



Bogotá, Octubre 12 de 2009

Señores:
Unión Temporal AGS - GE
Atn. Dr. Rafael Meneses
La Ciudad

Ref. Ar-Ar Dating

Respetado Dr. Meneses:

En primer lugar, queremos agradecerle tenernos en cuenta como su proveedor de Servicios Geológicos, Geoquímicos y Geofísicos de confianza.

Adjunto encontrara los resultados de las dataciones por ^{14}C solicitadas por ustedes.

Dichas dataciones fueron realizadas en Actlabs, en Ontario, Canada.

Agradecemos de antemano la atención prestada.

Atentamente,

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I. Overview

2 samples were submitted for Ar-Ar dating:

IGM 706724 hornblende+biotite Actlabs ID YK-37
IGM 706727 hornblende+biotite Actlabs ID YK-42

Summary Table of $^{40}\text{Ar}/^{39}\text{Ar}$ results

<u>Sample</u>	<u>Wt (mg)</u>	<u>Exper.</u>	<u>IIA (Ma)</u> $\pm 1 \square$	<u>TFA</u> $\pm 1 \square$	<u>WMPA (Ma)</u> $\pm 1 \square$	<u>Ca/K</u>	<u>Comments</u>
YK-37	33.06	4 steps heat	11.0 \pm 1.4	13.9 \pm 0.9	11.9\pm0.6	1.4-20.4	High temperature step characterized by 74 % of ^{39}Ar
YK-42	58.34	6 steps heat	9.6 \pm 0.5	9.9 \pm 0.3	9.8\pm0.2	0.14-8.04	Four steps plateau

Explanation:

$\pm 1 \square$ Estimated uncertainty (1 sigma);

TFA = Total fusion age;

Ca/K = Apparent Ca / K ratios;
Plateau age

IIA = Inverse Isochrone age

WMPA = Weighted mean plateau age;

WMIPA = Weighted mean Intermediate Plateau age

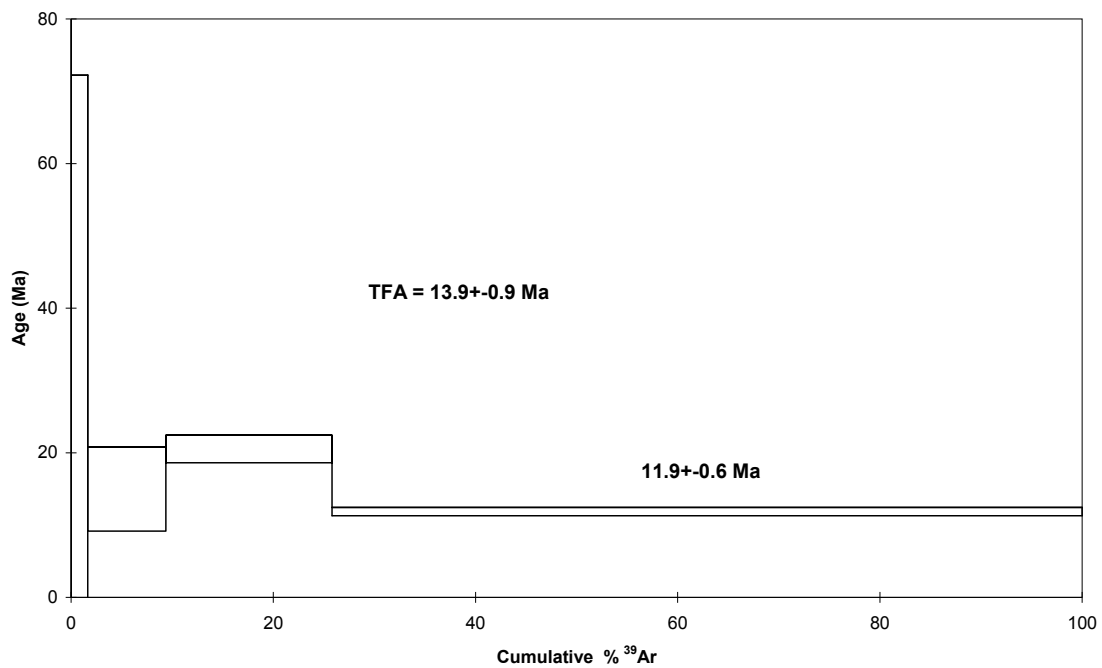
II Flux Monitoring and Isotope measurements

