DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1048

DISCUSSION

Intrusive rocks ranging in age from Precambrian to Miocene underlie approximately 30 percent of southeastern Alaska. This map consolidates what is currently known or inferred about the distribution, composition, and age relations of intrusive rocks in this region. Definition and interpretation of major plutonic belts are in progress and will be presented in another report.

Distribution

The distribution of plutonic rocks and selected structural features of southeastern Alaska are shown on this 1:100,000-scale compilation. Country rocks are unlabeled. Regions that are unmapped as of November 1978 are shaded. The map linework is modified from that of Beikman (1975) on the basis of reexamination of the original references and on unpublished data.

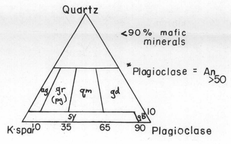
West of the Coast Range megalineament, intrusive rocks form discrete bodies with well-defined contacts. In the Coast Plutonic Complex of Canadian usage, east of the megalineament, plutons intrude amphibolite-grade gneisses and migmatite; contacts are gradational and subject to interpretation. Between lat 57° and 59°, only clearly intrusive rocks are included in the compilation; migmatites and gneisses are considered metamorphic. Elsewhere in the Coast Plutonic Complex, heterogeneous rock units, interpreted mostly as orthogneisses, are considered plutonic and are largely incorporated into Cretaceous and(or) Tertiary units.

Composition

Compositional data were generalized to provide a manageable classification system. The scheme used here is considerably modified from Bateman (1961). Diorite, quartz diorite, tonalite, and granodiorite are combined because many of the intrusive bodies vary internally and include two or more of these compositions. Alkalic, alkali granitic, peralkaline granitic, mafic, and ultramafic rock types were added to this classification system because of their genetic significance. The following classification results:

um - ultramafic (>90 percent mafic minerals)
gb - Gabbro/norite (plagioclase = $An_{>50}$)
gd - granodiorite/tonalite/quartz diorite/diorite
tj - tronDhjemite
qm - quartz monzonite
gr - granite
pg - peralkaline granite
ag - alkali granite
sy - syenite/monzonite/syenodiorite

The compositional fields of these categories are shown on this QKP diagram:



Published lithologic names have been used where compositional data were not available. Some errors may have been made in reclassification according to the scheme presented here in cases where the classification system of the original author was not known. This possibility is particularly true in the distinction between quartz monzonites and granites because other systems, such as the IUGS (Streckeisen, 1973), have a reduced quartz monzonite field.

Age

The intrusive age assignments presented on this map are based primarily on interpretation of potassium-argon isotopic data and extrapolation to undated but lithologically similar bodies. Age interpretations in the Coast Plutonic Complex and vicinity are currently being re-evaluated as uranium-lead isotopic dates are determined.

Tertiary age assignments everywhere and pre-Tertiary age assignments west of Seymour Canal-Duncan Canal-Clarence Strait lineament are based directly on potassium-argon age determinations. Sparse lead-alpha data generally agree with the latter assignments. East of the Seymour Canal-Duncan Canal-Clarence Strait lineament pre-Tertiary assignments are based on an interpretation of the discordance between biotite and hornblende potassium-argon data (J. G. Smith, oral commun., 1977) and on lithologic correlations by the original mappers and the present authors. Preliminary uranium-lead isotopic data suggest a 140-m.y. intrusive event; some or all Cretaceous assignments may reflect an 80-m.y. metamorphic event (J. G. Smith and J. G. Arth, oral communs., 1978). Locations of isotopically dated samples in southeastern Alaska have been compiled by Wilson, Dadisman, and Herzon (1979).

