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K/AR AGES OF CENOZOIC VOLCANIC ROCKS FROM THE OREGON CASCADES WEST OF 121°30'

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As part of our effort to calculate time-volume relations for Cenozoic volcanic rocks of the central portion of the Cascade Range in Oregon (McBirney, et al; 1974), a series of whole-rock K/Ar ages were determined from mapped sections west of the axis of the High Cascades. The analytical data are presented here as well as an informal stratigraphy suggested by the K/Ar ages. The least consistent data are for the group of assumed Columbia River Basalt equivalents and I am currently investigating these units in more detail using techniques described by Baksi (1974) as well as $^{40}Ar/^{39}Ar$ methods. A cyclic pattern of mid to late Cenozoic volcanic activity is suggested, but more detailed geochronology will be needed to satisfactorily test this working hypothesis. All apparent ages are interpreted as crystallization ages with no evidence for argon loss found in any of the dated sections.

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ANALYTICAL METHODS

Except where otherwise noted, all whole rock samples were analyzed for argon as a solid block. Samples were prepared by cutting a rectangular prism (about 1.5 cm x 1.5 cm x 5 cm) from the interior of each hand sample and then taking a 0.5 cm slice from each end of the prism. After ultrasonically cleaning all solid pieces in reagent grade acetone, alcohol and triple-distilled water, the two end pieces were ground to -100 mesh and reserved for the K^+ determination, with the solid block reserved for the argon analysis.

Potassium (K^+) concentrations were determined by single-channel flame-photometry after chemically separating the alkalis using a method described by Cooper (1963), and only a rough outline of the procedure is given here. Two aliquants of about 0.1 g each are weighed into platinum crucibles and dissolved with hydrofluoric and sulfuric acids. The resulting acidic solution is then neutralized with ammonium hydroxide causing precipitation of aluminum and iron hydroxide and their complexes. Ammonium carbonate is then added to precipitate a portion of the calcium as calcium carbonate. This mixture is then filtered into a volumetric flask with the filtrate containing primarily the cations K^+, Na^+, Mg^+, and minor amounts of Ca^{++}. An aliquant of a concentrated solution of lithium nitrate is added to each filtrate as an internal standard, each flask diluted to volume, and a portion of each analyzed using a Zeiss Model PF-5 Flame photometer. The solutions of unknown potassium concentration are compared to potassium standard solutions prepared from ultra high-purity compounds of KCl and K_2SO_4 in a similar way to the unknowns. Comparison of concentrations between standards and unknowns is done by linear interpolation since with this technique, the standard curve (intensity vs. concentration) is linear in the concentration range of 0–20 ppm. Various standard rock powders and procedural blanks are analyzed along with the unknowns. The analytical uncertainty of duplicate determinations is estimated to be less than 0.55% (pooled coefficient of variation of all pairs).

Extraction and purification of argon was accomplished in a manner very similar to that described by Dalrymple and Lanphere (1969). In short, argon is extracted by radiofrequency induction-heating of a molybdenum crucible which contains a weighed aliquant of the sample. An ^{38}Ar tracer is added and the tracer and sample argon is mixed on an activated-charcoal finger at liquid nitrogen temperature. For all argon data reported here, manifold-type (batch) tracers were used. Argon isotopic composition and ^{38}Ar concentration measurements for all tracer batches were made at both the K/Ar Laboratory at Ohio State and the K/Ar Laboratory of the Isotope Branch of the U.S. Geological Survey in Menlo Park, Calif. Argon analyses of both interlaboratory and intralaboratory standards at both facilities demonstrate analytical reproducibility of better than 1% with mean values in agreement with determinations by others (Lanphere and Dalrymple, in press).

Purification of the gaseous mixture is accomplished by means of a molecular-sieve dessicant, Cu-CuO getter, and Ti getter. The purified mixture is collected on an activated charcoal finger, attached to a breakseal vial, at liquid nitrogen temperature. The breakseal vial is sealed under vacuum, labeled, and reserved for the isotopic analysis of sample plus tracer argon.

Isotopic analysis of argon was made in the static mode using a Nuclide Corporation Model SGA-6-60 mass spectrometer, attached to a manifold containing breakseal vials of both sample plus tracer argon and purified atmospheric argon. Scans of the argon isotopic spectrum were recorded on a strip-chart recorder and time-zero extrapolations were made in a manner described by Fleck (1970). The measured isotopic ratios of the atmospheric argon were used to calculate the mass discrimination of the mass spectrometer at the time of analysis.

