LATEST CRETACEOUS AND CENOZOIC MAGMATIC ROCKS OF ALASKA

By

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INTRODUCTION

This map show the age, composition, and location of latest Cretaceous and Cenozoic magmatic rocks in Alaska. The age break at the latest Cretaceous was chosen to avoid arbitrarily dividing the 70- to 60-Ma volcanic province that is widespread throughout western Alaska. Magmatic provinces that are found entirely within the Cretaceous, such as the tin granites on the Seward Peninsula are not included even though some of the rocks are as young as 70 Ma. Older volcanic and plutonic rocks are shown on Barker and others (this volume) and Plafker and Berg (this volume). Rocks of Cretaceous age resulting in some overlap between the two maps.

On this map magmatic rocks are divided by age at 0-5 Ma, 5-30 Ma, 40-53 Ma, 55-65 Ma, and 65-76 Ma. Rocks of similar age are shown by a single color; shades of that color denote composition with darkest colors representing mafic rocks and lighter colors representing felsic rocks. Volcanic rocks have been divided into four units on the basis of their known or assumed silica content. Basalts contain less than 53% SiO_2, andesites contain between 53 and 63% SiO_2, dacites contain between 63 and 68% SiO_2, and rhyolites contain more than 68% SiO_2. The last two units overlap, whereas many volcanic field consist entirely of dacite, most rhyolite fields contain significant amounts of dacite. Highly undersaturated basaltic rocks, such as basanites and nephelinites, are shown by a pattern over the appropriate color for basalt of that age. Plutonic rocks are divided into three units: gabbro, intermediate to felsic granitic rocks, and felsic granitic rocks. Colors assigned to the plutonic rocks roughly correlate with those assigned to the volcanic rocks so that regional compositional trends can be recognized more readily. Gabbros are generally uncommon in Alaska, except for Eocene gabbros in the northern part of southeastern Alaska, some of which are layered gabbro like the Crillon-LaPerouse stock. Intermediate to felsic granites comprises the most common plutonic rock type and include the type of granitic rocks commonly found in the roots of eroded volcanic arcs. Syenite is included in this unit and is relatively uncommon, found chiefly in the northwestern part of the Alaska Range and where it is about 56 to 54 Ma. Felsic granite includes highly evolved rocks that generally contain more than 72% SiO_2.

Plutonic, hypabyssal, and clastic rocks are distinguished from volcanic rocks and from each other by map patterns. We have attempted to show the actual size and shape of the pluton, dike, or volcanic field so that individual plutons or volcanic fields can be recognized within the regional context. The size of small bodies has been exaggerated or, if the body is very small, replaced by a triangle. The size of dikes and sills have been greatly exaggerated. In most cases a dike or sill on the map actually represents many small dikes or sills. Dikes are shown by the color that best fits the composition rather than one age range or composition of rocks. In these cases only the dominant rock type is shown. However, where two or more units are present in approximately equal amounts, the pluton body or volcanic field is labeled with both units, but arbitrarily colored with only the most mafic or oldest unit.

Major volcanoes and calderas are shown on the map, but no attempt has been made to duplicate the excellent map of Luedke and Smith (1981), which shows all the known vents younger than 17 Ma in much more detail.

Tables briefly summarizing data on the magmatic rocks in mainland Alaska are given on the back of this map. More information is given in Moll-Stalcup (this volume). Similar tables for rocks in southeastern Alaska are given in Brew (this volume). Additional data on the Aleutian arc is summarized in Kay and Kay (this volume) and Vallier and others (this volume). Data on the Wrangell volcanic field is summarized briefly in table 1; more detail is given in Miller and Richter (this volume).

ACKNOWLEDGMENTS

Many people contributed published and unpublished data to this map. Their generous contributions are acknowledged under *Principal Sources of Geologic Data* on the back of the map. Tom Miller, Bob Luedke, and Hank Berg provided helpful reviews. I thank Beth O'Rourke Doyle and Leslie Gergen for drafting support. Sonia Macasaet provided typing support.

EXPLANATION

(Ages and (or) lithologies may be combined, queried where uncertain.)

(Unit names refer to table 1; unit names in southeast Alaska refer to tables 1 and 2, and figure 5 of Brew (this volume). Data for the Aleutian arc is given in Vallier (this volume.)

