

New K-Ar ages from allochthonous mafic and ultramafic complexes of the western Brooks Range (Brooks Range "ophiolite") show that igneous rocks yield ages nearly identical to those of underlying metamorphic aureole rocks. Dated rocks of the Misheguk igneous sequence from Tumit Creek consist of (1) hornblende gabbro with minor greenschist and lower grade alteration, hornblende age 147.2 ± 4.4 Ma; and (2) hornblende-bearing diorite, also slightly altered, age 155.8 ± 4.7 Ma. Both samples come from presumed higher levels of the Misheguk sequence. Dated samples of metamorphic aureole rocks come from outcrops near Kismilot Creek and lie structurally beneath the Iyikrok Mountain peridotite body. The rocks consist of amphibolite and garnet-bearing biotite-hornblende gneiss considered to be metamorphosed Copter igneous sequence and related sedimentary rocks. Hornblende ages are 154.2 ± 4.6 Ma and 153.2 ± 4.6 Ma. Metamorphism is clearly related to the structurally overlying peridotite, as the degree of alteration decreases downward.

We suggest that the K-Ar ages of these rocks represent the effects of thermal metamorphism post-dating igneous crystallization and are related to tectonic emplacement of the complex. Earlier K-Ar data on igneous rocks give similar ages and have been interpreted as reflecting tectonothermal events. The age of igneous crystallization of the mafic and ultramafic rocks of the Misheguk igneous sequence remains uncertain.

BODNAR, DIRK A., Sohio Petroleum Co., Houston, TX, and C. G. MULL, Alaska Div. of Geol. and Geoph. Surveys, Anchorage, AK

Age and Correlation of the Otuk Formation, North-Central Brooks Range, Alaska

Allochthonous Triassic rocks of the north-central Brooks Range thrust belt were originally mapped as part of the Middle to Upper Triassic Shublik Formation. Recently, these strata were named the Otuk formation. Detailed paleontologic studies of 11 measured sections more precisely document the age of the Otuk and show that its base is older than the base of the Shublik and that its top is younger than the top of the Shublik. Megafossils (pelecypods and ammonites) and microfossils (radiolaria, conodonts, and foraminifers) indicate an age range of Early Triassic (Dienerian-Smithian or older) to Middle Jurassic (Bajocian). The lithology consists of 120 m (390 ft) of interbedded, very fine-grained rocks (shale, limestone, and chert) representative of very slow deposition, below wave base in an open marine environment. The Otuk formation does not contain suitable reservoir rocks, but organic geochemical data indicate that the shales are possible oil source rocks. The Otuk formation is disconformable with both the underlying Permian (Wolfcampian-Guadalupian) Siksikpuk Formation and overlying Lower Cretaceous (Valanginian) coquinoid limestone and shale. These unconformities are correlative with similar unconformities in the northeastern Brooks Range and subsurface of the North Slope. Thus, the Otuk formation is a condensed, deeper water, more distal equivalent of the Ivishak and Shublik Formations, Karen Creek Sandstone, and lower Kingak Shale of the northeastern Brooks Range and equivalent subsurface units of the North Slope.

BOX, STEPHEN E., and W. W. PATTON, JR., U.S. Geol. Survey, Menlo Park, CA

Early Cretaceous Evolution of Yukon-Koyuk Basin and Its Bearing on Development of Brookian Orogenic Belt, Alaska

The Brookian orogenic belt (Seward Peninsula, Brooks Range, Ruby geanticline) forms three sides of the Cretaceous Yukon-Koyuk basin of west-central Alaska. Low Sr 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 the Barremian (Aptian?), 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 the Albian, 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 (approximately 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/year).

BREW, DAVID A., and ARTHUR B. FORD, U.S. Geol. Survey, Menlo Park, CA

Southeastern Alaska Tectonostratigraphic Terranes Revisited

The presence of only three major tectonostratigraphic terranes (TSTs) in southeastern Alaska and northwestern British Columbia (Chugach, Wrangell, and Alexander) is indicated by critical analysis of available age, stratigraphic, and structural data. A possible fourth TST (Stikine) is probably an equivalent of part or all of the Alexander. The Yakutat "block" belongs to the Chugach TST, and both are closely linked to the Wrangell and Alexander-(Stikine) TSTs; the Gravina "TST" is an overlap assemblage. The Alexander-(Stikine) TST is subdivided on the basis of age and facies. The "subterrane" within it share common substrates and represent large-scale facies changes in a long-lived island-arc environment.

The "Taku TST" is the metamorphic equivalent of the upper part (Permian and Upper Triassic) of the Alexander-(Stikine) TST with some fossil evidence preserved that indicates the age of protoliths. Similarly, the "Tracy Arm TST" is the metamorphic equivalent of (1) the lower (Ordovician to Carboniferous) Alexander TST without any such fossil evidence and (2) the upper (Permian to Triassic) Alexander-(Stikine) with some newly discovered fossil evidence.

Evidence for the ages of juxtaposition of the TSTs is limited. The Chugach TST deformed against the Wrangell and Alexander TSTs in Late Cretaceous. Gravina rocks were deformed at that time and also earlier. The Wrangell TST was stitched to the Alexander-(Stikine) by middle Cretaceous plutons but may have arrived before its Late Jurassic plutons were emplaced. The Alexander-(Stikine) and Cache Creek TSTs were juxtaposed before Late Triassic.

BRUNS, T. R., and R. VON HUENE, U.S. Geol. Survey, Menlo Park, CA, and S. D. LEWIS and J. W. LADD, Columbia Univ., Lamont-Doherty Geol. Observatory, Palisades, NY

Structure of Shumagin Continental Margin, Western Gulf of Alaska

The Shumagin continental margin lies between Kodiak Island and Unimak Pass. The oldest rocks known to underlie the margin are highly deformed, deep-water turbidites of Late Cretaceous age (Shumagin Formation). These turbidites were intruded by Paleocene and early Eocene granodiorites. Paleogene sedimentary rocks of the Kodiak region may extend southwest to and underlie at least parts of the Shumagin margin but are not known in outcrop on shelf islands. The Cretaceous and Paleogene(?) rocks form acoustic basement on multichannel seismic reflection data, and are overlain by a basin fill of probable late Miocene and younger age. Mesozoic rocks of the Alaska Peninsula extend seaward only to the inferred location of the Border Ranges fault.

The Shumagin margin is characterized by five major structural features or trends: (1) Shumagin basin, containing about 2.5 km of late Miocene and younger strata above acoustic basement; (2) Sanak basin, containing as much as 8 km of dominantly late Cenozoic strata in two subbasins separated by a basement high; (3) Cenozoic shelf-edge and upper-slope sedimentary wedges that are 3-4 km thick and possibly as thick as 6 km; (4) a mid-slope structural trend, Unimak ridge, that is characterized by numerous surface and subsurface structural highs; and (5) a 30-km wide accretionary complex at the base of the slope. A thin (less than 1-2 km) sediment cover of Miocene and younger age covers the continental shelf areas outside of Shumagin and Sanak basins.

The tectonic history of the margin includes: (1) Late Cretaceous or early Tertiary removal of the seaward part of the Cretaceous Alaska Peninsula margin along the Border Ranges fault and accretion of the Shumagin Formation against the truncated margin; (2) Miocene uplift and erosion of the shelf; (3) middle or late Miocene uplift of Unimak ridge; and (4) late Miocene and younger subsidence and infilling of Sanak and Shumagin basins, and subduction-accretion along the Aleutian Trench.