CONSTANTS USED AND ANALYTICAL UNCERTAINTY OF CALCULATED AGES

Constants used in the calculation of the ages are: $\lambda_\epsilon = 0.585 \times 10^{-10}$/yr, $\lambda_\beta = 4.72 \times 10^{-10}$/yr, $^{40}K/K$ total $= 1.22 \times 10^{-4}$ g/g and the isotopic composition of atmospheric argon is assumed to be: $^{40}Ar/^{36}Ar = 295.5$ and

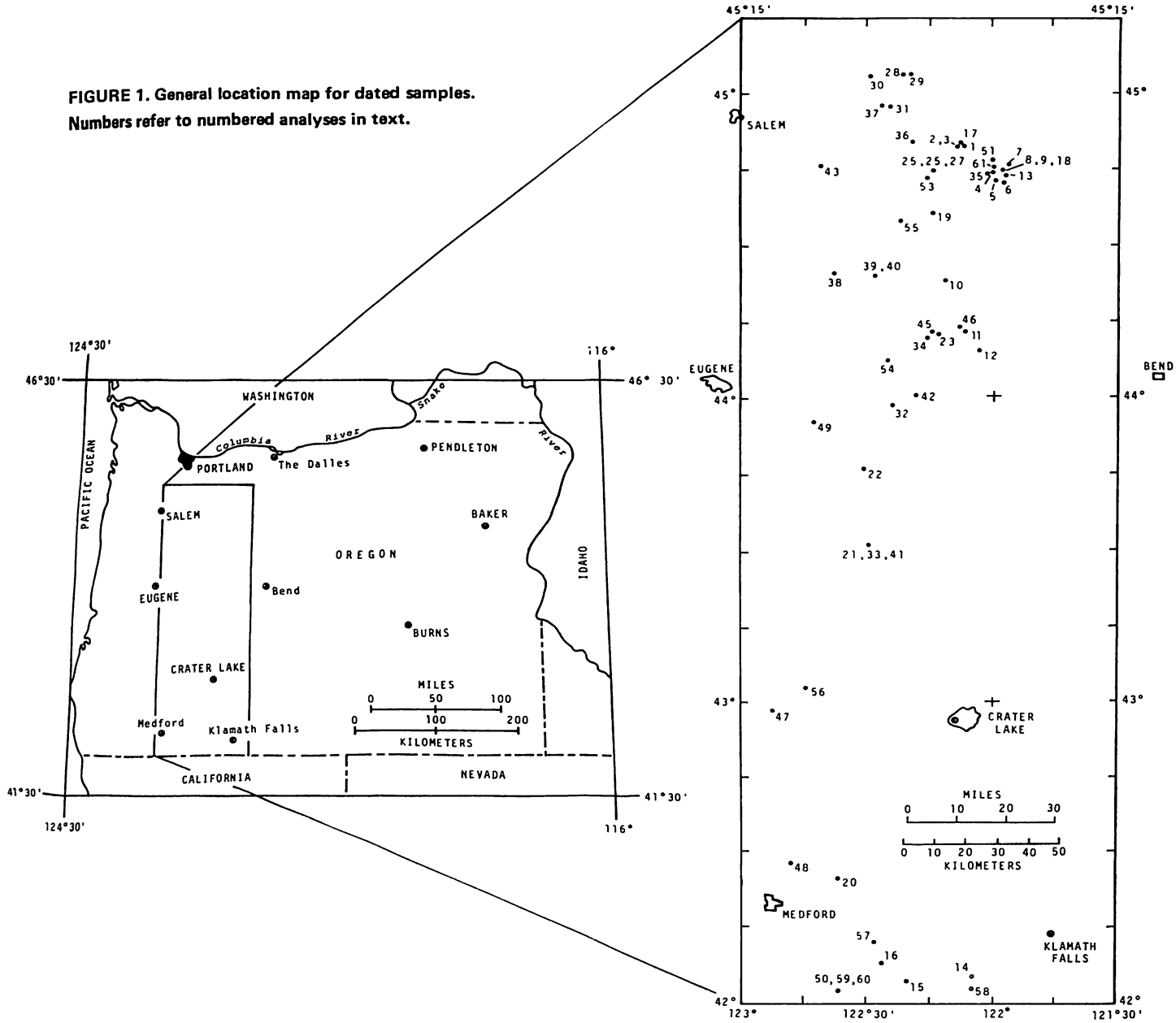

FIGURE 1. General location map for dated samples. Numbers refer to numbered analyses in text.

$^{36}Ar/^{38}Ar$ = 1,581. The plus and minus figure assigned to each calculated age is an estimate of the analytical uncertainty for a single analysis that has been calculated in a manner similar to that described by Cox and Dalrymple (1967).

A new set of decay constants for ^{40}K and a new atomic abundance of ^{40}K have been recommended for use by the IUGS Subcommission on Geochronology. They are: λ_ϵ = 0.581 x 10^{-10}/yr, λ_β = 4.962 x 10^{-10}/yr, and $^{40}K/K$ total = 1.167 x 10^{-4} atom/atom. To convert the K/Ar data from old to new constants, one has only to solve the following equation:

$$t = 1804 \log_e \left[3.35 \times 10^7 \frac{\text{moles } {}^{40}Ar_R/g}{\%\ K} + 1 \right] .$$

The value for the age (t) will be in millions of years.

