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$^{40}Ar/^{39}Ar$ Dating Studies of Minerals and Rocks in various areas in Mexico: USGS/CRM Scientific Collaboration (Part II)

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INTRODUCTION

This publication contains reduced $^{40}Ar/^{39}Ar$ geochronology data of 39 rocks (47 analyses) collected by geologists from Consejo de Recursos Minerales (CRM) in various areas in Mexico (fig.1–10). Also included in this report is information on rock type and the geographical location of the samples (table 1). Table 1 is in alphabetical order of the different regional offices of CRM in Mexico. These analyses were done under Annex 2 of the Memorandum of Understanding between the U.S. Geological Survey (USGS) and the CRM. This is the second report produced under this Annex; the first report was published in 2003 (Iriondo and others, 2003). The results presented here are intended only to be a preliminary publication of these geochronology studies, and the data are not interpreted in a geological context. Therefore, users unfamiliar with argon isotopic data should use these results carefully. This report is primarily a detailed source document for subsequent scientific publications and maps that will integrate this data into a geological context.

METHODS□

Sample Preparation

All of the rocks provided by CRM were crushed, ground, and sized using 250, 180, and 150μm sieves (60, 80, and 100 mesh, respectively). We used the largest size fraction possible of the target mineral that is free of inclusions from other mineral phases. Mineral separates of hornblende, muscovite, biotite, and K-feldspar (including sanidine) were produced using magnetic separation, heavy liquids, and hand picking to achieve a purity of >99 percent. Basalt and basaltic andesite samples were processed through heavy liquids and(or) magnetic separation to remove phenocrysts from the volcanic matrix. The resulting volcanic matrix samples were leached with 10 percent cold HCl to remove any traces of secondary calcite. All samples were washed in acetone, alcohol, and deionized water (X3) in a Branson B-220 ultrasonic cleaner to remove dust and then resieved by hand.

Aliquots of sample were packaged in copper capsules (aluminum for sanidine) and sealed under vacuum in quartz tubes. The samples then were irradiated for 20 hours (package KD29) in an aluminum container in the central thimble facility at the TRIGA reactor (GSTR) at the USGS in Denver. The monitor mineral used was Fish Canyon Tuff (FCT-3) sanidine with an age of 27.79 Ma (Kunk and others, 1985; Cebula and others, 1986) relative to Mmhb-1 with an age of 519.4 ± 2.5 Ma (Alexander and others, 1978; Dalrymple and others, 1981). The type of container and the geometry of samples and standards are the ones described by Snee and others (1988).

Sample Analysis

The samples were analyzed at the USGS Thermochronology laboratory in Denver, by using a VG Isotopes Ltd., Model 1200B or a Map 216 mass spectrometer both fitted with an electron multiplier using the $^{40}Ar/^{39}Ar$ step-heating method of dating or $^{40}Ar/^{39}Ar$ laser fusion dating. The samples were heated for 10 minutes per step and followed a schedule of three to twenty one steps per sample. The number and temperature of heating steps were selected in an attempt to limit the percentage of gas released to less than 20 percent per step for most samples. Biotite aliquots also were melted in a single heating to produce total fusion ages.

Heating of samples was done in a small volume, molybdenum-lined low blank tantalum furnace similar to that described by Staudacher and others (1978). The temperature was monitored by a W_5Re-$W_{26}Re$ thermocouple and controlled by a proportional programmable controller. The furnace and the rear manifold of the extraction system were pumped between steps with a turbo molecular pump. Two isolated ion pumps evacuated the front manifold and the mass spectrometer tube between each incremental step. The gas to be analyzed was purified in the first manifold by a SAES ST707 Zr-V-Fe getter (VG 1200B) or a SAES ST101 Al-Zr getter (MAP 216) operated at room temperature and by an incandescent tungsten filament. Gas was equilibrated with the second manifold with an empty cold finger (VG 1200B only) in the first manifold at LN_2 temperature to trap water and other condensibles, then isolated and cleaned in the front manifold with a SAES ST101 Al-Zr getter operated at 400°C and with a Ti getter operated at 350°C.

Prior to the admission by expansion methods of the argon dominated gas to the mass spectrometer, an activated charcoal finger (VG 1200B only) submerged in a constant boiling mixture of dry ice and acetone was used to remove gases with a molecular weight greater than 60 or 80 (primarily other noble gases). A second SAES ST101 active gas getter operated at room temperature further purified the argon-rich gas in the mass spectrometer. Argon isotopes with masses 40 through 36 and CO_2 (mass 44) were analyzed as a function of time in five to seven analyses cycles. ^{40}Ar, ^{39}Ar, ^{38}Ar, ^{37}Ar, and ^{36}Ar peaks and baselines were measured for five to fifteen one-second integrations in each of the five to seven cycles. After the analysis, the mass spectrometer was evacuated. All phases of the sample heating, cleanup, equilibration, and sample analysis were performed under computer control.

Seven sanidine samples were dated using the ^{40}Ar/^{39}Ar-laser fusion method with the MAP216 mass spectrometer. For each sample, 10 to 13 single grains of sanidine were individually fused using a Synrad model 48-5-28(w) 50-watt CO_2 laser. The laser chamber and manifold were pumped between analyses with a turbomolecular pump. An isolated ion pump was used to pump the mass spectrometer. Prior to mass spectrometer analysis, the gas was purified in the manifold by two SAES ST101 Al-Zr getters—one operated at room temperature and the other at 400°C, as well as a hot Re filament. The argon rich gas was further purified by a third SAES ST 101 getter operated at room temperature in the flight tube of the mass spectrometer.

Isotopic Data Reduction

All the argon isotopic data from the VG 1200B were reduced using an updated version of the computer program ArAr* (Haugerud and Kunk, 1988). The data from the MAP 216 were reduced using an updated version of the computer program Mass Spec (Deino, 2001). The decay constants used were those recommended by Steiger and Jäger (1977). The isotopic measurements made in the analysis had baseline values subtracted and then were regressed, to time zero by using standard linear regression techniques. These regressed values and associated statistical estimates of analytical uncertainties of the time zero peak values were used in data reduction. Sample blanks measured before the analyses (or every fourth analysis for laser fusion data) were subtracted from the regressed results for ^{40}Ar, ^{39}Ar, ^{37}Ar and ^{36}Ar. Error estimates of the blanks were quadratically combined with the regression errors and propagated through the error equations.

Corrections for interfering reactor-produced argon isotopes from Ca, K, and Cl in the sample were made by using the production ratios given in Dalrymple and others (1981) and Roddick (1983). Errors in calculating ages or ratios include measurement errors in the analysis, decay factor uncertainties, measured atmospheric or calculated initial ^{40}Ar/^{36}Ar ratios, the irradiation parameter J, the production ratios of the various reactor induced argon producing reactions, the initial ^{38}Ar/^{36}Ar ratio, and the age of the monitor (Haugerud and Kunk, 1988; Deino, 2001).

