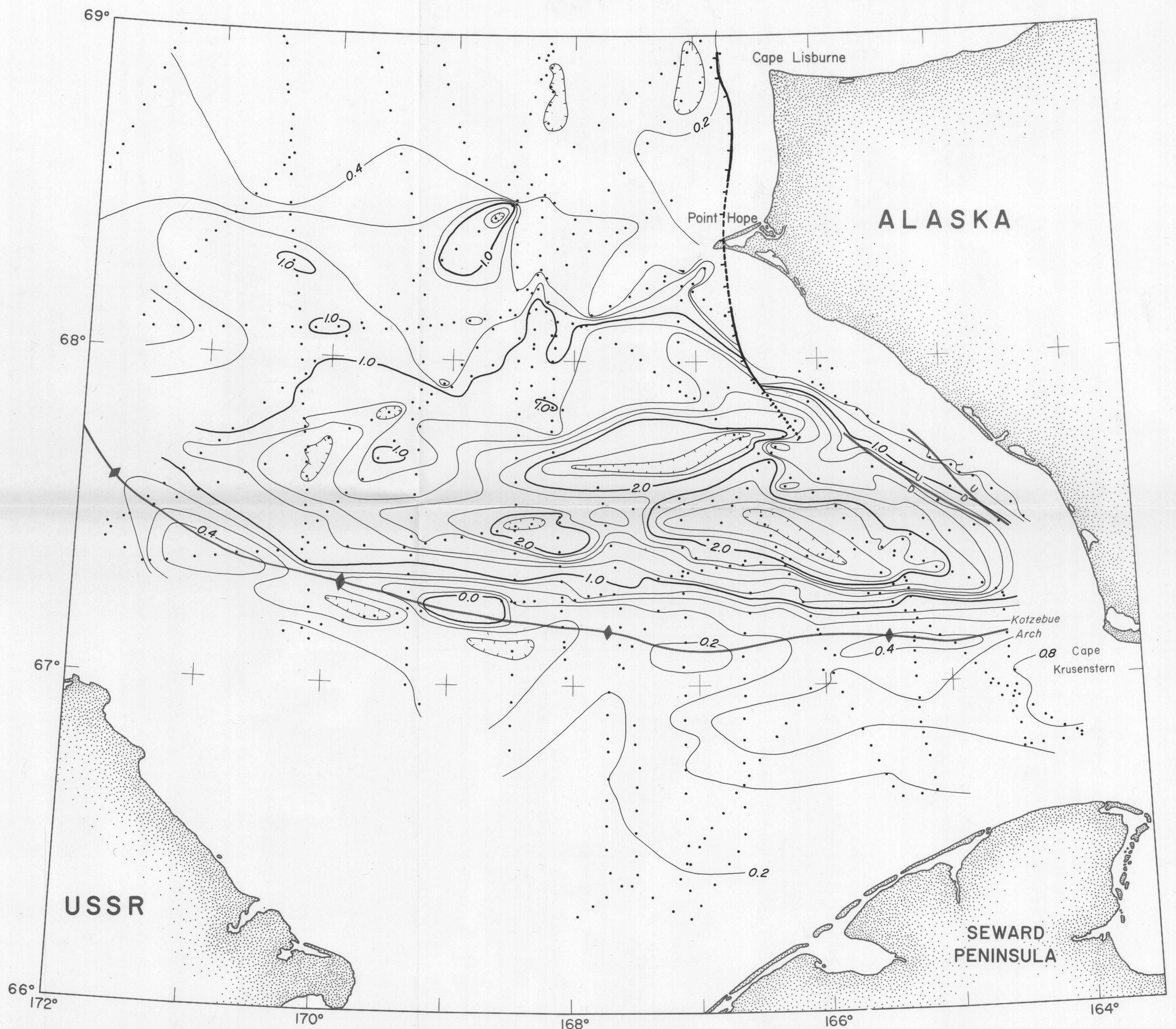
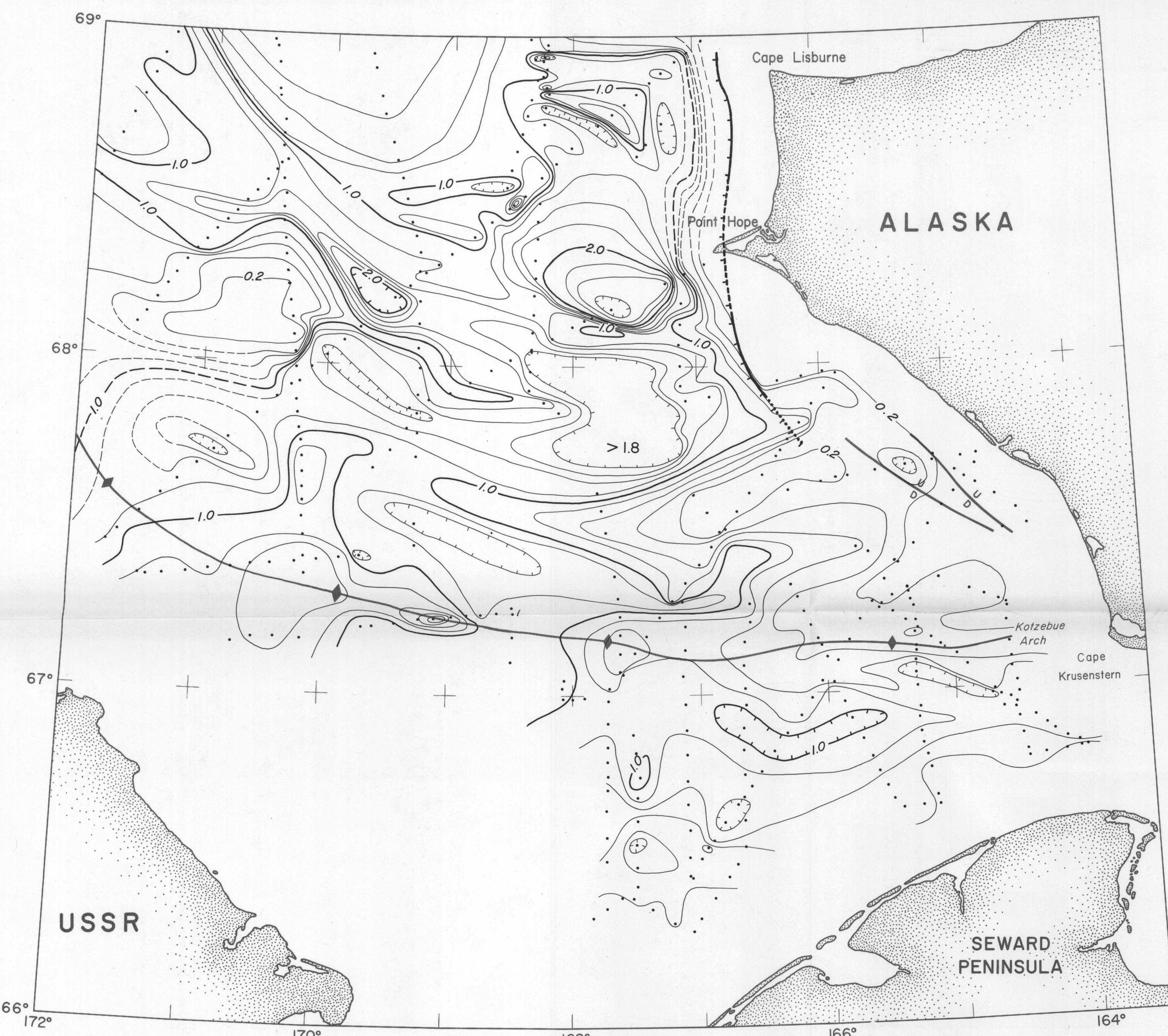