The samples wrapped in Al foil was loaded in evacuated and sealed quartz vial with K and Ca salts and packets of LP-6 biotite interspersed with the samples to be used as a flux monitor. The sample was irradiated in the nuclear reactor for 48 hours. The flux monitors were placed between every two samples, thereby allowing precise determination of the flux gradients within the tube. After the flux monitors were run, J values were then calculated for each sample, using the measured flux gradient. LP-6 biotite has an assumed age of 128.1 Ma. The neutron gradient did not exceed 0.5% on sample size. The Ar isotope composition was measured in a Micromass 5400 static mass spectrometer. 1200°C blank of ^{40}Ar did not exceed $n \cdot 10^{-10}$ cc STP

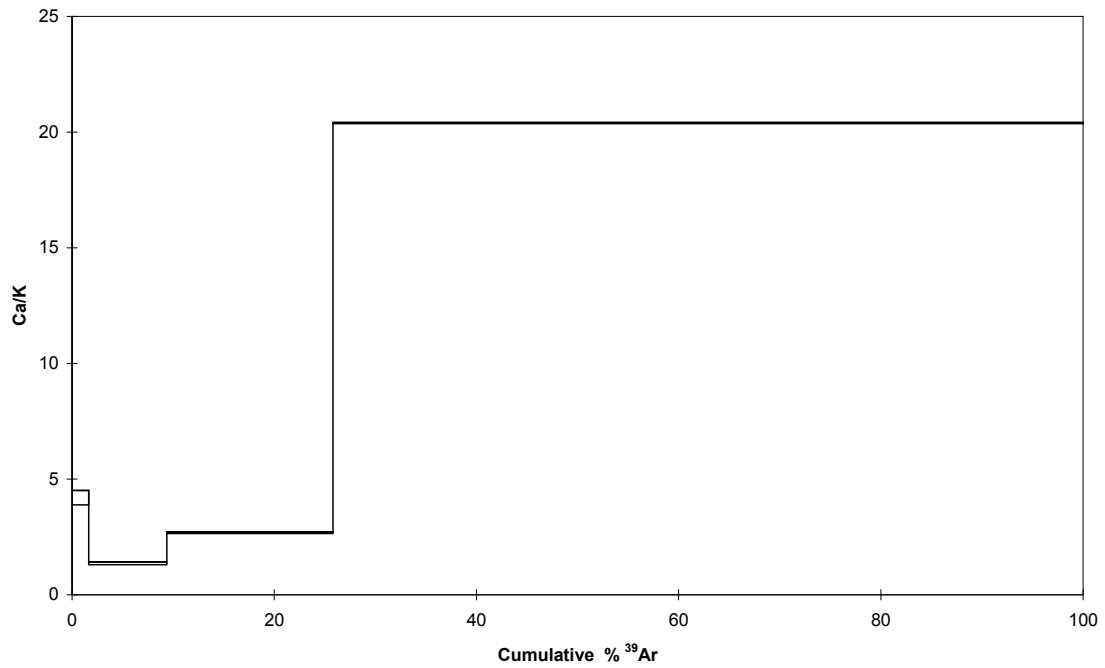
YK-37

The sample yielded age spectrum with high temperature step characterized by 74 % of ^{39}Ar , Age value of 11.9 ± 0.6 Ma. On the Inverse Isochrone Plot three points form linear regression characterized by age value of 11.0 ± 1.4 , MSWD = 0.7.

