the San Gregorio fault zone, central coastal California*, *in*: Garrison, R. E., Aiello, I., and Moore, J. C., eds., *Late Cenozoic fluid seeps and tectonics along the San Gregorio fault zone in the Monterey Bay region, California (volume and guidebook)*: Bakersfield, CA, Pacific Section, American Association of Petroleum Geologists, p. 145-150.

Burnham, K., 1998c, Preliminary comparison and correlation of two Cretaceous conglomerates, the strata of Anchor Bay and an unnamed unit in the Pilarcitos block, across the San Gregorio and San Andreas faults, *in*: Elder, W. P., ed., *Geology and tectonics of the Gualala block, northern California*: Los Angeles, CA, Pacific Section, Society for Sedimentary Geology (SEPM), p. 95-120.

Burnham, K., 1998d, Preliminary comparison of two upper Cretaceous conglomerates: the strata of Anchor Bay and an unnamed unit east of the Pilarcitos fault, San Mateo County, California: a contribution to the paleogeography of the region of the San Andreas fault system [Masters thesis]: Stanford University, 103 p.

Plus seven abstracts for conference presentations.

## Current memberships:

American Geophysical Union  
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