THICKNESS OF SECTION ABOVE ACOUSTIC BASEMENT



YOUNGEST SEQUENCE
THICKNESS OF SECTION ABOVE REGIONAL REFLECTOR



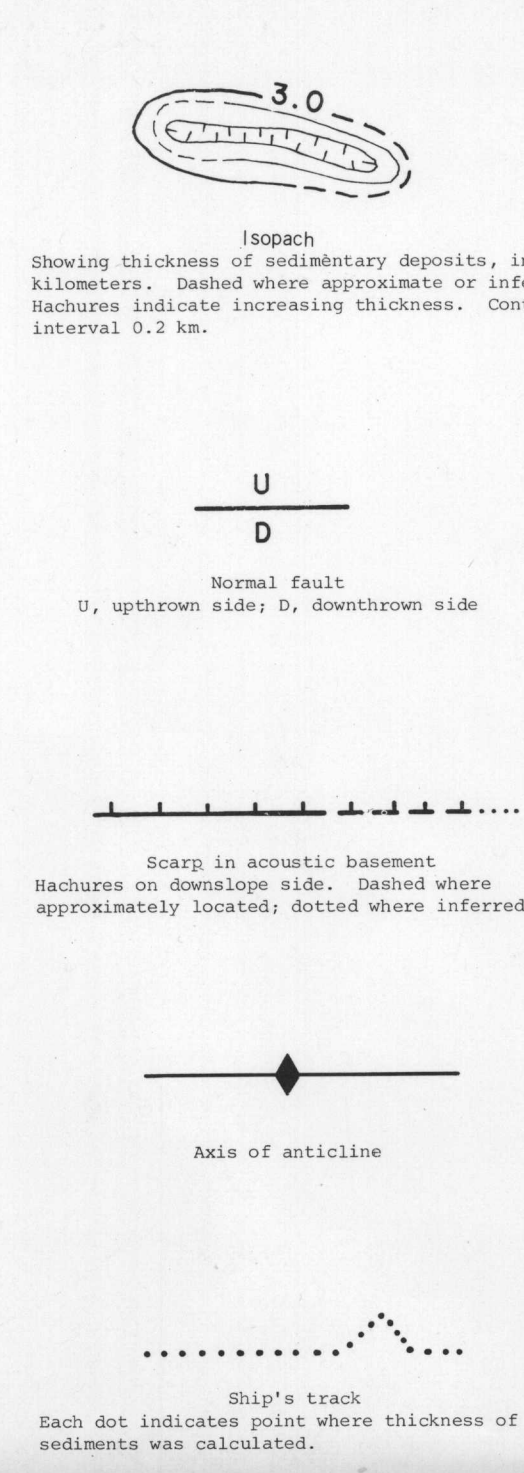
OLDEST SEQUENCE
THICKNESS OF SECTION BETWEEN REGIONAL REFLECTOR AND ACOUSTIC BASEMENT

