A RATIONALIZATION OF THE KOYUKUK "CRUNCH," NORTHERN AND CENTRAL ALASKA*

Irvin L. Tailleur
U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025
415-323-8111

ABSTRACT

Rocks of northern Alaska may have had tectonic continuity with rocks of central Alaska and southwestern Yukon Territory. Such structural continuity would make a syntaxial couple of the south-central Brooks Range and the Ruby Geanticline, with the northern syntaxis wrapping around the east half of the Koyukuk Basin. The syntaxial pair would have formed, along with the compound Chukchi Syntaxis at the west end of the Brooks Range and the pair of McKenzie syntaxes at the east end, in response to right-lateral drift between the Arctic Alaska and Pacificward plates. The enigmatic Koyukuk Basin, successor to the hinterland flank of the Brookian orogen, thus was "crunched" in the jaws formed by the east flank of the Chukchi syntaxis and the northeast flank of the (here named) Ruby syntaxis.

Palinspastics imply that: (1) rocks in the Fairbanks region were south of the latitude of Prince Rupert before Tertiary time; (2) the apparent pole for rotational separation (rifting) of Arctic Alaska and Canada is now significantly north of its original position; (3) the now-northwestern and -Arctic cratonal North America was bordered during the Late Devonian to Late Jurassic by a provenance derived from the Ellesmerian-Antler orogenic belts; (4) a several-hundred-mile broad epicontinetal basin was coupled to the provenance and seems to have had a shield-like provenance on its opposite side during at least Late Devonian and Mississippian time; (5) no proto-Pacific Ocean existed before the Pennsylvanian; (6) several-fold, Early Cretaceous shortening of supracrustal rocks produced the Brooks Range foldbelt and the Koyukuk and Colville basins that flanked it; and (7) regions now occupied by southern Alaska could accommodate the subsequent accretion of Wrangellia and other lithospheric "crumbs".

This hypothesis, which could be tested by analysis of post-Cretaceous paleomagnetism, fits more observations than the Carey-Patton alternative of rifting and partial closing of a Koyukuk sphenochasm. It would also rationalize or clarify the following: (1) a 135° acuity (instead of naturally curvilinear trends) for the belts of ophiolite(?), glaucophane, metamorphism, plutonism, Paleozoic platform carbonates, Triassic proximal facies, and Early Cretaceous shell beds that strike eastward through northern Alaska and then track, as proposed here, around the Ruby syntaxis in central Alaska; (2) apparent thrust-superpositions of coeval but lithogenetically contrasting sequences in the Porcupine-Woodchopper-Eagle regions; (3) the absence of tectonic provenances for Cretaceous orogenic deposits in central Alaska; and (4) the young igneous detritus on the west edge of the MacKenzie delta, more than 100 km from the closest source.

If validated, this hypothesis would greatly reduce estimates of the hydrocarbon potential of central Alaska while predicting extensions of Brooks Range copper and zinc-lead provinces southwestward across the Yukon River and eastward beyond Fairbanks.

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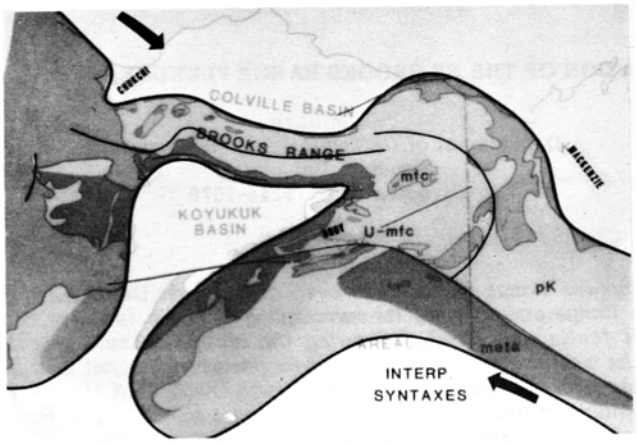

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