The data tables and figures presented below include the identification of individual step ages, plateau ages, average ages, inverse isochron ages, total fusion ages, and total gas ages for step-heating results. Total gas ages represent the age calculated from the addition of all of the measured argon peaks for all steps in a single sample. The total gas ages are roughly equivalent to conventional K-Ar ages. No analytical precision is calculated for total gas ages. Plateau ages were determined using the definition of Fleck and others (1977) as modified by Haugerud and Kunk (1988). Average ages are calculated in the same manner as a plateau age but fail the definition of Fleck and others (1977). ^{40}Ar/^{39}Ar laser fusion data tables include individual laser fusion ages and mean ages. Inverse isotope correlation analysis of the analytical data (for multistep or multigrain samples) to assess if nonatmospheric argon components were trapped in any samples and to calculate an inverse isochron age was done using the method of York (1969). For additional information on the sample data reduction procedure, see Haugerud and Kunk (1988), and Deino (2001).

RESULTS

^{40}Ar/^{39}Ar Geochronology Data

The ^{40}Ar/^{39}Ar geochronology results in this report are presented in alphabetical order of the regional offices from CRM in Mexico. For each regional office the data are presented in as many as four tables (tables 3–6). Table 3 contains the results of biotite total fusion analyses that were run on the VG 1200B. Table 4 contains the results of step-heating runs from the VG 1200B. Table 5 contains step-heating runs from the MAP 216, and table 6 contains results from laser total fusion runs from the MAP 216. In all of these tables, each sample starts with a line that gives the sample number, rock unit, the material analyzed, and the J-value used with its analytical uncertainty, the sample weight in milligrams (except for table 6 where the number of grains fused per analysis is listed), and the packet and package number from the irradiation. The tables include a step label for each analysis (except table 3), the temperature of the step, the percent of potassium derived $^{39}Ar_K$ for each step (the total for all steps in a single sample is 100 percent, except for table 6), the radiogenic yield (percentage of $^{40}Ar_R$ that is derived from the decay of potassium), moles of $^{39}Ar_K$, a corrected $^{40}Ar_R/^{39}Ar_K$ ratio from which the age can be directly calculated, apparent K/Ca, and K/Cl ratios for each step, a calculated apparent age for the step (in millions of years), and an estimate of the precision of each age at the 1 sigma level. The sample precision includes estimates of the errors that are unique to a single sample and can be used only for comparisons with other steps of the same sample. This error estimate does not include the error in "J". The last line in the table represents the total gas results for the sample. Note that no analytical error is calculated for the age in this line. If the sample has a plateau age, the percentage of $^{39}Ar_K$ on the plateau, the steps on the plateau, and the plateau age and its precision are printed. The plateau, when present, is listed in the final line of the sample. In table 6, a weighted mean age for those laser fusion results that agree in age within the limits of analytical precision is the final line of the sample entry.

Locations of the samples presented on figures 2–10 and some of the data from tables 4, 5, and 6 also are presented graphically following the tabular data. The VG 1200 step-heating results are presented in age-spectra diagrams (fig. 11) that plot the cumulative percent $^{39}Ar_K$ of the steps against apparent age in millions of years. The precision estimate used to construct the error boxes of each step is at two-sigma. The upper, smaller graph plots the apparent K/Ca ratio of each step against cumulative $^{39}Ar_K$ released. Map 216 step-heating results are presented in much the same way on figure 12 but also include a plot of radiogenic yield and apparent K/Cl. The laser fusion data sets (fig. 13) replace the age spectrum diagram with an age probability distribution diagram, frequently referred to as an ideogram and four smaller graphs. In the ideogram, a solid line represents the weighted mean age of the sample, while dashed lines represent the data with outliers included. Immediately above the ideogram are four smaller graphs—the lowest of these plots the age of sample ages with error bars, the two intermediate graphs are apparent K/Ca and K/Cl, and the upper graph is radiogenic yield. In these graphs, filled circles represent data that are included in the weighted mean age, while open circles are used for those that were excluded from the weighed mean age.

We have calculated isochron ages using inverse-isotope correlation diagrams that plot $^{39}Ar/^{40}Ar$ against $^{36}Ar/^{40}Ar$. These plots are included on figures 11, 12, and 13 adjacent to the respective age spectrum diagram or ideogram. These diagrams include the isochron age of the sample (calculated from the inverse of the x-axis intercept), the calculated initial $^{40}Ar/^{36}Ar$ ratio of the sample (the inverse of the y-axis intercept), the MSWD of the data (a goodness of fit indicator), the number of points used in the age regression, and the percentage of gas included in the correlation (except for fig. 13). For additional information on the sample data sets see Haugerud and Kunk (1988) and Deino (2001).

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Table 1. Summary of rock type and sample geographical location for dated rocks.

Sample	Type of rock	Geographic Location Lat.	Long.	CRM Geologic Map 1:50,000
Oficina Regional Chihuahua				
POD-1	rhyolite	28° 54.637'	104° 04.431'	Pozos
POD-2	andesite	28° 49.602'	104° 08.430'	Pozos
DHP-12	orthogneiss	28° 57.155'	105° 12.947'	Chorreras
DHP-14	granodiorite	28° 51.889'	105° 15.096'	Chorreras
DHP-15	granodiorite	28° 52.160'	105° 14.145'	Chorreras
FDRA-001	rhyolite tuff	28° 38.092'	105° 09.493'	El Jateado
FDRA-002	rhyolite	28° 35.538'	105° 17.712'	El Jateado
FVDA-1	dacite	28° 27.849'	104° 44.081'	La Coyota
FVDA-2	rhyolite tuff	28° 22.596'	104° 43.920'	La Coyota
AMDT-01	rhyolite	30° 14.023'	105° 59.946'	San Antonio El Bravo
Oficina Regional Chilpancingo				
VH-134	gabbro	18° 01' 54.8"	100° 08' 57.5"	Villa Hidalgo
Oficina Regional Culiacan				
TA-35	granodiorite	26° 47.597'	108° 12.991'	Tasajeras
TA-36	tonalite	26° 48.483'	108° 09.779'	Tasajeras
TA-37	granodiorite	26° 48.752'	108° 15.737'	Tasajeras
YE-25	granodiorite	26° 28.070'	108° 04.267'	Yecorato
YE-27	rhyolite	26° 25.304'	108° 13.916'	Yecorato
Oficina Regional Durango				
BO-1012	andesite? vitrophere	23° 45' 21.4"	105° 44' 55.9"	Borbollones
IR-585	andesite? vitrophere	24° 33' 46.3"	104° 01' 57.2"	Ignacio Ramirez
SP-405	basalt	25° 01' 55.4"	105° 24' 17.7"	Santiago Papasquiaro
Oficina Regional Hermosillo				
FA-4	rhyolite tuff	30° 16' 53.6"	110° 06' 53.08"	Arizpe
FA-5	microdiorite	30° 24' 22.1"	110° 00' 27"	Arizpe
2D-04	andesite porphyry	30° 25' 52"	110° 15' 55.2"	Bacanuchi
DATA-3	rhyolite tuff	30° 32' 58"	110° 21' 03"	Santa Teresa
Oficina Regional Morelia				
PL-272	gabbro	18° 27.151'	102° 20.587'	Playitas
RA-104	diorite	18° 38.440'	103° 26.096'	Colola
RA-162	granodiorite	18° 30.914'	103° 24.828'	Colola
Oficina Regional Oaxaca				
PQ-04	granodiorite	16° 55' 13.0"	96° 01' 41.4"	San Pedro Quiatoni
PQ-06	rhyolite tuff	16° 52' 59.0"	96° 15' 01.2"	San Pedro Quiatoni
MR-001	andesite porphyry	16° 44' 49.4"	96° 01' 04.8"	Totolapan
MR-003	andesite	16° 38' 48.3"	96° 18' 57.2"	Totolapan
Oficina Regional Saltillo				
LED-1	basalt	27° 36.225'	101° 27.289'	Nueva Rosita
CA-CI79	diorite	29° 03.094'	101° 39.423'	CD. Acuña
CA-CI85	monzonite?	29° 16.079'	101° 49.433'	CD. Acuña

