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Potassium-argon age determinations from the Port Moller
and Stepovak Bay quadrangles, Alaska Peninsula
by
Gregory D. DuBois, Frederic H. Wilson, and Nora B. Shew

Reported here are 17 new potassium-argon age determinations on 11 volcanic rocks and 6 intrusive rocks from the Port Moller, Stepovak Bay and Simeonof Island quadrangles. These dates were done in conjunction with an Alaska Mineral Resources Assessment Program (AMRAP) study for these quadrangles. The samples dated yielded ages of Eocene or younger, ranging from 0.53 to 37.13 Ma.

Table 1 shows the analytical data. Each sample was extracted twice and the mean age is reported as the final age determination. Argon extraction and measurement was done using standard techniques of isotope dilution mass spectrometry, essentially as described by Dalrymple and Lanphere (1969). Sample preparation, argon extraction and data reduction was performed by the authors. Operators for mass spectrometry included the authors and James E. Conrad, Leda Beth Gray-Pickthorn, Elliot Kollman and Malcolm Pringle. Potassium was determined by flame photometry using a lithium metaborate fusion technique (Engels and Ingamells, 1970). The potassium analyses were replicated 2-4 times and the mean K_2O is shown as well. The potassium analyses were replicated 2-4 times and the mean is shown as well. Potassium analysts were Paul Klock, Byron Lai, Sarah Neil, Laureano Espos, and Stuart Mac Pherson. The analytical error assigned to each age (table 1), is an estimate of the standard deviation of analytical precision using the method of Cox and Dalrymple (1967) and the authors calculated estimate of uncertainty in the concentration of ^{38}Ar tracer and potassium measurements. Table 2 consists of rock descriptions from hand sample and thin sections for each sample. Hand sample colors were assigned using Goddard (1948) except where noted that the Munsell Soil Color Chart (1975) was used.

References cited

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Table 1. Potassium-argon age determinations.

Sample and Locality	Latitude and Longitude	Rock Type	Mineral	$\%K_2O$	mean K_2O	$^{40}Ar_{rad}$ $x10^{-12}m/g$	$\%^{40}Ar_{rad}$	Apparent Age and error (m.y.)
82ASh9 Popof Strait	55 19.0'N 160 34.2'W	Tuff	BIO	7.88 7.92 7.91 7.95	7.915	374.4 394.64	27.55 31.16	32.56 ± .45 34.31 ± .43 mean....33.40 ± 1.38
82ASh14 Popof Strait	55 19.4'N 160 34.2'W	Andesite	PLAG-HF	0.226 0.234 0.230 0.226	0.229	12.23 12.50	60.12 71.38	36.73 ± .68 37.53 ± .76 mean....37.13 ± 1.16
82AWs10 Cape Aliaksin	55 30.0'N 160 47.8'W	Andesite	PLAG-HF	0.404 0.405 0.404 0.402	0.404	5.868 6.254	39.48 56.24	10.07 ± .09 10.73 ± .13 mean....10.40 ± .49
82AWs15 Lake Prospect Unga Is.	55 10.1'N 160 46.5'W	Andesite	QSER	3.58 3.61 3.62 3.59	3.60	167.45 164.76	91.54 92.60	32.03 ± .30 31.52 ± .39 mean....31.78 ± .61
82AWs32 Swedania Peninsula	55 33.5'N 160 32.5'W	Andesite	PLAG-HF	0.590 0.593 0.601 0.598	0.596	7.907 8.963	58.09 66.68	9.20 ± .11 10.43 ± .12 mean.....9.81 ± .88
82AWs36 Swedania Peninsula	55 33.1'N 160 27.7'W	Dacite	PLAG-HF	2.511 2.504	2.508	32.14 32.50	76.07 76.58	8.88 ± .04 8.98 ± .06 mean.....8.93 ± .10
82AWs41b American Bay	55 43.1'N 160 12.4'W	Dacite	HBL	0.539 0.539	0.539	6.53 6.33	20.91 26.24	8.40 ± .11 8.13 ± .10 mean.....8.27 ± .24
82AWs45 South of Bear Lake	55 50.2'N 160 01.78'W	Andesite	PLAG-HF	0.356 0.355	0.356	0.32 0.23	7.07 5.01	0.63 ± .03 0.44 ± .02 mean.....0.53 ± .14
83AWs65 Mitrofania Island	55 49.0'N 158 51.6'W	Grano-diorite	BIO	9.02 9.03	9.03	125.09 120.63	68.31 64.38	9.60 ± .07 9.26 ± .07 mean.....9.43 ± .26
83AWs100 Ramsey Bay	55 50.4'N 159 54.8'W	Andesite	HBL	0.325 0.326	0.326	2.45 2.58	13.60 11.42	5.15 ± .10 5.50 ± .13 mean.....5.33 ± .30
83AWs125 Ukolnoi "Onion"	55 12.0'N 161 37.7'W	Basalt	PLAG-HF	0.082 0.076	0.079	1.71 1.88	28.44 27.22	14.95 ± .82 16.43 ± .90 mean....15.69 ± 1.6
83AWs126 Moss Cape pluton	55 08.1'N 161 59.1'W	Quartz-diorite	BIO	9.51 9.58	9.55	42.87 45.46	34.95 32.70	3.12 ± .04 3.31 ± .04 mean.....3.21 ± .14
83AWs129a Wosnesenski Island	55 11.4'N 161 20.2'W	Diorite	PLAG-HF	0.317 0.313	0.315	8.00 7.94	71.36 46.92	17.55 ± .21 17.42 ± .22 mean....17.48 ± .32
83AWs131 Wosnesenski Island	55 12.0'N 161 20.3'W	Basalt	WR-HF	0.251 0.251	0.251	2.95 3.16	16.10 10.10	8.14 ± .13 8.71 ± .14 mean.....8.43 ± .45
83AYb526 Dent Point	55 47.8'N 159 51.0'W	Diorite	HBL	0.302 0.302	0.302	2.60 2.69	12.42 12.91	5.96 ± .12 6.17 ± .14 mean.....6.07 ± .23
84AWs212 Pinnacle Peak	55 44.5'N 160 45.2'W	Basalt	PLAG-HF	0.517 0.501	0.509	0.494 0.486	10.18 7.42	0.67 ± .03 0.66 ± .04 mean.....0.67 ± .05

