

TABLE A1. U-Pb GEOCHRONOLOGICAL DATA

Sample was collected from a granophyre zone mapped by Watson (1969) as a series of partly discontinuous sheets and locally discordant bodies near the top of a thick Umkondo dolerite sill crossed by the Mutambara-Chimanimani road. Sample site is 2 km west of road at grid reference E677N045 (Lat. 19°51'S, Long. 32°41'E), on Zimbabwe Government topographic map Sheet 1932D3.

Fractions	ZIM96-141	Weight (μg)	Concentration		Errors 2-sigma (%)						Age (Ma)		corr. Pb‡	
			U (ppm)	Pb* (ppm)	206 Pb† (ppm)	208 Pb† (ppm)	206 Pb	238 U	% err	235 U	% err	206 Pb	207 Pb† (ppm)	
z5	4.0	187.7	36.4	2137.4	0.148	0.18326	(0.22)	1.92966	(0.26)	0.07637	(0.12)	1084.8	1091.4	1104.7
z3	9.4	182.1	33.5	4168.9	0.120	0.17782	(0.75)	1.87544	(0.76)	0.07649	(0.10)	1055.0	1072.5	1108.0
z6	9.0	231.1	42.2	8769.0	0.198	0.16632	(0.11)	1.75541	(0.16)	0.07655	(0.12)	991.8	1029.2	1109.5
z2	4.0	449.7	78.0	4770.1	0.146	0.16467	(0.13)	1.73088	(0.16)	0.07623	(0.09)	982.7	1020.1	1101.2
z4	2.4	6928.7	1380.2	14855.7	0.377	0.15884	(0.31)	1.65524	(0.32)	0.07558	(0.08)	950.3	991.6	1084.0
z7	5.0	622.1	119.4	6398.8	0.341	0.15702	(0.09)	1.63902	(0.11)	0.07570	(0.05)	940.2	985.3	1087.2
z1	5.6	537.9	82.2	4064.3	0.109	0.14875	(0.10)	1.55337	(0.14)	0.07574	(0.09)	893.9	951.8	1088.2

\* Radiogenic Pb. † Measured ratio corrected for spike and fractionation. Mass fractionation correction of 0.15%/amu ± 0.04%/amu was applied to all analyses. ‡ Corrected for fractionation, spike, blank, and initial common Pb. § Total common Pb in analysis. Blank isotopic composition: 206Pb/204Pb =  $19.10 \pm 0.1$ ,  $207\text{Pb}/204\text{Pb} = 15.71 \pm 0.1$ ,  $208\text{Pb}/204\text{Pb} = 38.65 \pm 0.1$ . All errors are reported as 2-sigma. Each fraction represents a single crystal. Sample weights are estimated by using a video monitor with gridded screen and are known to within 40%. Common Pb corrections were calculated by using the model of Stacey and Kramers (1975) and the interpreted age of the sample.

## References:

- Stacey, J. S., and Kramers, J. D., 1975, Approximation of terrestrial lead isotope evolution by a two-stage model: Earth and Planetary Science Letters, v. 26, p. 207-221.
- Watson, R. L. A., 1969, The geology of the Cashel, Melsetter, and Chipping areas: Rhodesia Geological Survey Bulletin 60, 85 p.

TABLE A2. GEOCHRONOLOGICAL CONSTRAINTS FOR THE UMKONDO IGNEOUS PROVINCE

Rock unit	Date and reference*
Umkondo dolerites† (e. Zimbabwe)	Rb-Sr errorchron (whole-rock + biotite) = $1080 \pm 140/25$ Ma (Allsopp et al., 1989); U-Pb (zircon) = $1105 \pm 2$ Ma (this paper)
Deweras dike† (nw. Zimbabwe)	Rb-Sr errorchron (whole-rock) = $1100 \pm 270$ Ma (Hahn et al., 1991)
Kamativi dolerite dikes§ (Dete inlier, w. Zimbabwe)	Dikes cut Paleoproterozoic basement and are cut by pegmatites with Rb-Sr mineral isochron (muscovite-plagioclase) = $1025 \pm 15$ Ma (Priem et al., 1971); tentatively correlated with Deweras and related dikes farther north by Wilson et al. (1987) on the basis of similar trends
Dolerite sills and dikes† (Transvaal; 4 different localities)	Rb-Sr (biotite) = $1092 \pm 15$ Ma (Allsopp et al., 1967); K-Ar (whole-rock) = $1060 \pm 42$ Ma, (pyroxene) = $1040 \pm 42$ Ma, (plagioclase) = $891 \pm 36$ Ma (McDougall, 1963); K-Ar (plagioclase-pyroxene) = $885 \pm 35$ Ma, $876 \pm 35$ Ma (Jones and McElhinny, 1966)
Timbavati Gabbrot (ne. Transvaal)	$^{40}\text{Ar}/^{39}\text{Ar}$ (whole-rock) = $1123 \pm 5$ Ma, $1072 \pm 5$ Ma, $1072 \pm 6$ Ma; overprint at $696 \pm 4$ Ma (Burger and Walraven, 1979, 1980)
Dibete-Shoshong suite† (e. Botswana; 3 different localities)	Rb-Sr isochron (whole-rock) = $1081 \pm 15$ Ma (R. Mapeo, written commun., 1997); K-Ar (plagioclase-pyroxene) = $670 \pm 26$ Ma, $600 \pm 24$ Ma (Jones and McElhinny, 1966; inferred by Carney et al., 1994, to reflect resetting related to localized Pan-African shearing)
Kanye-Mochudi suite† (s. Botswana; 4 different localities)	K-Ar (plagioclase-pyroxene) = $1264 \pm 50$ Ma, $1110 \pm 44$ Ma, $951 \pm 38$ Ma (Jones and McElhinny, 1966); K-Ar (plagioclase) = $911 \pm 36$ Ma (McDougall, 1963)
Tshane gabbroic complex§ (subsurface, sw. Botswana)	Rb-Sr isochron (whole-rock) = $1021 \pm 86$ Ma (Carney et al., 1994)
Kgwebe Formation rhyolite (in Kgwebe-Ghanzi rift, w. Botswana)	U-Pb (zircon) = $1106 \pm 2$ Ma (Schwartz et al., 1996)
Namibian rhyolites (along strike from rhyolites in Kgwebe-Ghanzi rift)	U-Pb (zircon) = $1094 \pm 20$ Ma (Hegenberger and Burger, 1985); U-Pb (zircon) = $1102 \pm 7$ Ma (Pfurr et al., 1991)

Borgmassivet dolerites<sup>†</sup>  
(Dronning Maud Land)

Rb-Sr, Sm-Nd (whole-rock) = ca. 1000 Ma (Moyes et al., 1995; according to those authors, interpretation of the data is difficult owing to assimilation and partial resetting); K-Ar (biotite) =  $1183 \pm 33$  and  $1143 \pm 39$  Ma, (plagioclase) =  $1115 \pm 37$ ; other K-Ar dates are younger and are considered to reflect overprint at ca. 525 Ma (Peters et al., 1991)

*Note:* Dates have been recalculated where necessary with currently recommended constants.

\*Reference is given below only if not included in text.

†Unit has paleomagnetic pole correlated with Umkondo pole.

§Unit is shown in Figure 1 but not discussed in text.

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