EARLY CRETACEOUS EVOLUTION OF THE YUKON-KOYUKUK BASIN AND ITS BEARING ON THE DEVELOPMENT OF THE BROOKIAN OROGENIC BELT, ALASKA

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ABSTRACT

The Brookian orogenic belt (Seward Peninsula, Brooks Range, Ruby geanticline) forms three sides of the Cretaceous Yukon-Koyukuk Basin of west-central Alaska. Low Sr$_i$ values from igneous rocks within the basin suggest that it is not underlain by older continental crust. The basin encloses a south-facing horseshoe-shaped trend of Lower Cretaceous andesitic volcanic rocks. Major-element chemistry of these rocks indicates that they are calc-alkaline and of island-arc affinity.

Berriasian to Valanginian volcanic rocks in the basin are predominantly clastic and were deposited in shallow marine to subaerial environments. Marked subsidence began during Hauterivian time, accompanied by a change to highly potassic (shoshonitic) pyroclastic volcanism. During Barremian (Aptian?) time, these tuffs were interbedded with Brookian-derived turbidites, deposited in a trough between the subsided volcanic platform and the uplifted Brookian metamorphic belt. Paleoflow was clockwise around the basin from west to east. By Albian time, significant volcanism had ceased, and the intervening trough filled with Brookian sediment. The Brookian orogeny apparently resulted from attempted subduction of the North American margin beneath the intraoceanic Koyukuk arc. The relatively long timespan (~30 Ma) between initial continental underthrusting (Tithonian?) in the Brooks Range and the shutoff of arc volcanism (Aptian?) suggests a very slow convergence rate (1-2 cm/yr).
28,450 lbs. of seismic powder near Brady drill site on Kiligwa River, south-central Pet 4, in 1953 and exploded by 170-grain, 30.06 bullet, about 10:00 pm AST, July 25, 1965.