EXPLANATION

composition

sy ag gr/pg qm gd/tj gb um

Tag Tgr Tqm Tgd Tgb	TERTIARY
TKqm TKgd	TERTIARY AND(OR) CRETACEOUS
Kgr Kqm Kgd Kgb Kum	CRETACEOUS
Jqm Jgd	JURASSIC
JTkpg JTkgd	JURASSIC AND(OR) TRIASSIC
Meum	MESOZOIC
MzPzgd MzPzgb	MESOZOIC AND(OR) PALEOZOIC
Pzgr	PENNSYLVANIAN
Ogr Oqm Ogd/Otj Ogb Oum	ORDOVICIAN
Pzgd	PALEOZOIC
pCtj	PRECAMBRIAN(?)

Contact–**Dashed** where inferred or concealed by water

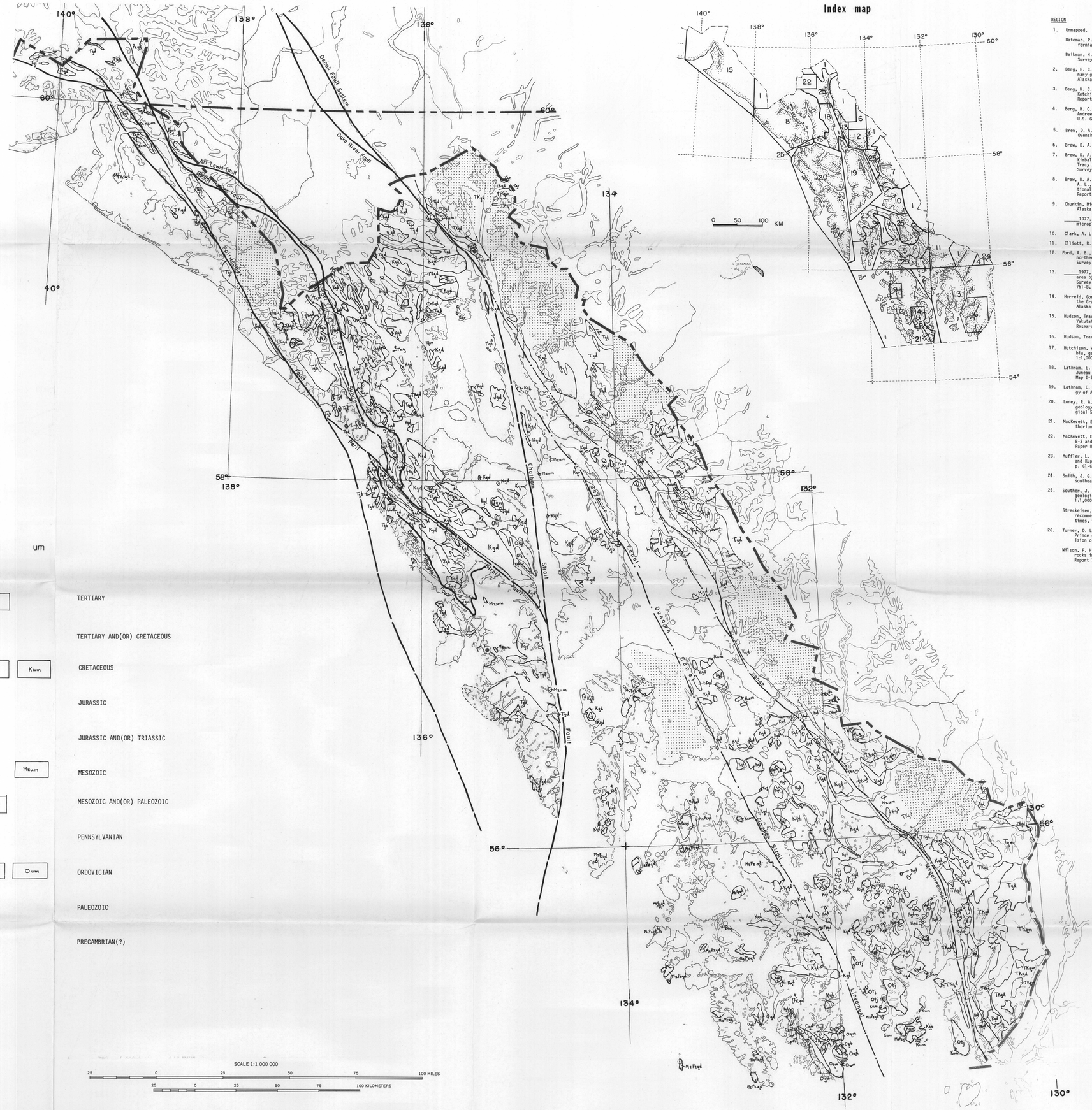
Lineament

Fault–**Dashed** where concealed by water

SCALE 1:1 000 000

25 0 25 50 75 100 MILES

25 0 25 50 75 100 KILOMETERS



Index map

REFERENCES

(Numbered references keyed to index map)

REGION

1. Unmapped.

Bateman, P. C., 1961, Granitic formations in east-central Sierra Nevada, near Bishop, California: Geological Society of America Bulletin, v. 72, no. 10, p. 1521-1537.

Beikman, H. M., 1975, Preliminary geologic map of southeastern Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-673, scale 1:1,000,000.

2. Berg, H. C., Elliott, R. L., Koch, R. D., Carten, R. B., and Wahl, F. A., 1976, Preliminary geologic map of the Craig D-1 and parts of the Craig C-1 and D-2 quadrangles, Alaska: U.S. Geological Survey Open-File Map 76-430.

3. Berg, H. C., Elliott, R. L., Smith, J. G., and Koch, R. D., 1978, Geologic map of the Ketchikan and Prince Rupert quadrangles, Alaska: U.S. Geological Survey Open-File Report 78-73-A.

4. Berg, H. C., Elliott, R. L., Smith, J. G., Pittman, T. L., Kimball, A. L., and Griscom, Andrew, 1977, Mineral resources of the Granite Fiords Wilderness Study Area, Alaska: U.S. Geological Survey Bulletin 1403, 151 p.