Table 1. Summary of rock type and sample geographical location for dated rocks.–Continued

Sample	Type of rock	Geographic Location Lat.	Long.	CRM Geologic Map 1:50,000
Oficina Regional Saltillo (cont.)				
MB-99	gabbro-diorite	29° 11.912'	103° 47.555'	Manuel Benavides
MB-114	sienite	29° 14.088'	102° 10.256'	Manuel Benavides
SMD-01	granite porphyry	28° 16.103'	103° 23.754'	San Miguel
SMD-02	basalt	28° 43.299'	102° 32.334'	San Miguel
SMD-03	sienite	28° 39.996'	102° 48.746'	San Miguel
Oficina Regional San Luis Potosi				
PV-003	trachyte porphyry	23° 22.269'	98° 09.830'	Ciudad Victoria

Table 2. Summary table for dated rocks from USGS/CRM Collaboration Part II.

Sample	Rock type	Laboratory number	Mineral	Type of age	Age (Ma)		Error (Ma)	Comments
Oficina Regional Chihuahua								
POD-1	rhyolite	#139KD29	sanidine	total fusion	32.82	±	0.04	—
POD-2	andesite	#125KD29	plagioclase	plateau	32.35	±	0.05	—
		#135KD29	volcanic matrix	average	33.07	±	0.05	—
DHP-12	orthogneiss	#148KD29	hornblende	average	954.70	±	4.14	—
DHP-14	granodiorite	#127KD29	K-feldspar	plateau	32.69	±	0.10	—
DHP-15	granodiorite	#163KD29	biotite	total fusion	33.13	±	0.02	—
FDR-001	rhyolite tuff	#140KD29	sanidine	total fusion	32.34	±	0.07	—
FDR-002	rhyolite	#159KD29	biotite	total fusion	41.88	±	0.03	—
FVDA-1	dacite	#142KD29	sanidine	total fusion	33.32	±	0.05	—
FVDA-2	rhyolite tuff	#136KD29	sanidine	total fusion	32.77	±	0.05	—
AMDT-01	rhyolite	#138KD29	sanidine	total fusion	37.64	±	0.05	—
Oficina Regional Chilpancingo								
VH-134	gabbro	#181KD29	hornblende	isochron	94.08	±	4.38	—
Oficina Regional Culiacan								
TA-35	granodiorite	#147KD29	hornblende	isochron	56.13	±	0.45	—
		#175KD29	biotite	total fusion	58.12	±	0.06	—
TA-36	tonalite	#145KD29	hornblende	plateau	57.85	±	0.31	—
		#167KD29	biotite	total fusion	59.38	±	0.05	—
TA-37	granodiorite	#146KD29	hornblende	average	57.24	±	0.31	—
		#179KD29	biotite	total fusion	58.50	±	0.03	—
YE-25	granodiorite	#149KD29	hornblende	average	86.07	±	0.47	—
		#173KD29	biotite	total fusion	78.79	±	0.03	—
YE-27	rhyolite	#141KD29	sanidine	total fusion	33.60	±	0.50	—
Oficina Regional Durango								
BO-1012	andesite? vitrophere	#124KD29	plagioclase	plateau	23.54	±	0.05	—
IR-585	andesite? vitrophere	#121KD29	plagioclase	average	31.06	±	0.05	—
SP-405	basalt	#133KD29	volcanic matrix	average	10.95	±	0.02	—
Oficina Regional Hermosillo								
FA-4	rhyolite tuff	#137KD29	sanidine	total fusion	24.53	±	0.05	—
		#171KD29	biotite	total fusion	24.62	±	0.09	—
FA-5	microdiorite	#161KD29	biotite	total fusion	27.47	±	0.05	—
Oficina Regional Hermosillo (cont.)								
2D-04	andesite porphyry	#122KD29	plagioclase	plateau	26.89	±	0.06	—
DATA-3	rhyolite tuff	#150KD29	biotite	total fusion	25.59	±	0.04	—
Oficina Regional Morelia								
PL-272	gabbro	#180KD29	hornblende	average	215.28	±	1.13	—
RA-104	diorite	#153KD29	biotite	total fusion	61.24	±	0.03	—
RA-162	granodiorite	#143KD29	hornblende	average age	57.03	±	0.31	—
Oficina Regional Oaxaca								
PQ-04	granodiorite	#144KD29	hornblende	total gas	~16			Bad sample, bad analysis
PQ-06	rhyolite tuff	#177KD29	biotite	total fusion	15.48	±	0.02	—
MR-001	andesite porphyry	#131KD29	volcanic matrix	average	17.51	±	0.05	—

Table 2. Summary table for dated rocks from USGS/CRM Collaboration part II.–Continued

Sample	Rock type	Laboratory number	Mineral	Type of age	Age (Ma)	Error (Ma)	Comments
Oficina Regional Oaxaca (cont.)							
MR-001	andesite porphyry	#123KD29	plagioclase	isochron	17.09	± 0.06	—
MR-003	andesite	#134KD29	volcanic matrix	average	22.31	± 0.03	—
Oficina Regional Saltillo							
LED-1	basalt	#132KD29	volcanic matrix	isochron	2.05	± 0.03	—
CA-CI79	diorite	#157KD29	biotite	total fusion	42.51	± 0.02	—
CA-CI85	monzonite?	#169KD29	biotite	total fusion	41.13	± 0.05	—
MB-99	gabbro-diorite	#120KD29	plagioclase	plateau	32.56	± 0.08	—
MB-114	sienite	#165KD29	biotite	total fusion	30.07	± 0.02	—
SMD-01	granite porphyry	#187KD29	white mica	plateau	32.71	± 0.05	—
		#185KD29	K-feldspar	plateau	32.70	± 0.06	—
SMD-02	basalt	#130KD29	volcanic matrix	average	46.45	± 0.07	—
SMD-03	sienite	#155KD29	biotite	total fusion	44.59	± 0.05	—
Oficina Regional San Luis Potosi							
PV-003	trachyte porphyry	#129KD29	K-feldspar	total gas	~33		Bad sample, bad analysis