Age determinations calculated with constants given below:

= 4.963 x 10^{-10} year^{-1} = 5.72 x 10^{-11} year^{-1} = 8.78 x 10^{-13} year^{-1}

$^{40}K/K$ = 1.167 x 10^{-4} atom percent.
BIO = biotite, HBL = hornblende, PLAG = plagioclase, QSER = whole-rock with quartz-sericite alteration, WR = whole-rock. HF = hydrofluoric acid treated, see Wilson (1980).

Base from U.S. Geological Survey topo sheets, 1:250,000.
Port Moller; Stepovak Bay; Simeonof Island, Alaska.
Base prepared by Thematic Mapping in Menlo Park, CA, 1982

SCALE 1:250 000
5 0 5 10 15 20 25 MILES
5 0 5 10 15 20 25 KILOMETERS
CONTOUR INTERVALS 200, 250, 500, AND 1000 FEET

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Table 2.
Sample locations and rock descriptions.

All determinations of plagioclase anorthite content were made optically using Carlsbad-albite twin method.

82ASh 9 - Unga Island on Popof Strait; Port Moller B-2 quad., 55 19'00"N 160 34'32"W. Very light gray (N8) crystal tuff with angular, broken or fractured crystals of quartz, plagioclase, biotite, and amphibole(?) in a weakly welded groundmass of glass shards.

82ASh 14 - Unga Island on Popof Strait; Port Moller B-2 quad., 55 19'21"N 160 34'10"W. Olive gray (5Y 3/2) porphyritic andesite(?) with phenocrysts to 2mm of plagioclase (An 55-60), orthopyroxene and clinopyroxene, and lithic fragments in a fine-grained groundmass of plagioclase microlites and glass. Groundmass plagioclase a variable weak orientation or foliation.

82AWs 10 - Volcanic flows capping Cape Aliaksin. Port Moller C-3 quad., 55 30'02"N 160 47'45"W. Olive gray (5Y 4/1) andesite(?) with large (2.5mm) plagioclase phenocrysts (An 60-65) and clinopyroxene phenocrysts (2mm) in a groundmass of plagioclase microlites and devitrified glass.

82AWs 15 - "Lake" prospect, southwest end of Unga Island. Port Moller A-3 quad., 55 10'08"N 160 46'30"W. Completely recrystallized, pinkish-white (7.5YR 8/2)* quartz-sericite altered volcanic(?) rock. Quartz and sericite pseudomorphs after plagioclase(?) and pyroxene(?) with abundant pyrite. All primary minerals have been replaced by secondary phases.

82AWs 32 - Volcanic flows capping peninsula north of Swedania Point. Port Moller C-2 quad., 55 33'32"N 160 32'31"W. Dark olive gray (5Y 3/1) andesite(?) with phenocrysts of hypersthene (1-1.5mm) and plagioclase (2-3mm, An 64) in a fine-grained groundmass of plagioclase, devitrified glass, and opaque oxides. Phenocrysts show weak parallel alignment or foliation.

82AWs 36 - Small hypabyssal plug on peninsula north of Swedania Point; Port Moller C-2 quad., 55 33'05"N 160 27'39"W. Very light gray (N8) dacite(?) with phenocrysts (1-1.5mm) of plagioclase (An 64) and clinopyroxene in a groundmass of quartz, plagioclase, and opaque oxides. The edges of pyroxene grains are altered to biotite and there is minor alteration of pyroxene to chlorite. Fracturing is pervasive throughout thin-section.

82AWs 41b - Dike intruding contact metamorphosed volcanic rocks at American Bay; Port Moller C-1, 55 43'04"N 160 12'26"W. Medium gray (N5) dacite(?) with grayish black (N2) and very light gray (N8) phenocrysts of hornblende and plagioclase (An 45-55) in a groundmass of plagioclase microlites and devitrified glass. Plagioclase phenocrysts show slight alteration in cores to clay minerals. Abundant chlorite veinlets cutting phenocrysts and groundmass, other chlorite disseminated though groundmass. Euhedral hornblende phenocrysts, some contain minor inclusions of plagioclase or opaque oxides.