5. Brew, D. A., Berg, H. C., Ford, A. B., Hufe, Carl, Hunt, Susan, Morrell, R. P., Ovenshine, A. T., and Sonnevil, R. S., unpublished data, 1978.

6. Brew, D. A., and Ford, A. B., unpublished data, 1979.

7. Brew, D. A., Grybeck, Donald, Johnson, B. R., Jachens, R. C., Nutt, C. J., Barnes, D. F., Kimball, A. L., Still, J. C., and Rataj, J. L., 1977, Mineral resources of the Tracy Arm-Fords Terror Wilderness Study Area and vicinity, Alaska: U.S. Geological Survey Open-File Report 77-649, 282 p.

8. Brew, D. A., Johnson, B. R., Grybeck, Donald, Griscom, Andrew, Barnes, D. F., Kimball, A. L., Still, J. C., and Rataj, J. L., 1978, Mineral resources of the Glacier Bay National Monument Wilderness Study Area, Alaska: U.S. Geological Survey Open-File Report 78-494.

9. Churkin, Michael, Jr., and Eberlein, G. D., 1975, Geologic map of the Craig C-4 quadrangle, Alaska: U.S. Geological Survey Geologic Quadrangle Map GQ-1169, scale 1:63,360.

_____1977, Ancient borderland terranes of the North American Cordillera; correlation and microplate tectonics: Geological Society of America Bulletin, v. 88, p. 769-786.

10. Clark, A. L., unpublished data, 1973.

11. Elliott, R. L., and Koch, R. D., unpublished data, 1978.

12. Ford, A. B., and Brew, D. A., 1977, Preliminary geologic and metamorphic-isograd map of northern parts of the Juneau A-1 and A-2 quadrangles, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-847, scale 1:31,680.

13. _____1977, Truncation of regional metamorphic zonation pattern of the Juneau, Alaska, area by the Coast Range batholith, in Blean, K. M., ed., The United States Geological Survey in Alaska: Accomplishments during 1976: U.S. Geological Survey Circular 751-B, p. B88-B87.