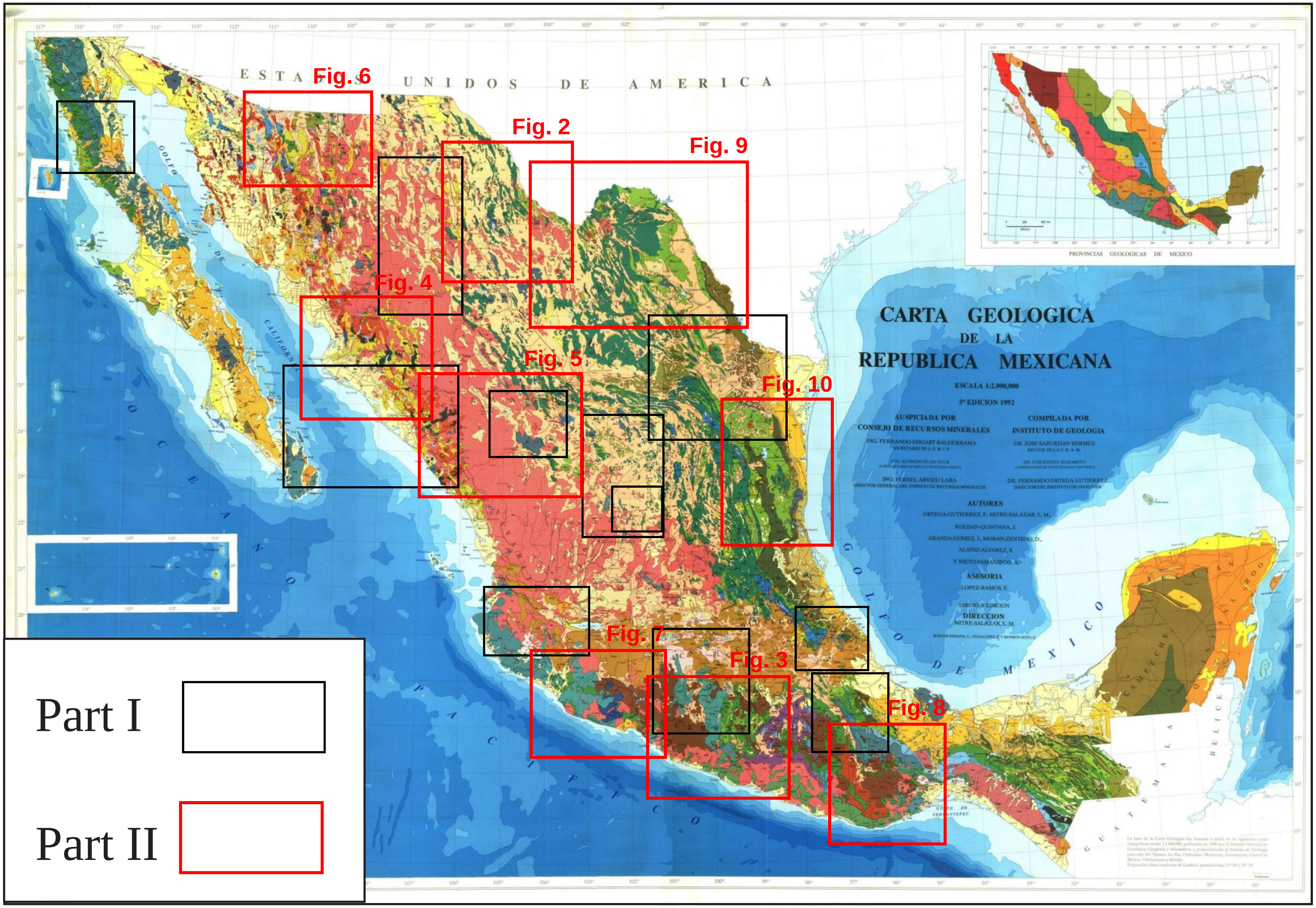


Figure 1. Geologic map of Mexico showing areas under study for USGS/CRM Scientific Collaboration in $^{40}Ar/^{39}Ar$ geochronology. Background geologic map corresponds to Carta Geologica de la Republica Mexicana (1:2,000,000).

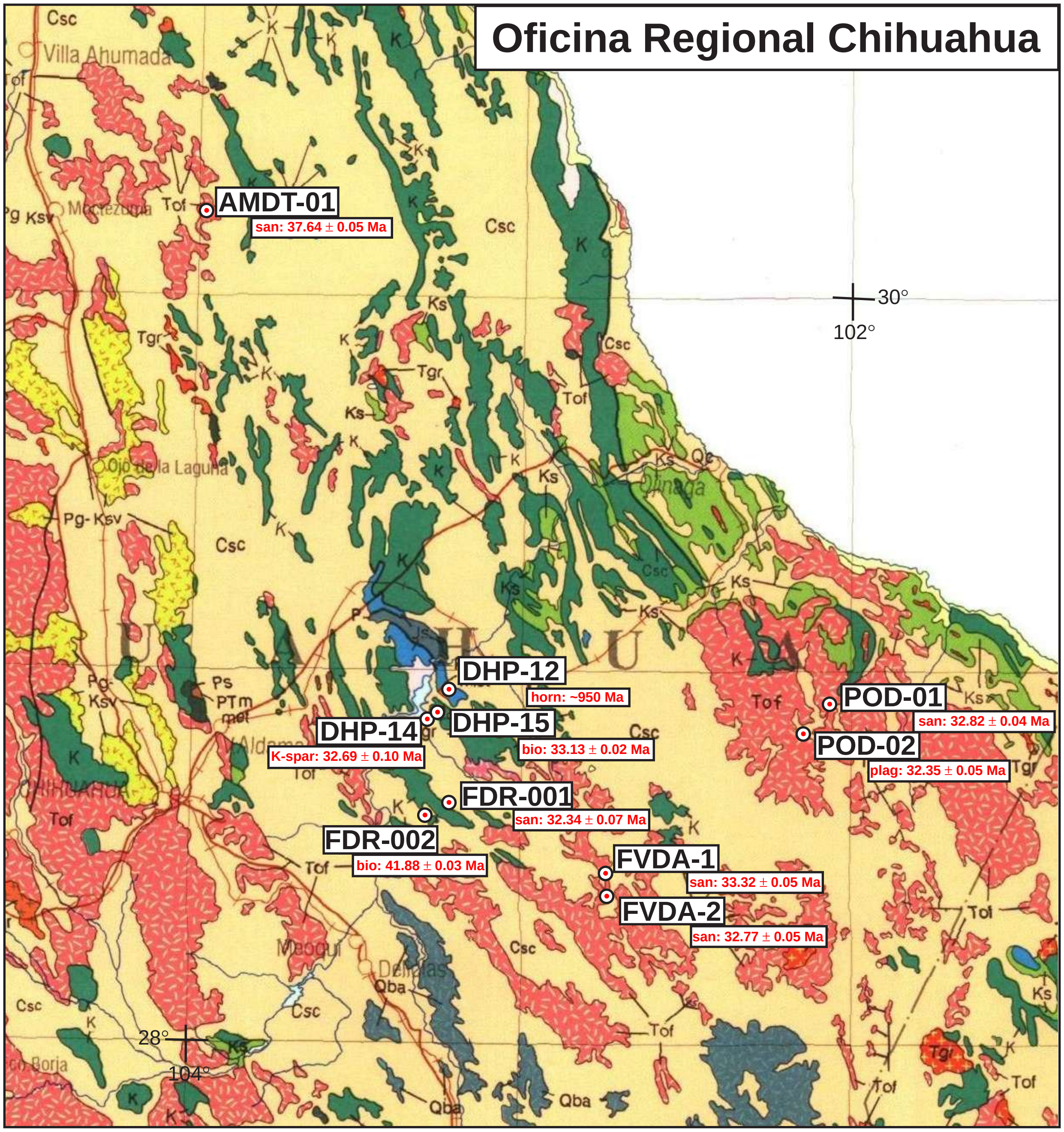


Figure 2. Sample location for samples collected by geologists from the Oficina Regional Chihuahua. Background geologic map corresponds to Carta Geologica de la Republica Mexicana (1:2,000,000). Abbreviations: san (sanidine); horn (hornblende); K-spar (K-feldspar); bio (biotite); plag (plagioclase).