SAMPLE DESCRIPTIONS

Battle Ax and High Cascades

1. *DMS-41* K/Ar
Andesite (44°48'40"N, 122°05'45"W; S5,T9S,R6E; near E base of Beachie Saddle, Marion Co., OR). *Analytical data:* %K = 0.6785, 0.6699; moles $^{40}Ar_R$ x 10^{-11}/g = 0.1489 (5.50% R), 0.1693 (21.8% R). *Collected by:* J. F. Sutter.
(whole rock) 1.24 ± 0.53 m.y.
(whole rock) 1.41 ± 0.60 m.y.

2. *DMS-35* K/Ar
Andesite (44°49'25"N, 122°08'10"W; at E end of 2nd switchback along trail from top of Battle Ax peak, Marion, Co., OR). *Analytical data:* %K = 0.5914,

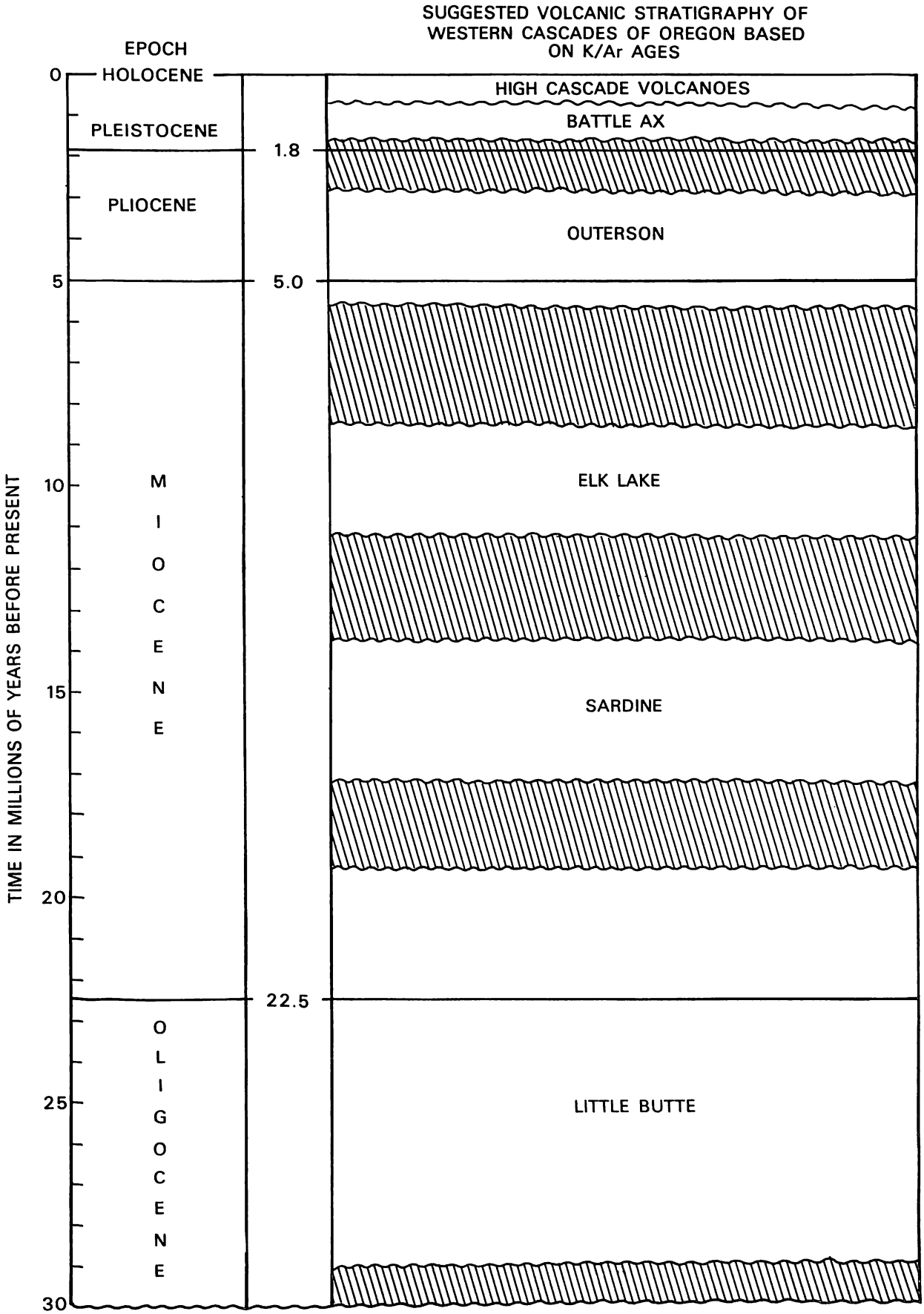

FIGURE 2. Suggested informal volcanic stratigraphy for Western Cascades of Oregon based on K/Ar ages.

