Evolution of the Coast-Cascade Orogen by tectonic thickening and magmatic loading: the Cretaceous Breakenridge Complex, southwestern British Columbia

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The Coast-Cascade orogen records the interplay of transpression and plutonism in the crust. This interplay is examined in this study by investigating the structural relationships between the Breakenridge complex and its adjacent country rock, the Slollicum schist, situated along the east side of Harrison Lake within southwest British Columbia. The Breakenridge complex was emplaced at 107-100 Ma as a sheeted intrusion in relatively shallow crustal levels (pressures less than 4 kbar).

At least three distinct deformational events have affected the plutonic complex, whose burial resulted in the attainment of peak metamorphic conditions over 9 kbar at 700°C. The first deformational event (100-96 Ma) was an orogen-parallel northward displacement attributed to the San Juan- NW Cascades thrust system. The second deformational event was associated with the emplacement of a younger plutonic suite (96-91 Ma) in structurally higher crustal levels. The third event overlapped in time with peak metamorphism at ca. 90-87 Ma, and broadly coincides with the time when the convergence of the Farallon oceanic plate changed to a more orthogonal subduction under the North American plate.

This study also proposes identification of a new plutonic body, the Snowshoe pluton (96-94 Ma), and it offers a revised tectonic model for this part of the mid-Cretaceous (110-80 Ma) CCO, that emphasizes both contraction and magma loading as mechanisms affecting the study area and resulting in significant crustal thickening.