Although gold skarns are generally small deposits (< 1 mmt), their consistent geologic characteristics make them relatively predictable ore-deposit targets in Alaska.

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Statistical Analysis of Correlation of Porosity and Permeability Determinations from Well Cuttings Using a Portable pNMR Apparatus with Conventional Core Analysis and Wireline Log Readings

The porosity-permeability (P-K) analyzer is a field-portable device that uses the principle of pulsed nuclear magnetic resonance to determine the content of hydrogen nuclei present in the free and bound water in rock samples. Using a simple dual-water model, these values may be used to calculate total porosity, free fluid index, and permeability index. The principle of measurement is such as to require relatively small sample volumes and reliable results can be obtained from well-cuttings samples or 3-mm diameter core plugs.

Results from the P-K analyzer are responsive to total fluid-filled pore space in the rock, although it is possible to distinguish free, i.e., movable, fluid from bound fluid, i.e., at grain boundaries or within restricted pores and in argillaceous rocks. The P-K response is entirely independent of formation lithology, mineralogy, or salinity of pore waters and is not appreciably affected by the presence of light oils. The presence of free or dissolved gases in the sample will have a significant effect on response. However, samples are brine flushed and aspirated in preparation for analysis in order to remove this effect.

We see, from these differences, that results from the P-K method cannot be expected to show a direct one-to-one correlation with those from conventional core analysis or the wireline density or neutron logging tools. A statistical analysis is presented using data from each of the analytical methods and types and conditions of sample. A strong correlation is demonstrated both visually and statistically, thereby providing verification of the P-K method and facilitating its use alongside data previously obtained by more conventional methods.

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Sedimentology of Tidally Deposited Miocene Bear Lake Formation, Alaskan Peninsula

The Miocene Bear Lake Formation—chiefly sandstone, shale, and conglomerate—crops out on the Alaskan Peninsula between Port Heiden and Pavlof Bay. As thick as 1,600 m in outcrop and 2,368 m in subsurface, the Bear Lake Formation appears to have been deposited mostly by tidal processes in a semi-enclosed back-arc basin that was bordered to the southeast by volcanic uplands of the Aleutian arc. To the northeast, the basin originally extended beneath Bristol Bay as part of the North Aleutian basin. The Bear Lake Formation, which rests unconformably on Oligocene volcanogenic sedimentary rocks and is unconformably overlain by Pliocene volcanic rocks, contains few, if any, interbedded volcanic rocks. Sandstone of the Bear Lake Formation contains more quartz, locally as much as 65%, than most Tertiary strata of the Alaska Peninsula. Rounded clasts of granitic rocks as large as 25 cm were probably derived from large batholithic complexes to the southeast.

Sandstone beds are characterized by large-scale trough and tangential-tabular cross-strata, herringbone cross-strata, shale drapes on cross-strata, reactivation surfaces, channeling, superposition of small-scale cross-strata or current ripple markings on large-scale cross-strata with reversal of flow directions, scattered megafossils, local coquinas, and local burrows that include *Ophiomorpha*. Shaly sequences are characterized by flaser bedding, current and oscillation ripple markings, starved ripple markings, abundant small-scale bioturbation, load casts, abundant mica and plant fragments, and synsedimentary slumps. Coarse-grained fluvial deposits at the base and fine-grained marine shelf deposits at the top of many sections suggest deposition during a major transgression, possibly as a result of subsidence of the Aleutian arc during an interval of relative volcanic quiescence.

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Tectonic Significance of Kanayut Conglomerate and Related Middle Paleozoic Deposits, Brooks Range, Alaska

The Upper Devonian and Lower Mississippian(?) Kanayut Conglomerate, which crops out for a distance of 950 km across the Brooks Range, is significant for understanding of the tectonic history of northern Alaska in relation to the geology of the circum-Arctic region. The Kanayut Conglomerate is as thick as 3,000 m and consists chiefly of conglomeratic fluvial strata that were deposited as a result of southwestward progradation of a large and coarse-grained fluvial-dominated delta. Underlying and overlying shallow marine and prodeltaic strata record the advance and retreat of the delta. The Kanayut and related deposits crop out in a series of thrust sheets in which the Paleozoic rocks were detached in the late Mesozoic from an unknown basement and transported at least several hundred kilometers northward. Detailed sedimentologic studies and measured sections in the Kanayut Conglomerate permit estimates to be made of the amount of displacement on the thrust sheets and suggest that the source area of the allochthonous middle Paleozoic deltaic deposits was the underlying autochthonous upper Precambrian and lower Paleozoic basement rocks of the North Slope.

The Kanayut Conglomerate is not palinspastically compatible with other middle Paleozoic successions in Alaska, in the cordillera of western Canada, in the conterminous western U.S., or in the Canadian Arctic Islands. The strata do, however, resemble fluvial deposits of the Old Red Sandstone in Svalbard and East Greenland. They and their associated autochthonous basement may have been displaced from an original position contiguous with the North Greenland foldbelt by post-Early Mississippian strike-slip faulting and thus indicate an early phase of circum-Arctic tectonic displacement prior to that associated with the opening of the modern Canada basin in the late Mesozoic.

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1984 Results of Trans-Alaska Crustal Transect in Chugach Mountains and Copper River Basin, Alaska

The Trans-Alaska Crustal Transect (TACT) program, a multidisciplinary investigation of the continental crust and its evolution along the Trans-Alaska pipeline corridor, was started by the USGS during 1984. Preliminary results of geologic, geophysical, and wide-angle reflection/refraction data obtained across the Chugach terrane (CGT) and the composite Wrangellia/Peninsular terrane (WRT/PET) suggest the following: (a) The CGT is composed of accretionary sequences that include, from south to north, Late Cretaceous schistose flysch, uppermost Jurassic to Early Cretaceous sheared melange, and Early(?) Jurassic blueschist/greenschist. (b) The CGT accretionary sequences have local broad, low-amplitude magnetic or gravity anomalies. (c) Seismic data show that the CGT along latitude 61°N, by alternating high- (6.9-8.0? km/sec) and low-velocity layers is suggestive of multiple thin slices of subducted oceanic crust and upper mantle. (d) Mafic and ultramafic cumulate rocks along the south margin of the WRT/PET have strong magnetic and gravity signatures and are interpreted as the uplifted root of a Jurassic magmatic arc superimposed on a late Paleozoic volcanic arc. Magnetic data suggest that comparable rocks underlie most of the PET. (e) The north-dipping Border Ranges fault (BRF) marks the suture along which the northern margin of the CGT was relatively underthrust at least 40 km beneath the WRT/PET. (f) Beneath the northern CGT and southern WRT/PET, a prominent seismic reflector ($v = 7.7$ km/sec), suggestive of oceanic upper mantle rocks, dips about 3°N and extends from a depth of 12 km beneath the Tasnuna River to 16 km beneath the BRF, where the dip appears to steepen to about 15° beneath the southern margin of the PET.

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Metallogenesis of Wrangellia Terrane, Eastern Alaska Range, Alaska

The Wrangellia terrane contains seven principal types of mineral deposits, each of which formed at a specific stage in the history of the terrane. They are from oldest to youngest: (1) small vein deposits of Cu-, Pb-, Zn-, Ag-, and Au-sulfides in fracture zones up to a few meters wide and as disseminations in hydrothermally altered late Paleozoic volcanic rocks; (2) Cu-, Ag-, and Au-sulfides in massive lenses and as dissemina-