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Title: TOPOLOGY AND ANATOMY OF THE CIRCUM-PACIFIC OROGENIC BELT IN GLOBAL CONTEXT

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Abstract: Subduction zones of the Circum-Pacific and Alpine-Himalayan orogenic belts follow intersecting great circles, the former consuming Pacific seafloor at arc-trench systems and the latter bringing continental blocks together by crustal collisions to assemble the African-Eurasian landmass. Great circles may be favored for orogenic belts because a great circle is the shortest distance between two points on a sphere, meaning that consumption of oceanic lithosphere to allow sea-floor spreading required for global heat loss encounters the least resistance from mantle viscosity and plate shear. Reconstructions of past orogenic systems can perhaps be guided by the constraint that they lay along great circles. A provisional test of the rule is provided by the Gondwanide and Hercynian orogenic systems, analogues respectively of the Circum-Pacific and Alpine-Himalayan belts which followed great circles during the assembly of Pangea.

Although the Circum-Pacific orogenic belt is aligned along a straight-line great circle, tectonic elements are asymmetric with respect to Earth's rotation pole. Extensional backarc spreading basins are restricted to east-facing arc-trench systems of the western Pacific, with contraction and retroarc thrusting typical of west-facing arc-trench systems of the eastern Pacific. This dichotomy reflects systematic westward drift of lithosphere over asthenosphere in response to planetary rotation. Invalid analogies are commonly drawn with western Pacific subduction systems to defend postulates of backarc basins along the American Cordilleras during Mesozoic time, but the supposed backarc basins were more likely remnant ocean basins that closed by arc-continent collision between east-facing intraoceanic island arcs and the west-facing continental-margin arcs of the western Americas.

The accretion of intraoceanic crustal elements to the American Cordilleras cannot be sensed with confidence by paleomagnetism because relative plate motions are commonly subparallel to latitude, paleolongitude cannot be gauged by paleomagnetism, and the concept of paleomagnetic Euler poles is an invalid geometric construct. On the other hand, hypotheses for coastwise terrane transport along the fringe of North America over distances suggested only to satisfy aberrant paleomagnetic remanence derive from systematic underinterpretation of the paleomagnetic data. In an orogenic belt, pluton tilt is predictable as a general phenomenon, and accounts for some aberrant paleomagnetic datasets. The remainder can be ascribed provisionally to sediment compaction because

multiple controlled studies of remanence vectors in sedimentary strata including seafloor sediments, turbidites, and continental redbeds define flattening factors (f) that range consistently from 0.50 to 0.75. Flattening of that order implies apparent discordances of 7-18 degrees in paleolatitude (750 to 1750 km) for mid-latitude (40-60 degrees) paleomagnetic sites in sedimentary rocks.