Age (Ma)	Subalkaline basalt	Basalt	Andesite	Dacite	Rhyolite and dacite	Gabbro	Granitic[1] (intermediate to felsic)	Granitic (dominantly felsic)
0-5		B1	C1	D1	E1	H5	F1	G1
5-30		B2	C2	D2	E2	H6	F2	G2
30-45[2]		B3	C3	D3	E3	H3	F3	G3
45-55		B4	C4	D4	E4	H4	F4	G4
55-65		B5	C5	D5	E5	H5	F5	G5
65-76	A6	B6	C6	D6	E6	H6	F6	G6

[1]Unit includes minor syenite
[2]Unit includes rocks as young as 25 Ma on the Alaska Peninsula

Unit boundary—Dotted where concealed; dashed where approximately located; queried where age not confirmed by radiometric age

Rocks not included in this report

Hypabyssal rocks—Unit color indicates age, unit label indicates composition

Area of chiefly tuff, breccia, and agglomerate—Aleutians outcrops include epiclastic volcanic rocks

Geologically significant volcanic or plutonic outcrop too small to be shown on map—Unit color indicates age, unit label indicates composition

Additional rock samples—Unit color indicates age, unit label indicates composition

Dredged—Approximate location on ocean floor. Two colors shown where seperate samples were obtained from one locality

Well—Approximate location

Caldera

Volcano

Explanation of combined unit labels—For simplicity, only the color of oldest and (or) most mafic unit is shown

Two compositions are present in approximately subequal amounts

Compositions span the labeled interval. If queried, composition is uncertain within the labeled range

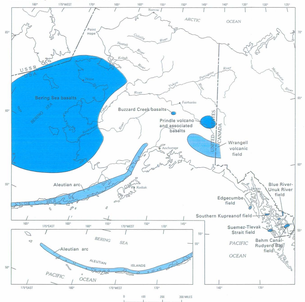
Age spans the labeled interval. If queried, age is uncertain within the labeled interval

Rock of both ages are present in approximately subequal amounts

SCALE 1:2 500 000

BATHYMETRIC CONTOUR INTERVALS 200, 800, AND 1,000 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DATUM IS MEAN LOW WATER

Alaskan Magmatic Provinces: 0-6 Ma



EXPLANATION

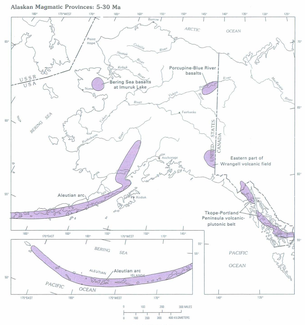
Unit boundary—Dashed where extent unknown or unmapped

Area of chiefly basalt fields

Area of chiefly orogenic andesite, basalt, and dacite

Time interval chosen to show initiation of widespread volcanism in bering sea region which began at about 6 Ma

Alaskan Magmatic Provinces: 5-30 Ma

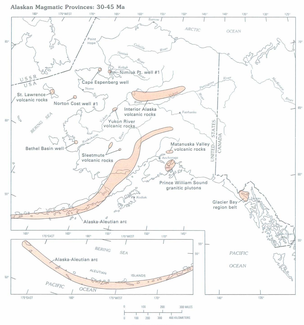


EXPLANATION

Unit boundary

Area of magmatic rocks 5-30 Ma

Alaskan Magmatic Provinces: 30-45 Ma



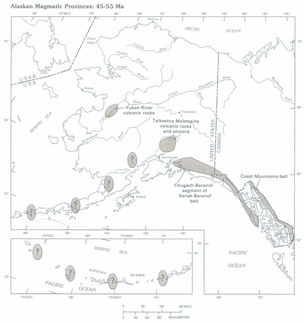
EXPLANATION

Unit boundary—Dashed where uncertain

Area of magmatic rocks 45-55 Ma

Well containing at least some magmatic rocks 30-45 Ma

Alaskan Magmatic Provinces: 45-55 Ma



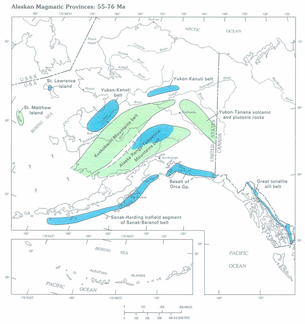
EXPLANATION

Unit boundary

Area of magmatic rocks 30-45 Ma

The earliest volcanic activity in the Aleutian arc may be as old as 45-55 Ma, as depicted by queries along the Aleutian arc

Alaskan Magmatic Provinces: 55-76 Ma



EXPLANATION

Unit boundary—Dashed where uncertain

Area of magmatic rocks 55-65 Ma

Area of magmatic rocks chiefly 66-72 Ma

Queries indicate areas covered by Quaternary alluvium or water that may be underlain by magmatic rocks 55-76 Ma

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Plate 6, Latest Cretaceous and Cenozoic Geology of Alaska
The Geology of North America (GNA-G1)