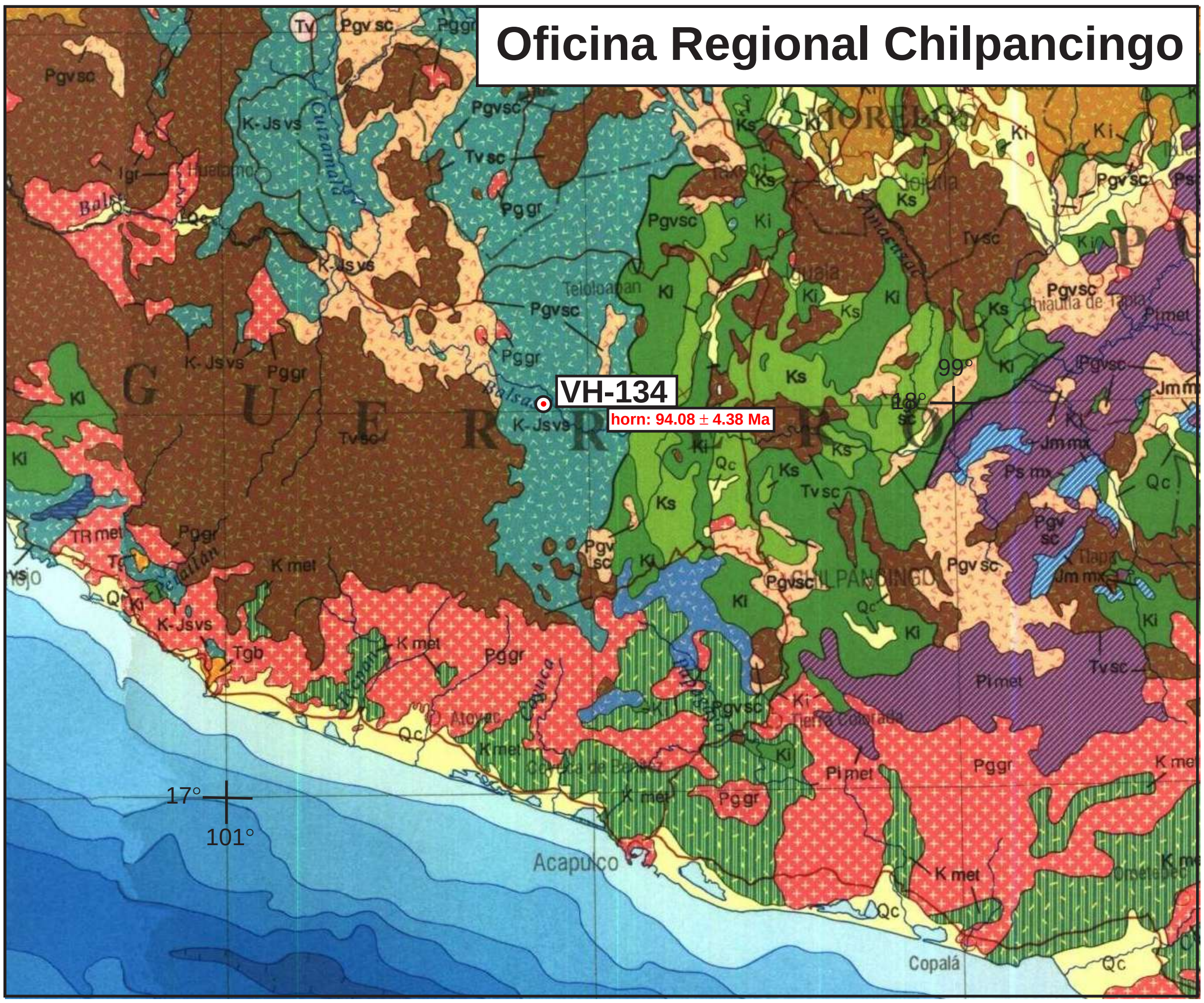


Figure 3. Sample location for samples collected by geologists from the Oficina Regional Chilpangingo. Background geologic map corresponds to Carta Geologica de la Republica Mexicana (1:2,000,000). Abbreviation: horn (hornblende).

