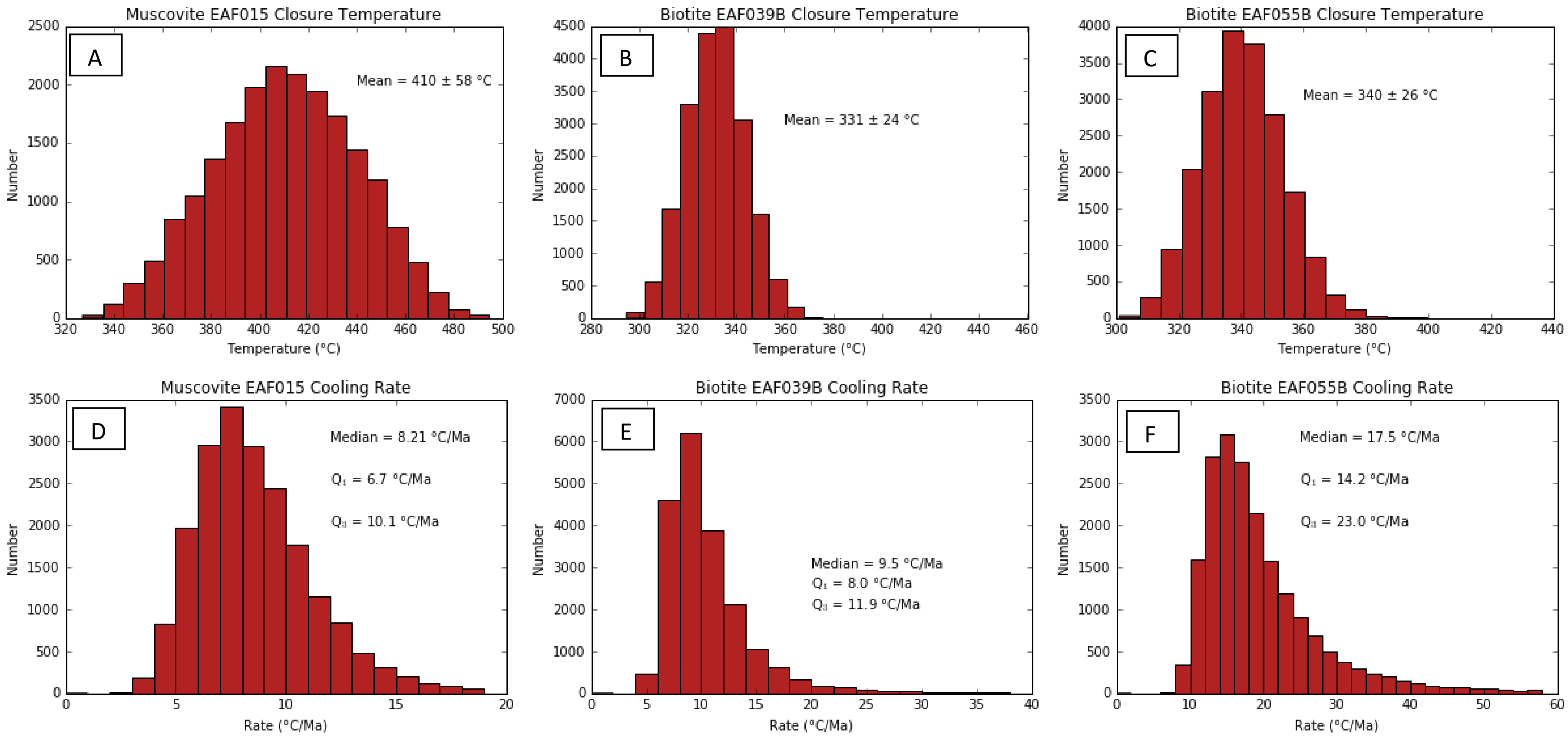
Data Repository item 2016219: Scibiorski, E., et al., 2016, Cooling and exhumation along the curved Albany-Fraser Orogen, Western Australia: Lithosphere, doi: 10.1130/L561.1
See also accompanying .xlsx file of Appendix 2 Ar/Ar Data.