2. (continued)
0.5898; moles $^{40}Ar_R \times 10^{-11}/g = 0.2005$ (9.1% R), 0.1357 (5.5% R). *Collected by:* J. F. Sutter.
(whole rock) 1.88 ± 0.50 m.y.
(whole rock) 1.27 ± 0.41 m.y.

3. *DMS-33* K/Ar
Andesite (44°49'30"N, 122°08'05"W; at top of Battle Ax peak, Marion Co., OR). *Analytical data:* %K = 0.6018, 0.5993; moles $^{40}Ar_R \times 10^{-11}/g = 0.02680$ (1.9% R). *Collected by:* J. F. Sutter.
(whole rock) 0.25 ± 0.03 m.y.

4. *MS-237* K/Ar
Basalt (44°44'40"N, 122°00'00"W; on SW slope of Gale Hill, Marion Co., OR). *Analytical data:* %K = 0.5950, 0.5789; moles $^{40}Ar_R \times 10^{-11}/g = 0.4634$ (0.3% R). *Collected by:* A. R. McBirney.
(whole rock) 0.44 ± 0.19 m.y.

5. *MS-238* K/Ar
Basalt (44°43'50"N, 121°59'00"W; on S slope of Timber Butte, Marion Co., OR). *Analytical data:* %K = 0.4747, 0.4562; moles $^{40}Ar_R \times 10^{-11}/g = 0.02149$ (1.6% R). *Collected by:* A. R. McBirney.
(whole rock) 0.26 ± 0.02 m.y.

Outerson Age Lavas

6. *MS-239* K/Ar
Basalt (44°43'20"N, 121°57'15"W; on S slope of Outerson Mountain, Marion Co., OR). *Analytical data:* %K = 1.656, 1.645; moles $^{40}Ar_R \times 10^{-11}/g = 1.648$ (7.1% R). *Collected by:* A. R. McBirney.
(whole rock) 5.60 ± 0.10 m.y.

7. *DMS-47* K/Ar
Andesite (44°45'35"N, 121°55'10"W; along Forest Service Road S-918 on N side of South Fork Breitenbush River, Marion Co., OR). *Analytical data:* %K = 1.376, 1.355; moles $^{40}Ar_R \times 10^{-11}/g = 0.8767$ (19.8% R). *Collected by:* J. F. Sutter.
(whole rock) 3.60 ± 0.05 m.y.

8. *DMS-48* K/Ar
Andesite (44°45'10"N, 121°56'40"W; just above Devil's Creek along Forest Service Road S-94, Marion Co., OR). *Analytical data:* %K = 0.6224, 0.6168; moles $^{40}Ar_R \times 10^{-11}/g = 0.5216$ (17.6% R). *Collected by:* J. F. Sutter.
(whole rock) 4.72 ± 0.19 m.y.

9. *DMS-50* K/Ar
Andesite (44°45'55"N, 121°55'10"W; along Forest Service Road S-94 about 20 m in elevation lower than DMS-48, Marion Co., OR). *Analytical data:* %K = 0.6422, 0.6353; moles $^{40}Ar_R \times 10^{-11}/g = 0.5184$ (7.9% R). *Collected by:* J. F. Sutter.
(whole rock) 4.55 ± 0.07 m.y.

10. *DMS-75* K/Ar
Basalt (44°23'20"N, 122°10'40"W; along Highway 20 N of Jumpoff Joe Mountain, Linn Co., OR). *Analytical data:* %K = 0.8457 (ave of 3); moles $^{40}Ar_R \times 10^{-11}/g = 0.7848$ (30.3% R). *Collected by:* J. F. Sutter.
(whole rock) 5.20 ± 0.07 m.y.

11. *CP-205* K/Ar
Basalt (44°13'00"N, 122°05'30"W; from top of section at Frisell Point, Lane Co., OR). *Analytical data:* %K = 0.5190, 0.5185; moles $^{40}Ar_R \times 10^{-11}/g = 0.3588$ (16.8% R). *Collected by:* A. R. McBirney.
(whole rock) 3.88 ± 0.06 m.y.

12. *CP-208* K/Ar
Basalt (44°09'30"N, 122°02'55"W; at top of Foley Ridge, Lane Co., OR). *Analytical data:* %K = 0.9128, 0.8940; moles $^{40}Ar_R \times 10^{-11}/g = 0.8150$ (15.4% R). *Collected by:* A. R. McBirney.
(whole rock) 5.06 ± 0.06 m.y.

13. *MS-258* K/Ar
Basalt (44°43'55"N, 121°56'45"W; along E flank of Outerson Mountain, Marion Co., OR). *Analytical data:* %K = 0.7786, 0.7572; moles $^{40}Ar_R \times 10^{-11}/g = 0.3830$ (15.1% R). *Collected by:* J. F. Sutter.
(whole rock) 2.80 ± 0.18 m.y.