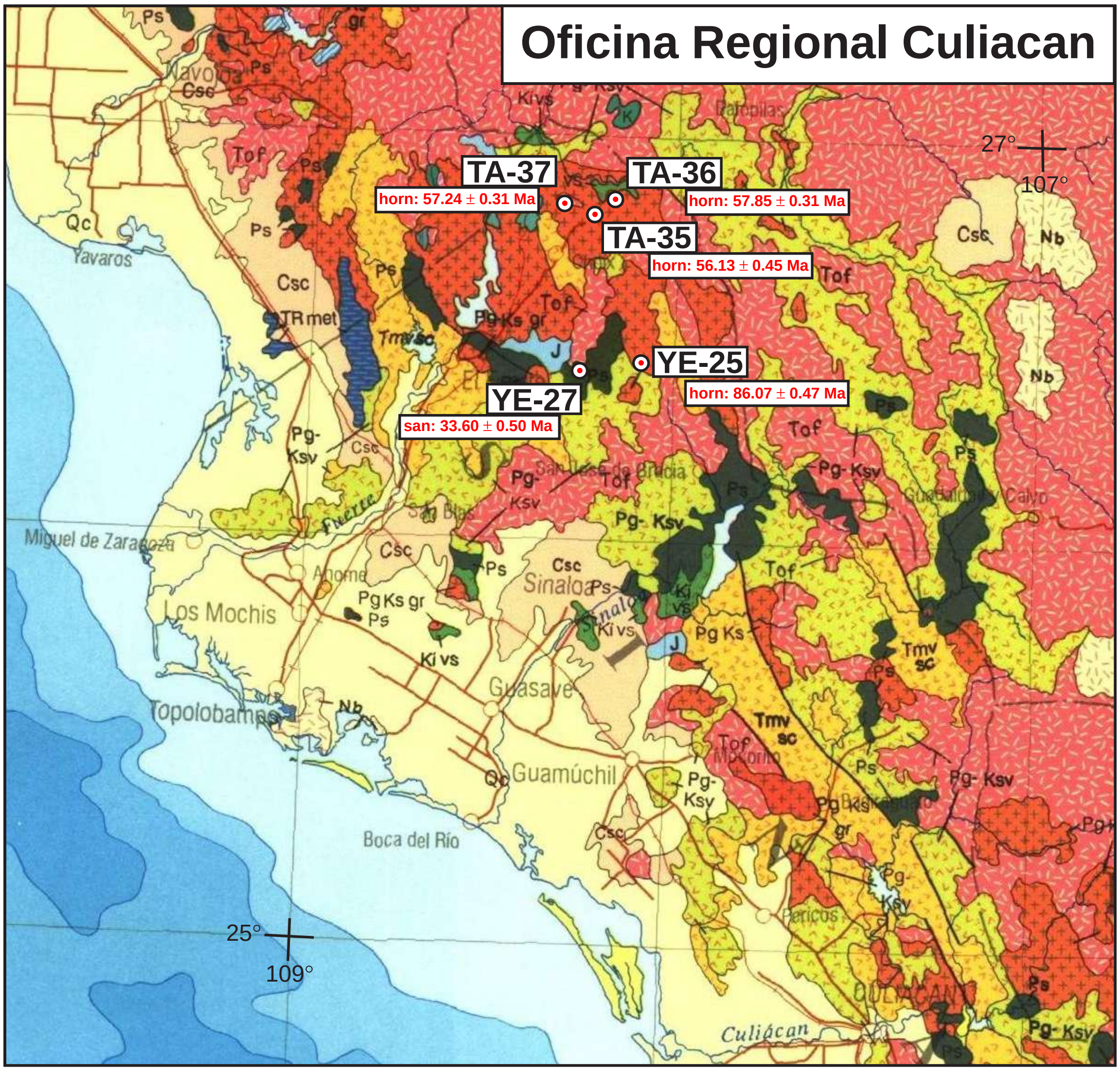


Figure 4. Sample location for samples collected by geologists from the Oficina Regional Culiacan. Background geologic map corresponds to Carta Geologica de la Republica Mexicana (1:2,000,000). Abbreviations: san (sanidine); horn (hornblende).

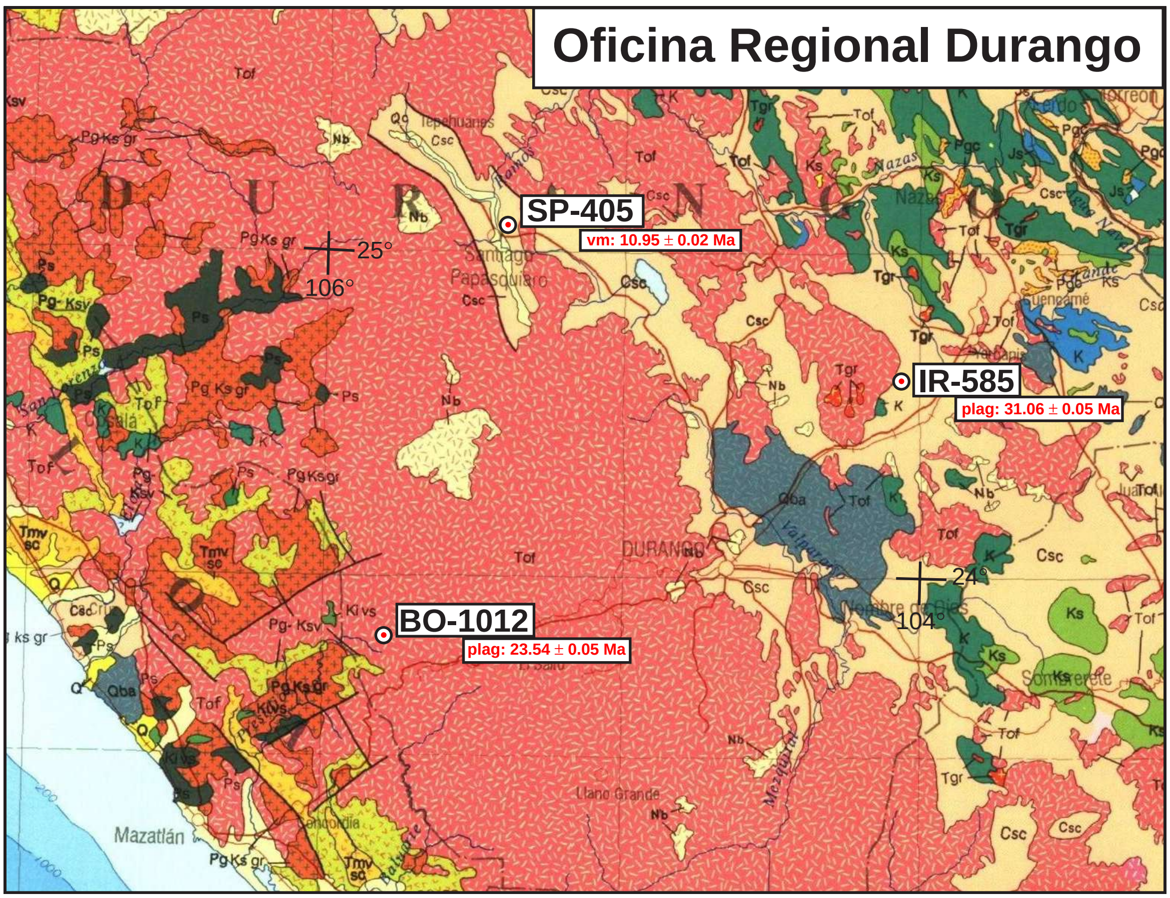


Figure 5. Sample location for samples collected by geologists from the Oficina Regional Durango. Background geologic map corresponds to Carta Geologica de la Republica Mexicana (1:2,000,000). Abbreviations: plag (plagioclase); vm (volcanic matrix).

