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SOME PLUTONIC ROCKS OF SOUTHWESTERN ALASKA, A DATA COMPILATION

OPEN-FILE REPORT 77-501

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By

Frederic H. Wilson

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Introduction

This report presents descriptive, chemical and age data on a number of plutons in southwestern Alaska. Included in this report are 39 plutons in the land area immediately south of 62 N and west of 156 W. This by no means includes all plutons within this area but represents those for which significant data exist. Included are a location map (fig. 1), a table of descriptive data (table 1), a table of chemical analyses (table 2), a series of ternary diagrams (fig. 2) showing plots of some of the chemical data for these plutons and a table of age data (table 3).

Acknowledgements

The bulk of this report draws heavily upon the work of Joseph M. Hoare and Warren L. Coonrad (1959a,b;1961a,b; and written communications). In addition, radiometric dating work of James G. Smith is included and some field data collected by Donald Grybeck, Allen Clark and J.B. Mertie Jr. (1938) are also utilized.

Description of Data

The presentation of data in this report results from study of field notes and thin sections of the selected plutons. In addition, a number of chemical analyses were available. Field work by the author was limited to the collection of the Mt. Waskey (9) and Zone Creek (11) pluton samples for potassium-argon work. A number of potassium-argon dates became available as this compilation was in progress; those in the Goodnews quadrangle are reported by Wilson and Smith (1976), the Shotgun Hills (3) dated sample (69 ACk 1008) data are reported by Berry and others (1976, p.4), and the Nyac (1) and Nunavachak Hills (35) ages are reported here for the first time.

Explanation of Associations

During the study of these rocks, three primary associations were found. Named the Late Cretaceous-Early Tertiary plutons, pyroxene-bearing plutons and mafic plutons, respectively, each of these are characterized by particular aspects and chemistry. Additionally, a number of plutons are believed to fall within the Late Cretaceous-Early Tertiary association but can not be definitely assigned to that group. These are grouped as the Probable Early Tertiary plutons. A final group of plutons is listed as the miscellaneous plutons of unsure association.

Late Cretaceous-Early Tertiary Plutons

This association is typified by rocks composed of oligoclase to andesine feldspars, biotite, amphibole and possibly pyroxene.

potassium feldspar and quartz are common. These bodies are often medium-grained and may have potassium feldspar or plagioclase phenocrysts. Chlorite is a common secondary mineral; it is essentially ubiquitous throughout the association. The principal lithologies rauge from granite through tonalite. Potassium -argon ages vary about the Tertiary boundary, from 59.2 to 70.7 m.y. The Nyac pluton (1), dated at 117 my is essentially identical to these bodies and is chemically indistinguishable from them with the data at hand. These bodies are characterized by greater than 12% normative quartz (usually greater than 17%) and greater than 15% normative orthoclase (usually greater than 20%). These bodies tend to appear in a belt through the center of the area studied.

Pyroxene-bearing Plutons

The most obvious characteristic of these plutons is the presense of pyroxene in thin section in all bodies. Commonly this is accompanied by biotite and the notable absence of amphiboles. Plagioclase composition ranges from oligoclase to andesine with perthitic feldspar present in the more silica-rich rocks. Texturally both medium-grained, equigranular and porphyritic rocks are found. potassium feldspar is not uncommon. Normative quartz ranges from 0 to 23% and normative orthoclase from 18 to 35%. Chemically these plutons are quite similiar to the Late Cretaceous-Early Tertiary plutons. No radiometric dates are as yet available on these bodies. These plutons tend to be found on the east side of the study area.

Mafic Plutons

The mafic plutons comprise the widest range of chemistry of any of these associations. The main bodies of the group are gabbros and are characterized by labradorite and amphiboles, though pyroxene is fairly common. Two bodies, the Tunulik (26) and Tokomarik Mtn. (25) plutons appear to belong to this association, based on field and thin section evidence. The Tunulik body has a mineralogy similiar to the pyroxene-bearing plutons but has less normative orthoclase and significantly more normative pyroxenes. The Tokomarik Mtn. body is essentially composed of quartz and plagioclase and is classified as trondhjemite or plagiogranite. The gabbros of the association are typically coarse-grained with the less mafic being medium-grained. The only date available (Crater Hill, (28)) is of middle to late Jurassic age, implying that the mafic plutons may be the oldest rocks studied. Generally these bodies tend to be found on the southwest side of the study area.

Miscellaneous Plutons of Unsure Association

There are six bodies in this group, scattered throughout the area and of quite different chemistries and mineralogies. Two of these bodies are possibly associated with the mafic plutons (i.e. the Eek River Sill (38) and Chagvan Mtn. (39)) but they are altered enough to make identification uncertain. Chagvan Mtn. may be the oldest of the mafic plutons (J.M. Hoare, oral communication, 1976). The other miscellaneous plutons are quite distinct in relation to each other and the associated groups of plutons.

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Notes for Table 1

1 Uppercase letters after sample numbers indicate sample data types used;

Blank	Field notes and usually a hand sample
T	Thin section
C	Chemical analysis
A	Potassium-argon age determination

2 Minerals listed in order of abundance.

3 B = biotite, H = hornblende, A = amphibole.
The plus and minus value is an estimate of the standard deviation of analytical precision using the method of Cox and Dalrymple (1967), together with an estimate of uncertainty based on evaluation of the variations in the concentration of the 38-Ar tracer and the potassium measurements.

4 Sample and analytical data for this age determination are listed in Table 3.

Table 3 Potassium-argon age data

MAP NUMBER	SAMPLE NUMBER	LITHOLOGY	MINERAL DATED	$\%K_2O$	$^{40}Ar_{rad}$ mol/gr x 10^{-10}	$\%^{40}Ar_{rad}$	AGE* m.y.	SOURCE
1	63ACo414	Granodiorite	Biotite	8.48 8.55 8.52	15.2	89.	117. + 3.3	M. A. Lanphere, written communication, 1965.
35	74AHr26	Granite	Biotite	8.42 8.48 8.45	1.59	77.	12.7 + 0.5	J. G. Smith, written communication, 1976.

* Ages have been recalculated using new (1976) K-Ar constants:

$\lambda_\epsilon = 0.572 \times 10^{-10} yr^{-1}$

$\lambda_{\epsilon'} = 8.78 \times 10^{-10} yr^{-1}$

$\lambda_\beta = 4.963 \times 10^{-10} yr^{-1}$

$^{40}K/K = 1.167 \times 10^{-4}$ mol/mol

Age shown in this table is original as reported.