Supplemental Figure 1. (A,B,C) Histograms showing the results of the Monte Carlo simulation modeling the 40Ar/39Ar closure temperature in muscovite and biotite. The mean is reported with ± 2 sigma. (D, E, F) Histograms showing the results of the Monte Carlo simulation modeling the cooling rate between hornblende and mica closure temperature. The strongly right-tailed skew of the histograms is due to the large range in mathematically calculated cooling rates. This also skews the mean and standard deviation to unrealistically high values. For this reason, the median is a better measure of the central tendency of these populations, and the inter-quartile range is a more robust measure of scale than the standard deviation.

Supplementary Table 1 Initial inputs to Dodson's equation (Equation 1 above).

Locality	Hornblende cooling age		Mica cooling age			Mineral Constants				
	Sample	Cooling age (Ma, ± 2σ)	Sample	Mineral	Cooling age (Ma, ± 2σ)	T_{C0} (°C)	a (μm)	E (kcal/mol)	D_0 (cm^2/s)	A
Biranup Zone										
SW of Urayrie Rock	EAF012	1194 ± 6	EAF015	Ms	1177 ± 5	425	350	63 ± 7	$2.3^{+70}_{-2.2}$	55
Ponton Creek	EAF038	1192 ± 13	EAF039B	Bt	1169 ± 5	300	350	50.5 ± 2.2	$0.4^{+0.96}_{-0.28}$	27
Fraser Zone										
Wyralinu Hill	EAF055B	1217 ± 8	EAF054	Bt	1205 ± 4	300	350	50.5 ± 2.2	$0.4^{+0.96}_{-0.28}$	27

Values for the activation energy (E), diffusion coefficient (D_0) and volume constant (A) for biotite were taken from Grove and Harrison (1996), as biotites analysed in this study have similar Fe/Mg ratios. The initial closure temperature estimates (T_{C0}) for biotite was 300 °C (Harrison et al., 1985).Values for the activation energy (E), diffusion coefficient (D_0), volume constant (A) and the initial closure temperature estimate (T_{C0}) of 425 °C for muscovite were taken from Harrison et al. (2009). Grainsize (a) was estimated at the time of $^{40}Ar/^{39}Ar$ analysis.

References Cited:

Grove, M., and Harrison, T.M., 1996, $^{40}Ar^*$ diffusion in Fe-rich biotite: The American Mineralogist, v. 81, p. 940–951, doi:10.2138/am-1996-7-816.

Harrison, T.M., Célérier, J., Aikman, A.B., Hermann, J., and Heizler, M.T., 2009, Diffusion of ^{40}Ar in muscovite: Geochimica et Cosmochimica Acta, v. 73, p. 1039–1051, doi:10.1016/j.gca.2008.09.038.

Supplementary Table 2 Probability distributions and values of variables used in the Monte Carlo simulation.

Variable	Input Probability Distribution	Value	Source
Hornblende			
$^{40}Ar/^{39}Ar$ age (Ma)	Normal (mean, σ)	Varies for each mineral	Table 3
Biotite			
E	Triangular (min, mode, max)	50.5 ± 2.2 kcal/mol	Grove and Harrison (1996)
D_0	Triangular (min, mode, max)	$0.4^{+0.96}_{-0.28}$ cm^2/s	
Muscovite			
E	Triangular (min, mode, max)	63 ± 7 kcal/mol	Harrison et al. (2009)
D_0	Triangular (min, mode, max)	$2.3^{+70}_{-2.2}$ cm^2/s	
Mica			
$^{40}Ar/^{39}Ar$ cooling age (Ma)	Normal (mean, σ)	Varies for each mineral	Table 3
$^{40}Ar/^{39}Ar$ closure temperature (°C)	n/a	Directly calculated by iterating Equation 1	
Cooling rate (°C/Ma)	n/a	Initially calculated based on hornblende cooling age and closure temperature, and mica cooling age and initial closure temperature (T_{C0}). Cooling rate is recalculated after each iteration of Equation 1, using the newly calculated closure temperature.	

The uncertainty of each random variable was modelled using either a uniform, triangular or normal probability distribution. The values of all other variables in Equation 1 are the same as those in Supplementary Table 1.