

K-Ar age determinations on Pliocene basalts from the Espanola Basin, New Mexico

Kim Manley

Isochron/West, Bulletin of Isotopic Geochronology, v. 16, pp. 29-30

Downloaded from: <https://geoinfo.nmt.edu/publications/periodicals/isochronwest/home.cfm?Issue=16>

Isochron/West was published at irregular intervals from 1971 to 1996. The journal was patterned after the journal *Radiocarbon* and covered isotopic age-dating (except carbon-14) on rocks and minerals from the Western Hemisphere. Initially, the geographic scope of papers was restricted to the western half of the United States, but was later expanded. The journal was sponsored and staffed by the New Mexico Bureau of Mines (now Geology) & Mineral Resources and the Nevada Bureau of Mines & Geology.



ISOCHRON/WEST
A Bulletin of Isotopic Geochronology

All back-issue papers are available for free: <https://geoinfo.nmt.edu/publications/periodicals/isochronwest>

This page is intentionally left blank to maintain order of facing pages.

K-AR AGE DETERMINATIONS ON PLIOCENE BASALTS FROM THE ESPAÑOLA BASIN, NEW MEXICO

Kim Manley
U. S. Geological Survey
Denver, CO 80225

Four basalts from the Española Basin, New Mexico, were dated by the K-Ar method, and the dates contribute to the reconstruction of the Pliocene history of the Española Basin. Financial support was received from NSF Grant GA 39850.

Two of the basalts are from two localities in the Cerros del Rio volcanic field at the southern end of the Española Basin. The age of sample no. 1 provides a minimum age for the immediately underlying Ancha Formation. The Ancha Formation, previously considered late Pliocene or Pleistocene in age (Spiegel and Baldwin, 1963), is now established as a deposit of Pliocene age. The age of the second basalt (no. 2) gives a minimum age for underlying ancestral gravels of the Rio Grande, the Totavi Lentil of the Puye Formation, in Ancho Canyon.

Sample no. 3 is from the Servilleta Formation (Miller and others, 1963) at the northern end of the Española Basin. It is from Black Mesa, the southernmost exposure of the Servilleta Formation, where the basalt of the Servilleta overlies the Chamita Formation of Galusha and Blick (1971). This new date for the Servilleta extends the age range of volcanism reported as 3.6 to 4.5 m.y. by Ozima and others (1967).

Sample no. 4 provides an age for an isolated flow northeast of the town of Vadito in the northeast portion of the Española Basin. This flow was mapped by Miller and others (1963) as part of the Servilleta Formation. However, the age and petrology of this flow are sufficiently different from the Servilleta Formation flows (Lipman, 1969) that it may be better considered related to the feldspathoidal basalts of Pliocene to Holocene age on the High Plains (Lipman and Mehnert, 1975).

Analytical Data

F M Consultants: $\lambda_{\epsilon} = 0.584 \times 10^{-10} / \text{yr}$; $\lambda_{\beta} = 4.72 \times 10^{-10} / \text{yr}$

H. H. Mehnert: $\lambda_{\epsilon} = 0.585 \times 10^{-10} / \text{yr}$; $\lambda_{\beta} = 4.72 \times 10^{-10} / \text{yr}$

SAMPLE DESCRIPTIONS

1. Basalt 75-5-19-3 K-Ar (whole rock) 1.96 ± 0.06 m.y.

Latite flow ($35^{\circ}46'17''$ N, $106^{\circ}07'05''$ W; T 18 N, R 8 E, unsurveyed; Horcado Ranch quad., Santa Fe Co., NM). Analytical data: $K_2O = 3.2\%$; $*Ar^{40}/\Sigma Ar^{40} = 18.6\%$; dated by: F M Consultants Ltd., England; collected by: Kim Manley.

2. Basalt 74-11-12-1 K-Ar (whole rock) 2.6 ± 0.4 m.y.

Alkali-olivine flow ($35^{\circ}46'36''$ N, $106^{\circ}13'30''$ W; T 18 N, R 7 E, unsurveyed; White Rock quad., Sandoval Co., NM). Analytical data: $K_2O = 0.98\%$; $*Ar^{40}/\Sigma Ar^{40} = 13.7\%$; dated by: Harold Mehnert, U. S. Geological Survey, Denver; collected by: Kim Manley. Comment: Minor alteration could indicate that this sample was subject to an argon loss discrepancy when first dated by F M Consultants. It was redated by Harold Mehnert at the U. S. Geological Survey and that age determination is reported here. The first determination — 1.17 ± 0.09 m.y. — is inconsistent with field relationships and recent zircon fission-track dating of a pumice layer in the Puye Formation (Manley, 1976).

3. Basalt 72S6 K-Ar (whole rock) 2.78 ± 0.44 m.y.

Olivine tholeiite flow ($36^{\circ}08'50''$ N, $106^{\circ}01'50''$ W; T 22 N, R 9 E, unsurveyed; Lyden quad., Rio Arriba Co., NM). Analytical data: $K_2O = 0.42\%$; $*Ar^{40}/\Sigma Ar^{40} = 7\%$; dated by: F M Consultants Ltd., England; collected by: Kim Manley.

4. Basalt 72S9 K-Ar (whole rock) 5.11 ± 0.84 m.y.

Basanite flow ($36^{\circ}11'14''$ N, $105^{\circ}37'02''$ W; NE¼ sec. 36, T 23 N, R 12 E; Tres Ritos quad., Taos Co., NM).
Analytical data: $K_2O = 2.03\%$; $*Ar^{40}/\Sigma Ar^{40} = 23.8\%$; dated by: F M Consultants Ltd., England; collected by: Kim Manley.

REFERENCES

- Galusha, Ted, and Blick, J. C. (1971) Stratigraphy of the Santa Fe Group, New Mexico: Am. Mus. Nat. Hist. Bull., v. 144, no. 1.
- Lipman, P. W. (1969) Alkalic and tholeiitic basaltic volcanism related to the Rio Grande depression, southern Colorado and northern New Mexico: Geol. Soc. America Bull., v. 80, p. 1343-1354.
- Lipman, P. W., and Mehnert, H. H. (1975) Late Cenozoic basaltic volcanism and development of the Rio Grande depression in the southern Rocky Mountains: Geol. Soc. America Mem. 144, p. 119-154.
- Manley, Kim (in press) Tephrochronology of the Tesuque, Ancha and Puye Formations of the Santa Fe Group, Española Basin, New Mexico: Geol. Soc. America, Abstracts with Programs, v. 8.
- Miller, J. P., Montgomery, Arthur, and Sutherland, P. K. (1963) Geology of part of the southern Sangre de Cristo Mountains, New Mexico: New Mexico Bureau Mines and Mineral Resources Mem. 11.
- Ozima, Minoru, Kono, M., Kaneoka, I., Kinoshita, H., Kobayashi, K., Nagata, T., Larson, E. E., and Strangway, D. W. (1967) Paleomagnetism and K-Ar ages of some volcanic rocks from the Rio Grande gorge, New Mexico: Jour. Geophys. Research, v. 70, no. 10, p. 2615-2621.
- Spiegel, Zane, and Baldwin, Brewster (1963) Geology and water resources of the Santa Fe area, New Mexico: U. S. Geol. Survey Water-Supply Paper 1525.