82AWs 45 - Flow from westernmost late Quaternary volcanic center in cluster south of Bear Lake; Port Moller D-1 quad., 55 50'12"N 160 01'47"W. Medium dark gray (N4) porphyritic andesite(?) with phenocrysts of clinopyroxene and plagioclase (An 62-65) in a very-fine-grained groundmass of glass, plagioclase, clinopyroxene, and opaque oxides. Phenocrysts are up to 3mm, glomeroporphyritic masses are up to 5mm.

83AWs 65 - Mitrofania Island; Stepovak Bay D-3 quad., 55 48'59"N 158 51'35" W. Hypidiomorphic-granular textured, fine to medium-grained, granodiorite. Very light gray (N8) with black (N1) hornblende and biotite. Hornblende and biotite rim clinopyroxene; plagioclase grains (An 40-45) and all occur in a matrix of interstitial quartz and potassium feldspar. Estimated mode is: plagioclase 40%, K-feldspar 20%, quartz 20%, biotite 8%, clinopyroxene 5%, hornblende 5%, and opaque oxides 2%.

83AWs 100 - Ramsey Bay; Stepovak Bay D-6 quad., 55 50'24"N 159 54'45"W. Light olive gray (5Y 6/1)* dacite porphyry with olive black (5Y 2/1) hornblende and pinkish white (5YR 8/1)* plagioclase phenocrysts. Plagioclase phenocrysts (An 55) are partially resorbed and are weakly saussuritized(?); some hornblende phenocrysts are partial altered to calcite. Rare quartz and untwinned feldspar grains may be potassium-feldspar. Plagioclase phenocrysts and the groundmass are pervasively fractured.

83AWs 125 - Columnar-jointed plug on Ukolnoi Island; Port Moller A-5 quad., 55 12'00"N 161 37'41"W. Dark olive gray (5Y 3/1), fine-grained, basalt. Clinopyroxene and plagioclase phenocrysts in a groundmass of devitrified glass and minor orthopyroxene. Larger plagioclase laths (An 75-80) are unaltered and larger clinopyroxene grains are altered to bastite.

83AWs 126 - Moss Cape pluton; Port Moller A-6 quad., 55 08'04"N 161 59'05"W. Clinopyroxene-biotite quartz monzodiorite. Light yellowish gray (10YR 6/1) with dusky green (5G 3/2) pyroxene and black (N1) biotite crystals. In thin-section, subhedral plagioclase laths (An 50-60), clinopyroxene, and amphibole crystals with inclusions of irregular blebs of quartz. Groundmass of biotite, and anhedral potassium feldspar and quartz. Abundant opaque oxides, particularly as inclusions in amphibole. Quartz is also present as fracture fillings. Estimated mode: 60% plagioclase, 15% potassium feldspar, 10% clinopyroxene, 10% quartz, 3% biotite, and 2% opaque oxides.

83AWs 129a - Small plug on southeast Wosnesenski Island; Port Moller A-5 quad., 55 11'25"N, 161 20'10"W. Medium light gray (N6), fine-to very-fine-grained two-pyroxene, plagioclase diorite. Clinopyroxene is dominant over orthopyroxene. Plagioclase and pyroxene laths are strongly parallel aligned. Plagioclase composition indeterminate due to fine grainsize.

83AWs 131 - Columnar-jointed flows surrounding plug on Wosnesenski Island; Port Moller A-5 quad., 55 12'00"N 161 20'17"W. Black (N2), fine-grained, porphyritic, flow-banded basalt. Plagioclase phenocrysts (An 80-85?) are partially resorbed into groundmass which is composed of abundant opaque oxides and fine-grained clinopyroxene with very fine glass. Altered mafic phenocrysts that may have been olivine. Flows surround plug described above (sample 83AWs 129a).

83AYb 526 - Sill at Dent Point; Stepovak Bay D-6 quad., 55 47'45"N 159 51'02"W. Porphyritic light gray (N7) dacite with moderate-olive-brown (5Y 4/3) hornblende and yellowish white (5Y 8/1) plagioclase phenocrysts. Fractured subhedral, strongly-zoned, plagioclase phenocrysts (to 3mm, average AN 48) and euhedral, though very slightly resorbed, hornblende phenocrysts (2mm) in a very fine-grained, groundmass of devitrified glass and plagioclase(?) microlites. Very minor alteration of some plagioclase to sericite.

84AWs 212 - Late Quaternary flows capping Pinnacle Peak; Port Moller C-3quad., 55 44'27"N 160 45'14"W. Reddish gray (10R 5/1)* porphyritic basalt with phenocrysts of olivine, clinopyroxene, orthopyroxene, and plagioclase (An 85-90) in a fine-grained groundmass of clinopyroxene, plagioclase, and glass. Partial alteration of olivine to iddingsite. Fine-grained opaque oxides are common in groundmass.

* Colors from Munsell Color (1975)

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