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Landscapes associated with subduction plate boundaries evolve in response to volcanic and tectonic processes in the upper plate. Orogenic topography developed in the North American plate associated with subduction of the Juan de Fuca plate reflects the combined and competing affects of arc magmatism, vertical axis rotation of crustal blocks, crustal faulting, and erosional exhumation. At the Cascadia margin in the Pacific Northwest, the Oregon Block, a rigid forearc block in the upper plate, actively rotates clockwise with respect to stable North America. Horizontal clockwise rotation dominates the deformation field, which imparts strong latitudinal gradients in the orogenic topographic expression due to along-strike changes in the structural style of upper plate deformation. Although a relatively low range with a mean elevation of 1 km or less, the Cascade Range creates a pronounced orographic barrier to eastward flow of moisture from the Pacific Ocean towards the continental interior. A down-to-the east normal fault system formed to the west of the modern arc marks the breakaway for east-west extensional structures of the northwest Basin and Range in the south. Erosional exhumation accounts for up to half of the rock uplift of the footwall block in the forearc (the Western Cascade province). Low-relief basin-and-range topography reflects a relatively small magnitude of crustal thinning, but is too small to account for the increased area required by clockwise rotation of the forearc block. Magmatic addition between the arc and Basin and Range, localized large-magnitude extension across the arc, or both potentially reconcile the difference. Roughly at the latitude of Bend, OR, active upper plate deformation changes to north-south contraction and oblique reverse faulting. Structures associated with this crustal shortening form at acute to high-angles to the arc and likely extend from the backarc in the east to the forearc in the west across the arc. Thus, although deformation and landscape evolved in synchrony, southern Cascadia differs from the north because the two processes are portioned between the forearc and backarc in the south and distributed in the north.