14. *MS-261 (NA-34B)* K/Ar
Basalt (42°05'35"N, 122°04'30"W; along W bank of Klamath River near Big Bend Reservoir, Klamath Co., OR). *Analytical data:* %K = 0.9972, 0.9916; moles $^{40}Ar_R \times 10^{-11}/g = 0.6290$ (4.9% R). *Collected by:* R. Naslund.
(whole rock) 3.55 ± 0.23 m.y.

15. *MS-262 (NA-137)* K/Ar
Basalt (42°04'35"N, 122°20'50"W; along E bank of Jenny Creek SE of Pinehurst, Jackson Co., OR). *Analytical data:* %K = 0.3793, 0.3765; moles $^{40}Ar_R \times 10^{-11}/g = 0.2264$ (7.1% R). *Collected by:* R. Naslund.
(whole rock) 3.33 ± 0.09 m.y.

16. *MS-263 (NA-1758)* K/Ar
Basalt (42°08'15"N, 122°26'00"W; on the S slope of Chinquapin Mountain, Jackson Co., OR). *Analytical data:* %K = 0.4866, 0.4832; moles $^{40}Ar_R \times 10^{-11}/g = 0.2606$ (4.9% R). *Collected by:* R. Naslund.
(whole rock) 3.01 ± 0.14 m.y.

Elk Lake Age Lavas

17. *DMS-40* K/Ar
Andesite (44°49'50"N, 122°07'45"W; near E base of Battle Ax Mountain, Marion Co., OR). *Analytical data:* %K = 1.240, 1.231; moles $^{40}Ar_R \times 10^{-11}/g = 2.420$ (16.2% R). *Collected by:* J. F. Sutter.
(whole rock) 10.96 ± 0.75 m.y.

18. *DMS-49* K/Ar
Basalt (44°44'35"N, 121°55'35"W; along Forest Service Road S-94 just above Devil's Creek, Marion Co., OR). *Analytical data:* %K = 0.8442, 0.8402; moles $^{40}Ar_R \times 10^{-11}/g$ = 1.688 (10.9% R). *Collected by:* J. F. Sutter.
(whole rock) 11.23 ± 0.17 m.y.

19. *DMS-58* K/Ar
Andesite (44°36'10"N, 122°14'15"W; at Minniece Point, Linn Co., OR). *Analytical data:* %K = 1.361, 1.358; moles $^{40}Ar_R \times 10^{-11}/g$ = 2.570 (35.2% R). *Collected by:* J. F. Sutter.
(whole rock) 10.59 ± 0.12 m.y.

20. *DMS-147* K/Ar
Andesite (42°25'25"N, 122°37'30"W; near intersection of Highway 140 and road to Poole Hill on SE edge of town of Lake Creek, Jackson, Co., OR). *Analytical data:* %K = 0.7006, 0.6989; moles $^{40}Ar_R \times 10^{-11}/g$ = 1.146 (20.2% R). *Collected by:* J. F. Sutter.
(whole rock) 9.17 ± 0.12 m.y.

21. *DMS-153* K/Ar
Basalt (43°31'30"N, 122°30'55"W; 3.28 km SSW of Bear Bones Mountain, Lane Co., OR). *Analytical data:* %K = 0.1612, 0.1607; moles $^{40}Ar_R \times 10^{-11}/g$ = 0.3101 (6.1% R). *Collected by:* J. F. Sutter.
(whole rock) 10.79 ± 0.28 m.y.

22. *DMS-161* K/AR
Basalt (43°45'40"N, 122°30'30"W; above Forest Service Nursery just N of the town of West Fir, Lane Co., OR). *Analytical data:* %K = 1.370, 1.360; moles $^{40}Ar_R \times 10^{-11}/g$ = 2.704 (14.2% R). *Collected by:* J. F. Sutter.
(whole rock) 11.09 ± 0.15 m.y.

23. *MS-253* K/Ar
Andesite (44°12'45"N, 122°12'40"W; along N slope of Lookout Ridge, Jackson Co., OR). *Analytical data:* %K = 1.436, 1.425; moles $^{40}Ar_R \times 10^{-11}/g$ = 2.162 (55.7% R). *Collected by:* J. F. Sutter.
(whole rock) 8.46 ± 0.11 m.y.

24. *BX-256* K/Ar
Dacite (44°46'53"N, 122°11'46"W; at SW end of French Creek Ridge, Marion Co., OR). *Analytical data:* %K = 1.973, 1.983; moles $^{40}Ar_R \times 10^{-11}/g$ = 3.893 (15.6% R). *Collected by:* C. White.
(whole rock) 11.02 ± 0.35 m.y.

Sardine Lavas

25. *DMS-5* K/Ar
Andesite (44°44'10"N, 122°14'10"W; on Hall Ridge N of Detroit Reservoir; dike in Sardine flows, Marion Co., OR). *Analytical data:* %K = 0.8395, 0.8349; moles $^{40}Ar_R \times 10^{-11}/g$ = 2.386 (17.8% R). *Collected by:* J. F. Sutter.
(whole rock) 15.94 ± 0.21 m.y.

