

The mid-Cretaceous Oregonian event: closure of a marginal seaway by westward subduction in the North American Cordillera

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Perhaps the least known Cretaceous orogenic event in the North American Cordillera is the Oregonian, although Blackwelder had recognized the event by 1914. The event occurred during the mid-Cretaceous at ~100 Ma and rocks affected by it outcrop discontinuously from southern Mexico to Alaska. The event resulted from the closing of a marginal sea, named the Bisbee-Arperos seaway in Mexico and Arizona and the Gravina-Gambier basin in British Columbia and Insular Alaska. The ocean formed after the Late Jurassic-Neocomian Nevadan orogeny and associated postcollisional magmatism.

In the most complete cross-section, located in western Mexico, a west-facing Albian carbonate platform was buried by easterly-derived Cenomanian clastic rocks at 100 Ma, then overthrust from the west by rocks of the 128-105 Ma Santiago Peak-Alisitos arc, which collectively serve to document westerly subduction. The tectonically thickened collision zone was intruded from 100-84 Ma by distinctive tonalite-granodiorite plutonic complexes, all with $Sr/Y > 10$, $Sm/Yb > 2.5$, $Nb/Y > 0.4$, and $La/Yb > 10$. These are typical features of slab failure, not arc, plutons. Remnants of the basin, related easterly vergent 100 Ma thrusts, and 100-84 Ma slab failure plutons occur in the eastern Peninsular Ranges, the eastern Sierra Nevada, Salinia, the Idaho batholith, the High Cascades, and the Coast plutonic complex of British Columbia.

Within the Sierra Nevada, rocks older than 100 Ma were strongly deformed by folds & thrusts at ~100 Ma whereas Lower Cretaceous rocks of the Great Valley Group, located just to the west, exhibit no deformation of that age. Detrital zircon studies by Jim Wright suggest that Lower Cretaceous rocks of the group were not derived from rocks exposed in the Sierras, but more likely from rocks of Oaxaca. Also, blueschists of the Franciscan complex formed without apparent disruption from 131 Ma until ~82 Ma. Thus, rocks of the Great Valley Group, the Coast Range ophiolite and the Franciscan complex were unlikely to have been next to the Sierran block prior to 100 Ma. Examination of accreted terranes in the upper plate of the Oregonian collision indicates that older arcs such as Slate Creek-Combie and the Smartville-Foothills also formed above westward-dipping subduction zones, indicating westward subduction throughout the Jurassic and Cretaceous.

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