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Title: GRIST IN THE NORTH AMERICAN-FARALLON-KULA MILL: THE COAST-NORTH CASCADES OROGEN.

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Abstract: The Coast-North Cascades Orogen(CNCO)is nearly 2000 km long and up to 200 km wide, with an axis in the Coast Mountains of British Columbia and Alaska and the North Cascades of northwestern Washington. In the southern CNCO, three groups of late Paleozoic and/or Mesozoic terranes can be identified. Group 1, in southeastern Coast Mountains, eastern North Cascades and metamorphosed in the Cascade crystalline core, comprises Bridge River accretionary complex and Methow-Cadwallader arc-related terranes, all founded on late Paleozoic oceanic lithosphere and overlapped by Late Jurassic-Early Cretaceous clastics. Group 2, in southwestern Coast Mountains and structurally low in northwest Cascades and San Juan Islands, consists of Wrangellia, Nooksack-Harrison and Chilliwack arc-dominated terranes, all associated by the Middle Jurassic. Group 3, in structurally high parts of the northwest Cascades, San Juan Islands and southernmost Cascade crystalline core, includes Late Jurassic-Early Cretaceous ophiolite, melange and clastics similar to rocks in the Klamath Mountains.

Spatial and structural relationships between the terrane groups show how the CNCO evolved. (1) Between the Middle Jurassic and mid-Cretaceous (~170-95 Ma), Group 2 terranes moved southward by 800+/-400 km relative to Group 1 terranes and came to lie oceanward of them. Terminal stages of southward movement are recorded by sinistral strike-slip faults, and folds and thrust faults formed by orogen-parallel contraction. Group 3 rocks were emplaced on thrusts over those of groups 1 and 2, an observation in accord with the paleogeography proposed by Wyld et al. (2006), who restored offsets on Late Cretaceous and Cenozoic strike-slip faults in the northern Cordillera and locate Groups 1 and 2 near, respectively, northern and southern Klamaths in the mid-Cretaceous.
(2) In the mid-Cretaceous (~100-85 Ma), orogen-normal compression created systems of east- and west-vergent folds and reverse and thrust faults. The crust of the CNCO was thickened, uplifted, eroded and supplied detritus to flanking basins. (3) In later Cretaceous and early Cenozoic time (~85-45 Ma), the entire CNCO and much of the

hinterland to the east moved northward on dextral strike-slip faults, initially during transpression, later transtension.

CNCO structures reflect changes in relative plate convergence directions, from oblique with a southward, sinistral component, through orthogonal, to oblique with a northward, dextral component. The structures record response of weak arc lithosphere of the North American Plate caught between strong continental lithosphere and Farallon and Kula oceanic plates.