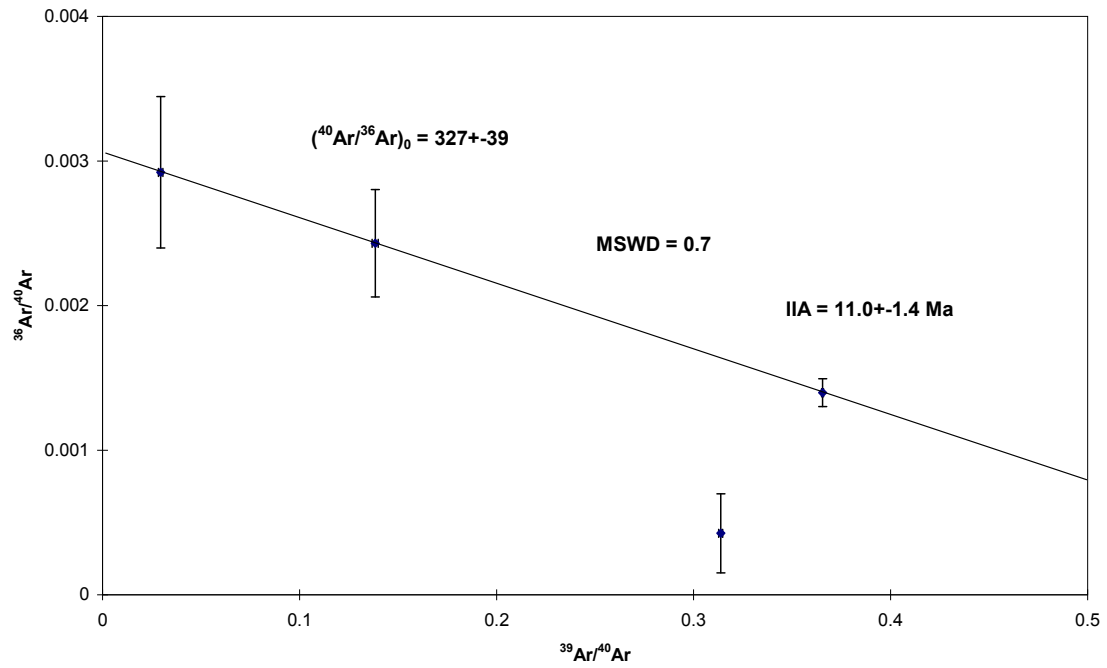
Age Spectrum



Ca/K Spectrum



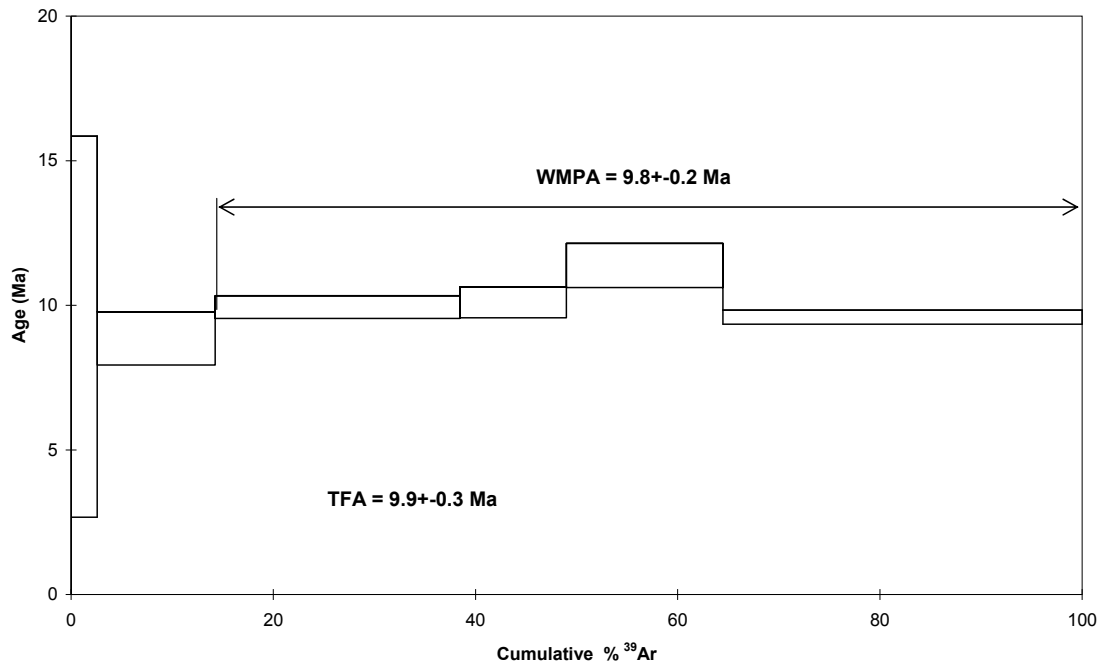
Isochrone diagram



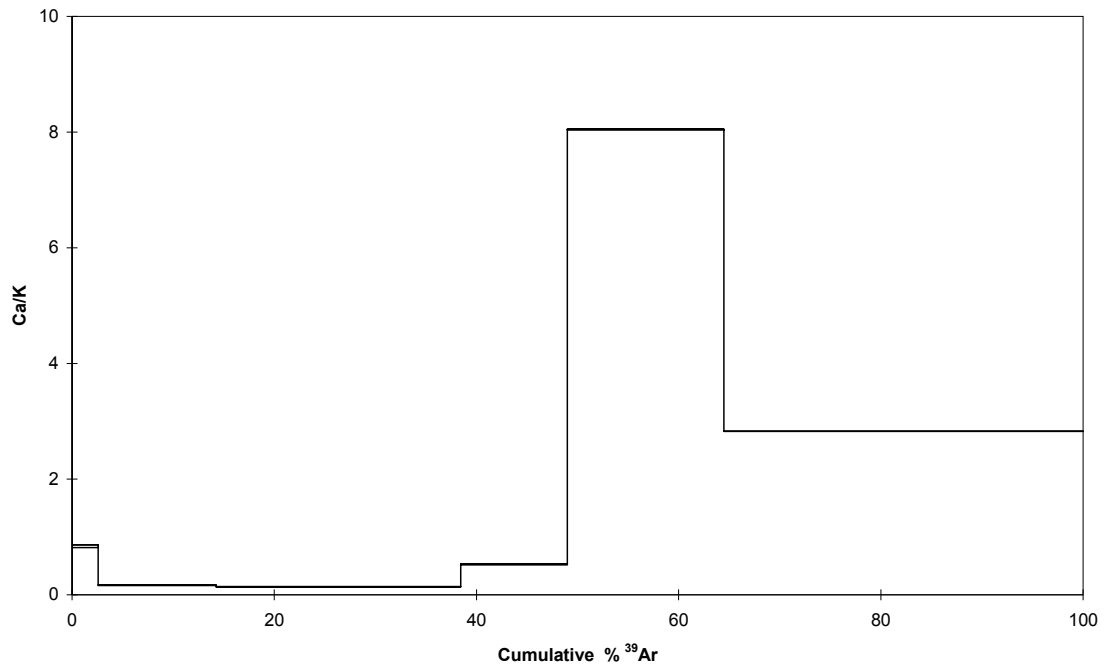
YK-42

The sample yielded age spectrum with four steps plateau characterized by 86 % of ^{39}Ar , Age value of 9.8 ± 0.2 Ma. On the Inverse Isochrone Plot plateau points form linear regression characterized by age value of 9.6 ± 0.5 , MSWD = 1.3

