BROOKS RANGE OPHIOLITES RECONSTRUCTED*

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ABSTRACT

We have constructed a cross-section for the western Brooks Range ophiolites from exposures at Asik Mountain, Maiyumerak Mountains, and Avan Hills. The section includes a previously unreported sheeted dike unit. Roeder and Mull (1978) suggested that these ophiolites were derived by northward transport from the Angayucham Terrain, where mafic and ultramafic rocks dip southward beneath the Yukon-Koyukuk Basin (see Harding, et al., this volume). These ophiolites may, therefore, be representative of the lithosphere underlying the basin.

The base of the section, exposed in the central Avan Hills, consists of tectonized, probably residual, dunite and harzburgite. Cumulate ultramafic rocks overlie the tectonized peridotite at Avan Hills, and comprise the lowest exposures at Asik Mountain. The lower part of the cumulate unit is dominantly dunite, with greater proportions of interlayered pyroxenite and wehrlite up-section. This unit is 2,000 m thick (measured normal to the near vertical cumulate layers at Asik Mountain) and is considerably thicker than typical ophiolite ultramafic cumulate units. The ultramafic cumulates grade into a rythmically layered gabbro unit that is >2,000 m thick.

No extrusive rocks are exposed above the gabbros at Asik Mountain or Avan Hills, but mafic volcanic rocks exposed in the western Maiyumerak Mountains may be the top of the ophiolite section. There, sheeted dikes (>300 m thick) consist of basalt, minor diorite and rare rhyolite. Pillowed basalt screens occur between the dikes. The dike unit is overlain by pillowed and massive basalt flows. These rocks are lithologically and topographically unlike mafic to intermediate intrusive and volcanic rocks previously described from thrust sheets beneath the ultramafic and gabbroic rocks at Asik Mountain and Avan Hills.

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CORRELATION OF ANGAYUCHAM RANGE AND COPTER IGNEOUS SEQUENCE BASALTS IN THE BROOKS RANGE, ALASKA, FROM THEMATIC MAPPER DATA*

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ABSTRACT

We are studying the tectonics of the Brooks Range using Landsat Thematic Mapper (TM) images in combination with field, geochemical, and geophysical data. Sixteen digital TM scenes of 300,000 km^2 have been acquired, from the Alaskan oil pipeline west to the Bering Sea. Data from the images are being used to constrain balanced cross-sections, and to differentiate and map lithologic units.

TM reflectance data support the interpretation that basalt of the Angayucham Range, along the southern margin of the Brooks Range, and basalt of the Copter Igneous Sequence, exposed in several isolated thrust sheets ≈200 km to the west, are equivalent. Two spectrally distinct basalts are recognized in both the Ambler District of the Angayucham Range and in the Copter Igneous Sequence exposure in the Maiyumerak Mountains. In both areas a structurally higher basalt has greater band 7 and band 1 reflectance, and lower band 3 reflectance, than the underlying basalt. In the Ambler District, the TM spectral differences correlate with age, rare earth element and trace element differences identified by USGS workers. Differences between the basalts were not identified by USGS workers in the field or on aerial photographs. In the Maiyumerak Mountains, the TM spectral differences correlate with color and morphological differences we recognized in the field. We are analyzing Maiyumerak Mountain samples to determine if geochemical differences correlate with spectral differences, as in the Angayucham Range.

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