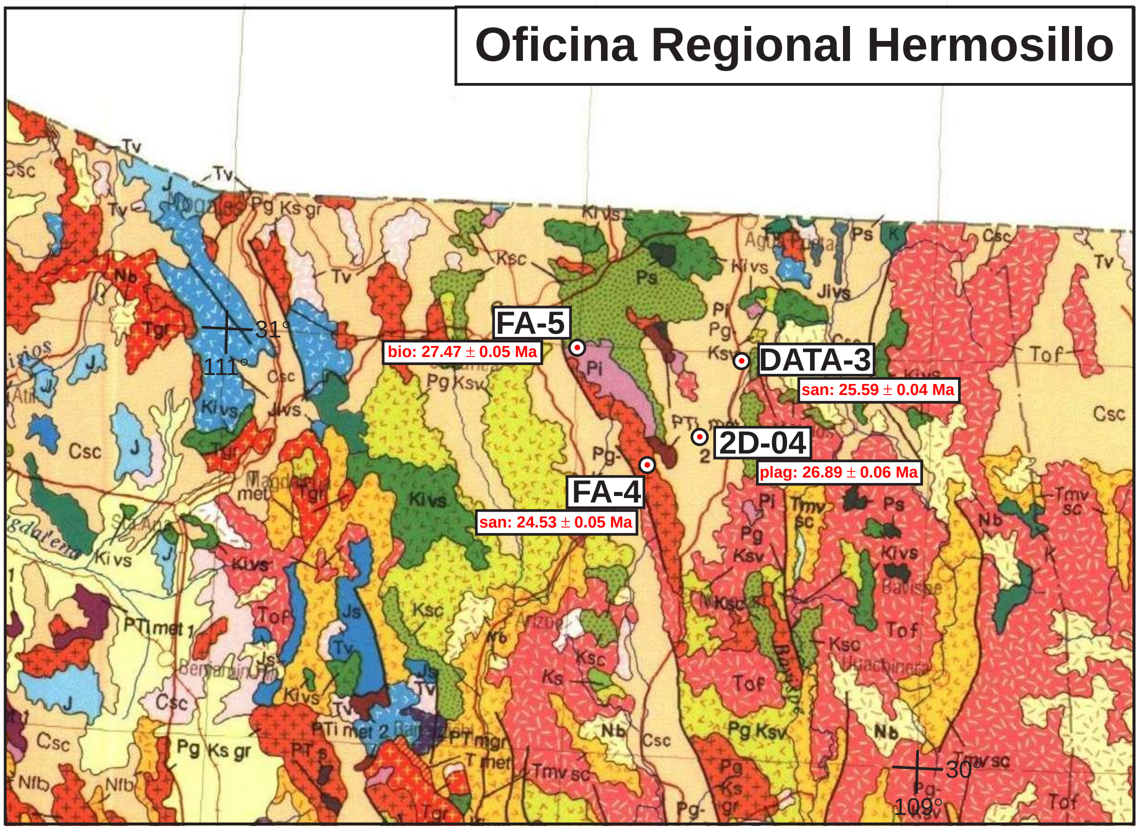


Figure 6. Sample location for samples collected by geologists from the Oficina Regional Hermosillo. Background geologic map corresponds to Carta Geologica de la Republica Mexicana (1:2,000,000). Abbreviations: san (sanidine); bio (biotite); plag (plagioclase).

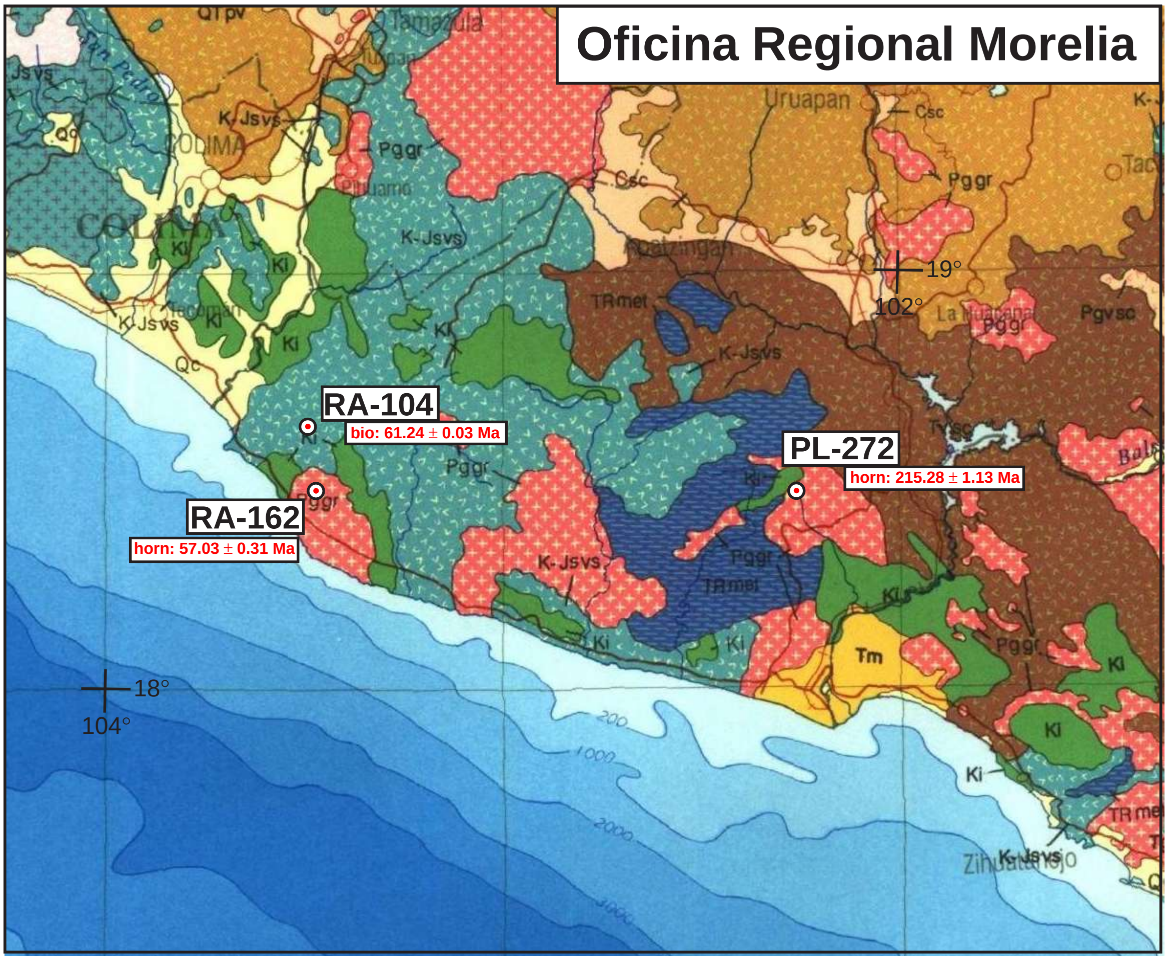


Figure 7. Sample location for samples collected by geologists from the Oficina Regional Morelia. Background geologic map corresponds to Carta Geologica de la Republica Mexicana (1:2,000,000). Abbreviations: horn (hornblende); bio (biotite).