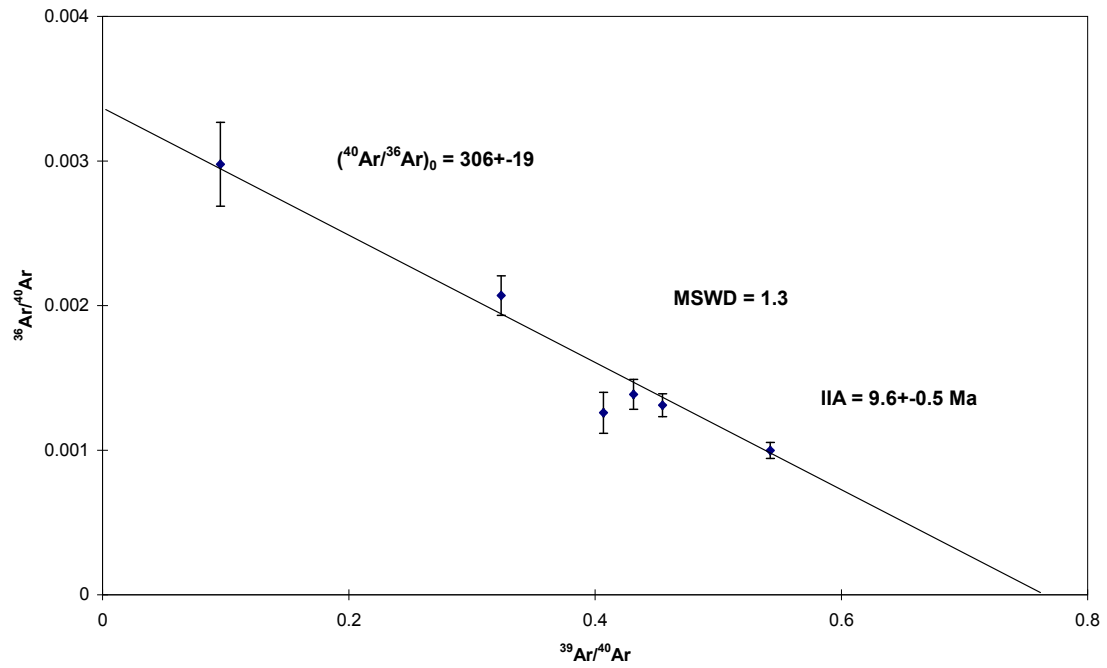
Age Spectrum



Ca/K Spectrum



Isochrone diagram



Tabulated data

Sample: YK-37 J=0.004106±0.000044

T ⁰ C	⁴⁰ Ar _{cc} (STP)	⁴⁰ Ar/ ³⁹ Ar	±1σ	³⁸ Ar/ ³⁹ Ar	±1σ	³⁷ Ar/ ³⁹ Ar	±1σ	³⁶ Ar/ ³⁹ Ar	±1σ	Ca/K	Σ ³⁹ Ar (%)	Age (Ma)	±1σ
500	2.07*e ⁻⁹	33.953	1.326	0.0532	0.0312	1.1675	0.0867	0.0992	0.0182	4.20	1.6	34.0	38.2
700	2.07*e ⁻⁹	7.225	0.082	0.0499	0.0059	0.3781	0.0163	0.0176	0.0027	1.36	9.4	15.0	5.8
900	1.94*e ⁻⁹	3.187	0.010	0.0246	0.0040	0.7441	0.0079	0.0014	0.0009	2.68	25.8	20.5	1.9
1130	7.51*e ⁻⁹	2.736	0.004	0.0265	0.0008	5.6640	0.0063	0.0038	0.0003	20.39	100.0	11.9	0.6

Sample: YK-42 J=0.004100±0.000044

T ⁰ C	⁴⁰ Ar _{cc} (STP)	⁴⁰ Ar/ ³⁹ Ar	±1σ	³⁸ Ar/ ³⁹ Ar	±1σ	³⁷ Ar/ ³⁹ Ar	±1σ	³⁶ Ar/ ³⁹ Ar	±1σ	Ca/K	Σ ³⁹ Ar (%)	Age (Ma)	±1σ
600	6.67*e ⁻⁹	10.449	0.032	0.0276	0.0029	0.2334	0.0067	0.0311	0.0030	0.84	2.6	9.3	6.6
700	8.93*e ⁻⁹	3.089	0.003	0.0217	0.0004	0.0456	0.0009	0.0064	0.0004	0.16	14.3	8.9	0.9
800	13.16*e ⁻⁹	2.199	0.002	0.0216	0.0003	0.0389	0.0008	0.0029	0.0002	0.14	38.4	9.9	0.4
900	6.05*e ⁻⁹	2.319	0.002	0.0223	0.0006	0.1456	0.0017	0.0032	0.0002	0.52	49.0	10.1	0.5
1000	9.41*e ⁻⁹	2.458	0.002	0.0219	0.0003	2.2339	0.0021	0.0031	0.0003	8.04	64.5	11.4	0.8
1130	16.22*e ⁻⁹	1.844	0.001	0.0213	0.0002	0.7851	0.0007	0.0018	0.0001	2.83	100.0	9.6	0.2