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Segmentation of the Late Cretaceous California Convergent Margin into Supra-subduction Core Complexes and its Lasting Influence on Regional Lithospheric Structure

Cursory inspection of regional geologic maps reveal that California is a rather odd region compared to most long-term convergent margin belts in that it is segmented into profoundly different Mesozoic basement regimes, and overlying Upper Cretaceous-Cenozoic basinal tracts. The first order segmentation from north to south consists of the Klamath Mountains salient, the iconic Sierra Nevada-Great Valley-Franciscan convergent margin triad, the Mojave-restored Salinia low-lying plateau, and the Peninsular Ranges batholith and its offshore forearc. Co-extensive with each of these basement segments are distinct underplated Late Cretaceous-earliest Cenozoic subduction accretion assemblages, which can be generally identified as the Dothan-Redwood Creek schists\Klamaths, Franciscan complex\Great Valley-Sierra Nevada, Rand-Pelona schists\Mojave-Salinia, and Catalina schist\Peninsular Ranges (backslashes simulate structural stacking relations). Each of the underplated subduction assemblages has a unique protolith association, and unique crustal ascent-unroofing history that mark them as distinct subduction extrusion channel products that developed abruptly in Late Cretaceous-earliest Cenozoic time. A plate tectonic model is developed wherein the Farallon plate went into a Cordilleran wide phase of slab flattening through Late Cretaceous-earliest Cenozoic time during which it hosted multiple LIP impactors (Shatsky and Hess rise conjugates, and Siletzia/proto-Yellowstone plume swell). Cycles of intensified slab flattening and superimposed focused slab rollback related to the passage of each impactor segmented the California convergent margin into supra-subduction core complexes expressed today as the aforementioned basement domains and their distinct ascended subduction channel metamorphic cores. The structure, composition, and initial exhumation history of the Great Valley subsurface basement and its relationship to the Franciscan complex are important elements in unraveling the history of this formative phase of California tectonics and its long-lasting imprint on lithospheric structure. Much of this talk will pursue the Great Valley basement relations.