14. Herreid, Gordon, Bundtzen, T. K., and Turner, D. L., 1978, Geology and geochemistry of the Craig A-2 quadrangle and vicinity, Prince of Wales Island, southeastern Alaska: Alaska Division of Geological and Geophysical Surveys, Geologic Report 48, 49 p.

15. Hudson, Travis, Plafker, George, and Lanphere, M. A., 1977, Intrusive rocks of the Yakutat-St. Elias area, south-central Alaska: U.S. Geolgical Survey Journal of Research, v. 5, no. 2, p. 155-172.

16. Hudson, Travis, Smith, J. G., and Elliott, R. L., unpublished data, 1979.

17. Hutchison, W. W., Berg, H. C., and Okulitch, A. V., 1973, Skeena River, British Columbia, geological map: Geological Survey of Canada Open-File Report no. 166, scale 1:1,000,000.

18. Lathram, E. H., Loney, R. A., Condon, W. H., and Berg, H. C., 1959, Progress map of the Juneau quadrangle, Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map I-303, scale 1:250,000.

19. Lathram, E. H., Pomeroy, J. S., Berg, H. C., and Loney, R. A., 1965, Reconnaissance geology of Admiralty Island, Alaska: U.S. Geological Survey Bulletin 1181-A, p. R1-R48.

20. Loney, R. A., Brew, D. A., Muffler, L. J. P., and Pomeroy, J. S., 1975, Reconnaissance geology of Chichagof, Baranof, and Kruzof Islands, southeastern Alaska: U.S. Geological Survey Professional Paper 792, 105 p.

21. MacKevett, E. M., Jr., 1963, Geology and ore deposits of the Bokan Mountain uranium-thorium area, southeastern Alaska: U.S. Geological Survey Bulletin 1154, 125 p.

22. MacKevett, E. M., Jr., Robertson, E. C., and Winkler, G. R., 1974, Geology of the Skagway B-3 and B-4 quadrangles, southeastern Alaska: U.S. Geological Survey Professional Paper 832, 33 p.

23. Muffler, L. J. P., 1967, Stratigraphy of the Keku Islets and neighboring parts of Kuiu and Kupreanof Islands, southeastern Alaska: U.S. Geological Survey Bulletin 1241-C, p. C1-C52.

24. Smith, J. G., 1977, Geology of the Ketchikan D-1 and Bradfield Canal A-1 quadrangles, southeastern Alaska: U.S. Geological Survey Bulletin 1425, 49 p.

25. Souther, J. G., Brew, D. A., and Okulitch, A. V., 1974, Iskut River, British Columbia, geologic map: Geological Survey of Canada Open-File Report no. 214, scale 1:1,000,000.

Streckeisen, A. L., chairman, 1973, Plutonic rocks--classification and nomenclature recommended by the IUGS Subcommission on the Systematics of Igneous Rocks: Geotimes, v. 18, no. 10, p. 26-30.

26. Turner, D. L., Herreid, Gordon, and Bundtzen, T. K., 1977, Geochronology of southern Prince of Wales Island, Alaska, in Short notes on Alaskan geology-1977: Alaska Division of Geological and Geophysical Surveys, Geologic Report 55, p. 11-16.

Wilson, F. H., Dadisman, S. V., and Herzon, P. L., 1979, Map showing radiometric ages of rocks in Alaska; Part I, Southeastern Alaska: U.S. Geological Survey Open-File Report 79-594.

PRELIMINARY MAP OF INTRUSIVE ROCKS IN SOUTHEASTERN ALASKA

by
David A. Brew and Robert P. Morrell

1980

Planimetric base from U.S. Geological Survey, 1:2,500,000
Alaska Map E, 1973

Geology compiled in 1978-79

Interior-Geological Survey, Reston, Va.-1980

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