26. *DMS-7* K/Ar
Andesite (44°44'30"N, 122°14'15"W; on Hall Ridge N of Detroit Reservoir, Marion Co., OR). *Analytical data:* %K = 1.331, 1.316; moles $^{40}Ar_R \times 10^{-11}/g$ = 3.668 (19.5% R). *Collected by:* J. F. Sutter.
(whole rock) 15.50 ± 0.20 m.y.

27. *DMS-8* K/Ar
Andesite (44°45'10"N, 122°13'30"W; from a small vent near crest of Hall Ridge N of Detroit Reservoir, Marion Co., OR). *Analytical data:* %K = 1.088, 1.079; moles $^{40}Ar_R \times 10^{-11}/g$ = 3.240 (28.3% R). *Collected by:* J. F. Sutter.
(whole rock) 16.72 ± 0.20 m.y.

28. *DMS-18* K/Ar
Andesite (45°03'20"N, 122°22'05"W; C S7,T6S,R4E; along North Fork Molalla River; boulder in lahar, Clackamas Co., OR). *Analytical data:* %K = 0.9458, 0.9324; moles $^{40}Ar_R \times 10^{-11}/g$ = 2.893 (25.8% R). *Collected by:* J. F. Sutter.
(whole rock) 17.22 ± 0.20 m.y.

29. *DMS-21* K/Ar
Andesite (45°04'10"N, 122°21'40"W; SC S5,T6S,R4E; along Lukens Creek, Clackamas Co., OR). *Analytical data:* %K = 1.182, 1.175; moles $^{40}Ar_R \times 10^{-11}/g$ = 3.256 (19.0% R). *Collected by:* J. F. Sutter.
(whole rock) 15.45 ± 0.52 m.y.

30. *DMS-22* K/Ar
Andesite (45°02'05"N, 122°29'25"W; S7,T6S,R3E; along Middle Fork Molalla River, Clackamas, Co., OR). *Analytical data:* %K = 1.109, 1.093; moles $^{40}Ar_R \times 10^{-11}/g$ = 2.958 (47.2% R). *Collected by:* J. F. Sutter.
(whole rock) 15.03 ± 0.20 m.y.

31. *DMS-24* K/Ar
Andesite (44°57'35"N, 122°23'40"W; along Middle Fork Molalla River, Clackamas Co., OR). *Analytical data:* %K = 0.8698, 0.8670; moles $^{40}Ar_R \times 10^{-11}/g$ = 2.371 (37.3% R). (whole rock, 30/60 mesh) %K = 0.9294, 0.9233; moles $^{40}Ar_R \times 10^{-11}/g$ = 2.547 (55.0% R). *Collected by:* J. F. Sutter.
(whole rock) 15.27 ± 0.22 m.y.
(whole rock, 30/60 mesh) 15.38 ± 0.17 m.y.

32. *CP-168* K/Ar
Andesite (43°59'05"N, 122°23'15"W; C S24,T18S, R3E; on S side of Fall Creek along Highway 181, Lane Co., OR). *Analytical data:* %K = 1.285, 1.284; moles $^{40}Ar_R \times 10^{-11}/g$ = 3.263 (34.2% R). *Collected by:* A. R. McBirney.
(whole rock) 14.21 ± 0.16 m.y.

33. *DMS-159* K/Ar
Hornblende andesite (43°31'55"N, 122°30'00"W; from quarry on N slope of Spring Butte about 2.8 km E of road junction, Lane Co., OR). *Analytical data:* %K = 0.9660, 0.9517; moles $^{40}Ar_R \times 10^{-11}/g = 2.623$ (10.7% R). *Collected by:* J. F. Sutter.
(whole rock) 15.30 ± 0.25 m.y.

34. *MS-251* K/Ar
Basalt (44°12'15"N, 122°15'00"W; near the head of Blue River Reservoir; dike intruding Sardine, Lane Co., OR). *Analytical data:* %K = 0.9682, 0.9609; moles $^{40}Ar_R \times 10^{-11}/g = 2.354$ (28.6% R). *Collected by:* J. F. Sutter.
(whole rock) 13.66 ± 0.17 m.y.

35. *MS-256* K/Ar
Andesite (44°43'50"N, 122°01'10"W; W side S1, T10S, R6E; along Boulder Creek, Marion Co., OR). *Analytical data:* %K = 0.9804, 0.9667; moles $^{40}Ar_R \times 10^{-11}/g = 3.002$ (20.9% R). (whole rock, 30/60 mesh) %K = 1.084, 1.060; moles $^{40}Ar_R \times 10^{-11}/g = 3.294$ (34.5% R). *Collected by:* J. F. Sutter.
(whole rock) 17.24 ± 0.32 m.y.
(whole rock, 30/60 mesh) 17.18 ± 0.20 m.y.