ISOPACH MAPS OF TERTIARY SEDIMENTS, HOPE BASIN, SOUTHERN CHUKCHI SEA, ALASKA

BY
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1978

EXPLANATION



DISCUSSION

The isopach maps are based on single-channel seismic reflection data (with sparker and air-gun sound sources) collected on U.S. Coast Guard vessels by the U.S. Geological Survey (Grantz and others, 1970b, 1971, 1972a, b, 1974a, b). Preliminary interpretations of the data have been presented previously (Grantz and others, 1970a, 1971). The dotted lines on the isopach maps show the tracks along which the reflection data were recorded; the dots indicate points at which thicknesses were calculated. To obtain depths from reflection times, seismic velocity gradients were obtained from four refraction soundspeed profiles made in 1971 and 1973. These profiles collectively give a mean gradient for Hope Basin sediments described by $v = 1.72 + 2.02T$, with a correlation coefficient, $r^2 = 0.99$, where v is compressional wave velocity and T is one-way reflection time.

Seismic velocities of sediments in Hope Basin are low, and the sediments are of above average acoustic transparency compared to typical shelf deposits. Both characteristics suggest that the deposits are relatively young. The sediments can be divided into an older and a younger sequence by a very strong, reverberant reflector which is consistently observed over the whole basin. No direct evidence exists of the age of this reflector. Near Kotzebue Sound and toward the Seward Peninsula coast the young sequence above this reflector has a thickness of from 0.5 to 1.0 km. Based on the occurrence of Mesozoic and Quaternary sediments around Kotzebue Sound and on the acoustic nature of the Hope Basin sediments, the reflector is estimated to be middle Tertiary. The "younger" sediments lay in upper right can be crudely estimated as Mesozoic and Quaternary and the "older" (lower left) as Paleogene with perhaps some Cretaceous. The data base is more complete for the uppermost sediments than for the deeper sediments because the depth to which the seismic techniques could provide reliable data varied with weather conditions, ship speed, the acoustic nature of the sediments being profiled, and the particular seismic sources and streamers used. "Acoustic basement" refers to a generally rough-surfaced layer below which the seismic techniques employed did not penetrate. The seismic velocity in the acoustic basement is 4.5 km/sec or greater, and a best guess as to the outside analog of the basement might be the well-consolidated shales of middle to lower Cretaceous age exposed along the coast between Point Hope and Cape Krusenstern.

The Kotzebue arch, shown as an anticlinal axis on the map, is an older basement structure that acted as the southern hinge line for the subsidence of the Mesozoic basin. The arch itself was uplifted several hundred meters in late Tertiary time. In the Point Hope region, the Tertiary sediments rest on a basement scarp. A gravity high in the region landward of this scarp (Happel and McHardie, 1976) suggests that dense older rocks are near the surface, probably correlative of the Paleozoic rocks exposed in the Lisburne Hills. The large normal faults that act as boundaries to the basin in the youngest sediments trend parallel to the coastline north of Cape Krusenstern. Numerous smaller faults and other smaller structural trends which occur are difficult to map with the existing data coverage and are not shown.

Sources of data and selected references pertaining to Hope Basin

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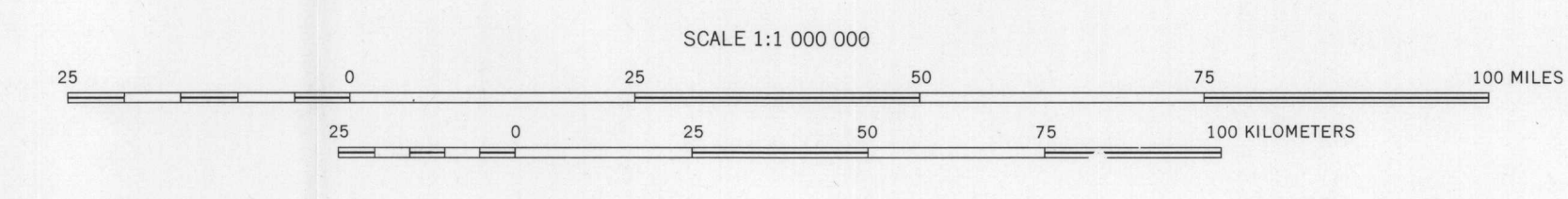
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POLAR STEREOGRAPHIC PROJECTION

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