Assumed Columbia River Basalt Equivalents

36. *DMS-11* K/Ar
Basalt (44°50'40"N, 122°18'30"W; in the North Little Santiam Valley about 0.6 km N of Henline Creek, Marion Co., OR). *Analytical data:* %K = 0.1768, 0.1645; moles $^{40}Ar_R \times 10^{-11}/g = 0.3900$ (1.7% R). *Collected by:* J. F. Sutter.
(whole rock) 12.80 ± 0.76 m.y.

37. *DMS-23* K/Ar
Basalt (44°57'45"N, 122°25'20"W; along Middle Fork Molalla River at confluence with Pine Creek, Clackamas Co., OR). *Analytical data:* %K = 1.059, 1.045; moles $^{40}Ar_R \times 10^{-11}/g = 3.526$ (15.9% R). (whole rock, 18/30 mesh) %K = 1.057, 1.041; moles $^{40}Ar_R \times 10^{-11}/g = 2.824$ (49.5% R). (whole rock, 30/60 mesh) %K = 1.045, 1.059; moles $^{40}Ar_R \times 10^{-11}/g = 2.868$ (53.9% R). (whole rock, 30/60 mesh, HF etched) %K = 1.077, 1.074; moles $^{40}Ar_R \times 10^{-11}/g = 2.937$ (39.3% R). *Collected by:* J. F. Sutter.
(whole rock) 18.73 ± 0.63 m.y.
(whole rock, 18/30 mesh) 15.06 ± 0.60 m.y.
(whole rock, 30/60 mesh) 15.25 ± 0.24 m.y.
(whole rock, 30/60 mesh, HF etched) 15.28 ± 0.19 m.y.

38. *DMS-68* K/Ar
Basalt (44°24'45"N, 122°36'45"W; along Highway 20 E of Sweethome and about 0.8 km W of Green Peter Junction, Linn Co., OR). *Analytical data:* %K = 0.6147, 0.5520; moles $^{40}Ar_R \times 10^{-11}/g = 2.286$ (1.1% R). (whole rock, 30/60 mesh) %K = 0.5139, 0.5066; moles $^{40}Ar_R \times 10^{-11}/g = 2.292$ (44.9% R). *Collected by:* J. F. Sutter.
(whole rock) 21.88 ± 3.77 m.y.
(whole rock, 30/60 mesh) 25.05 ± 0.28 m.y.

39. *DMS-69* K/Ar
Basalt (44°24'05"N, 122°27'40"W; along Highway 20 near Cascadia State Park, Linn Co., OR). *Analytical data:* %K = 0.7788, 0.7770; moles $^{40}Ar_R \times 10^{-11}/g = 3.243$ (14.0% R). (whole rock, 30/60 mesh) %K = 0.8075, 0.8120; moles $^{40}Ar_R \times 10^{-11}/g = 3.153$ (59.6% R). *Collected by:* J. F. Sutter.
(whole rock) 23.27 ± 0.80 m.y.
(whole rock, 30/60 mesh) 21.74 ± 0.25 m.y.

40. *DMS-70* K/Ar
Basalt (44°24'15"N, 122°26'50"W; along Highway 20 just E of intersection with Road 13001, Linn Co., OR). *Analytical data:* %K = 0.8928, 0.8898; moles $^{40}Ar_R \times 10^{-11}/g = 3.484$ (57.5% R). *Collected by:* J. F. Sutter.
(whole rock, 30/60 mesh) 21.83 ± 0.36 m.y.

41. *DMS-158* K/Ar
Basalt (43°31'40"N, 122°29'45"W; on W flank of Spring Butte 2.0 km E of road intersection, Lane Co., OR). *Analytical data:* %K = 0.4251, 0.4217; moles $^{40}Ar_R \times 10^{-11}/g = 1.222$ (31.2% R). *Collected by:* J. F. Sutter.
(whole rock) 16.14 ± 0.19 m.y.

42. *CP-166* K/Ar
Basalt (44°00'55"N, 122°17'40"W; S11 & 14, T18S, R4E; along Highway 181 along Quartz Creek at boundary, Lane Co., OR). *Analytical data:* %K = 0.8591, 0.8511; moles $^{40}Ar_R \times 10^{-11}/g = 2.282$ (26.9% R). *Collected by:* A. R. McBirney.
(whole rock) 14.93 ± 0.28 m.y.

43. *CP-180* K/Ar
Stayton Lava (basalt) (44°45'10"N, 122°39'20"W; along Highway 226 between Lyons and Jordan, Linn Co., OR). *Analytical data:* %K = 0.4818, 0.4770; moles $^{40}Ar_R \times 10^{-11}/g = 1.653$ (31.6% R). *Collected by:* A. R. McBirney.
(whole rock) 19.26 ± 0.23 m.y.

44. *CP-202* K/Ar
Astoria basalt (46°37'50"N, 123°17'20"W; S11, T13N, R5W; near Doty, Washington). *Analytical data:* %K = 0.8365, 0.8336; moles $^{40}Ar_R \times 10^{-11}/g = 2.294$ (27.3% R). *Collected by:* John Armentrout.
(whole rock) 15.36 ± 0.18 m.y.

45. *MS-252* K/Ar
Basalt (44°13'15"N, 122°13'35"W; SW¼, NE¼ S32, T15S, R5E; just S of Lookout Creek, Lane Co., OR). *Analytical data:* %K = 0.5762, 0.5687; moles $^{40}Ar_R \times 10^{-11}/g = 3.537$ (6.8% R). (whole rock, 30/60 mesh)

45. (continued)
%K = 0.5472, 0.5464; moles $^{40}Ar_R \times 10^{-11}/g$ = 1.404 (34.0% R). *Collected by:* J. F. Sutter.
(whole rock) 34.39 ± 0.85 m.y.
(whole rock, 30/60 mesh) 14.36 ± 0.29 m.y.

46. *MS-254* K/Ar
Basalt (44°14'10"N, 122°07'30"W; SE¼, NW¼ S30, T15S,R6E; just N of Lookout Creek, Lane Co., OR). *Analytical data:* %K = 0.5206, 0.5159; moles $^{40}Ar_R \times 10^{-11}/g$ = 1.847 (6.3% R). *Collected by:* J. F. Sutter.
(whole rock) 19.91 ± 1.94 m.y.

Little Butte

47. *DMS-133* K/Ar
Basalt (42°59'00"N, 122°51'50"W; along South Umpqua River about 3.8 km NE of junction with Jackson Creek Road, Douglas Co., OR). *Analytical data:* %K = 0.2294, 0.2239; moles $^{40}Ar_R \times 10^{-11}/g$ = 1.009 (12.9% R). *Collected by:* J. F. Sutter.
(whole rock) 24.83 ± 0.50 m.y.

48. *DMS-144* K/Ar
Andesite (42°28'10"N, 122°48'05"W; along Little Butte Creek just E of Eagle Point, Jackson Co., OR). *Analytical data:* %K = 0.7205, 0.7129; moles $^{40}Ar_R \times 10^{-11}/g$ = 3.697 (30.1% R). *Collected by:* J. F. Sutter.
(whole rock) 28.75 ± 0.34 m.y.

49. *CP-173* K/Ar
Gabbro (43°55'30"N, 122°41'50"W; near SE end of Fall Creek Reservoir about 0.3 km W of bridge across Winberry Creek, Lane Co., OR). *Analytical data:* %K = 0.3480 (ave of 3); moles $^{40}Ar_R \times 10^{-11}/g$ = 1.330 (28.6% R). *Collected by:* A. R. McBirney.
(whole rock) 21.34 ± 0.55 m.y.

50. *MS-270* K/Ar
Andesite (42°02'25"N, 122°36'15"W; NW¼ S4,T41S, R2E; along new Highway 99, Jackson Co., OR). *Analytical data:* %K = 0.8533, 0.8344; moles $^{40}Ar_R \times 10^{-11}/g$ = 4.408 (31.5% R). *Collected by:* J. F. Sutter.
(whole rock) 29.11 ± 0.34 m.y.

51. *DMS-43* K/Ar
Breitenbush Tuff (ignimbrite) (44°46'30"N, 121°59'35"W; along road between Cleator Bend and Breitenbush, Marion Co., OR). *Analytical data:* %K = 0.7282, 0.7402; moles $^{40}Ar_R \times 10^{-11}/g$ = 2.594 (32.4% R). *Collected by:* J. F. Sutter.
(Plagioclase) 19.74 ± 0.24 m.y.

52. *BX-99* K/Ar
Andesite (44°46'00"N, 122°01'33"W; 1 mile SE of Eagle Rock, Marion Co., OR). *Analytical data:* %K = 0.8079, 0.8053; moles $^{40}Ar_R \times 10^{-11}/g$ = 3.500 (64.1% R). *Collected by:* C. White.
(whole rock) 24.22 ± 0.27 m.y.

Plutons

53. *DMS-53* K/Ar
Detroit pluton (diorite) (44°43'05"N, 122°15'00"W; from quarry just above the Detroit Dam, Marion Co., OR). *Analytical data:* %K = 1.235, 1.222; moles $^{40}Ar_R \times 10^{-11}/g$ = 2.124 (16.1% R). *Collected by:* J. F. Sutter.
(whole rock) 9.68 ± 0.18 m.y.

54. *DMS-77* K/Ar
Nimrod stock (leucogranite) (44°07'40"N, 122°24'05"W; along Highway 126 at small Waterfall NE of Nimrod, Lane Co., OR). *Analytical data:* %K = 4.093, 4.044; moles $^{40}Ar_R \times 10^{-11}/g$ = 11.54 (32.3% R). *Collected by:* J. F. Sutter.
(whole rock) 15.86 ± 0.18 m.y.

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