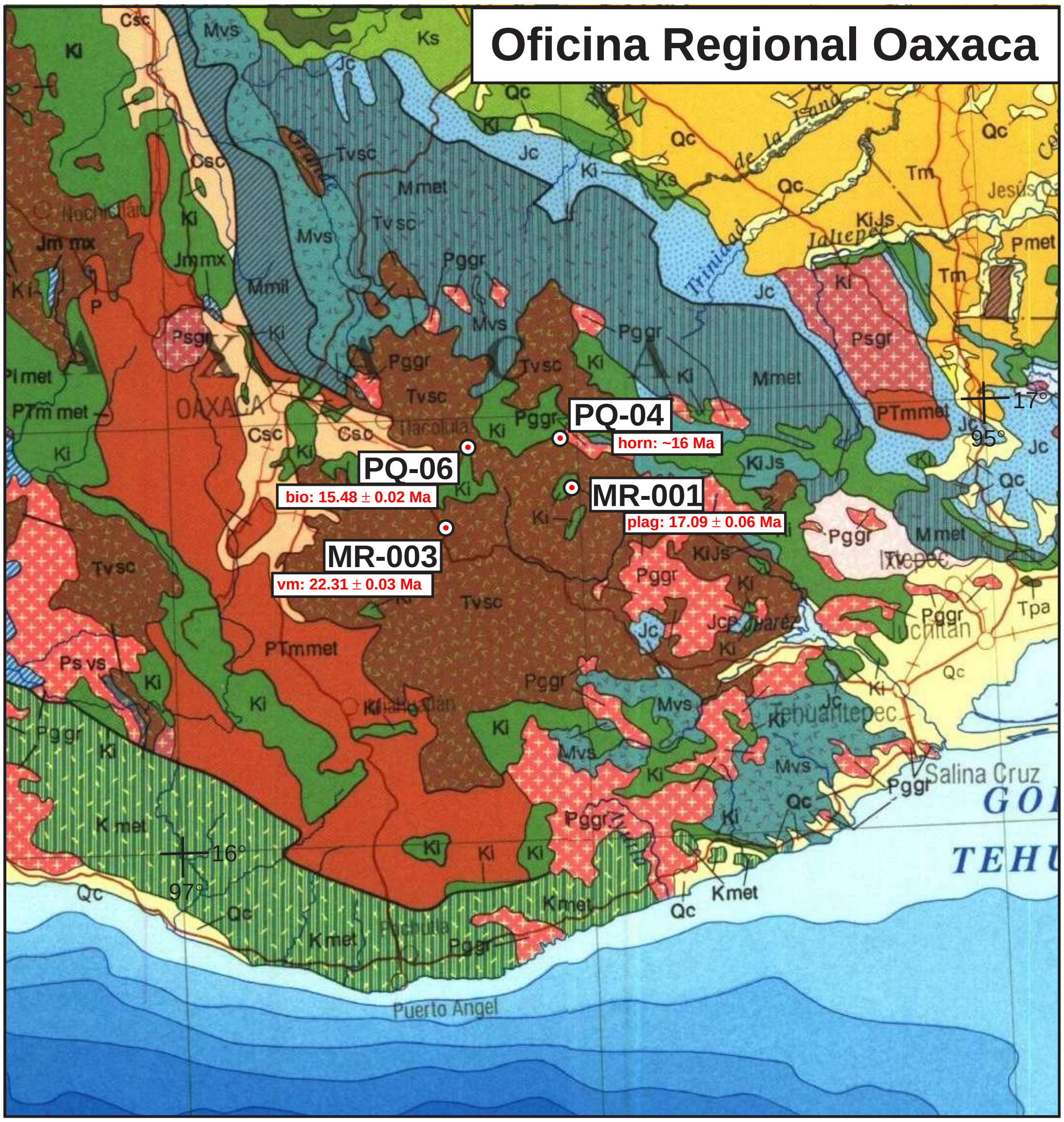


Figure 8. Sample location for samples collected by geologists from the Oficina Regional Oaxaca. Background geologic map corresponds to Carta Geologica de la Republica Mexicana (1:2,000,000). Abbreviations: horn (hornblende); bio (biotite); plag (plagioclase); vm (volcanic matrix).

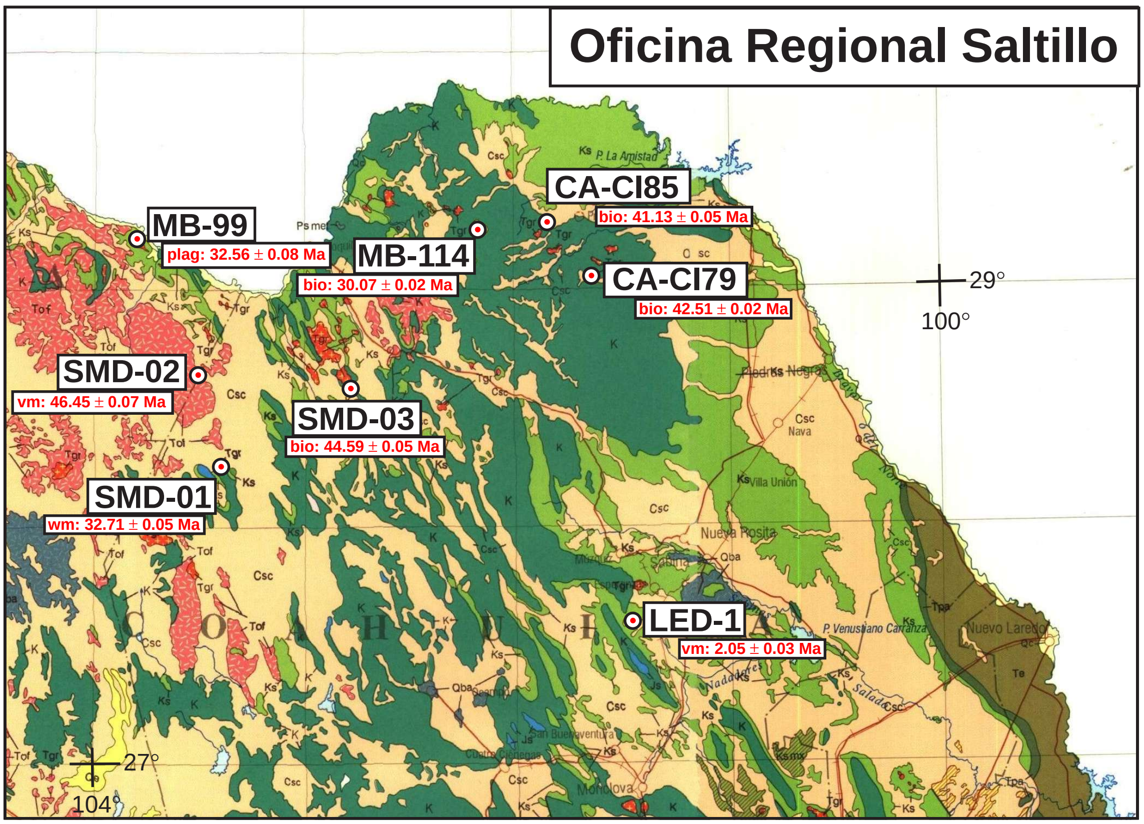


Figure 9. Sample location for samples collected by geologists from the Oficina Regional Saltillo. Background geologic map corresponds to Carta Geologica de la Republica Mexicana (1:2,000,000). Abbreviations: bio (biotite); plag (plagioclase); vm (volcanic matrix); wm (white mica).

Figure 10. Sample location for samples collected by geologists from the Oficina Regional SL Potosi. Background geologic map corresponds to Carta Geologica de la Republica Mexicana (1:2,000,000). Abbreviation: K-spar (K-feldspar).

Table 3. $^{40}Ar/^{39}Ar$ biotite total fusion data obtained using the VG 1200 spectrometer.

Temp. °C	$\%^{39}Ar$ of total	Radiogenic Yield (%)	$^{39}Ar_k$ (Moles x 10^{-12})	$\frac{^{40}Ar^*}{^{39}Ar_k}$	Apparent K/Ca	Apparent K/Cl	Apparent Age (Ma)	Error (Ma)
Oficina Regional Chihuahua								
DHP-15	*granodiorite*	***biotite TF***	*J = 0.005197 ± 0.50%*		*wt = 6.4 mg*	*#163KD29*		
1450	100	90.4	0.375431	3.566	32.6	25	**33.13**	**± 0.02**
FDR-002	*rhyolite*	***biotite TF***	*J = 0.005203 ± 0.50%*		*wt = 6.3 mg*	*#159KD29*		
1450	100	92.9	0.414443	4.514	344.1	73	**41.88**	**± 0.03**
Oficina Regional Culiacan								
TA-35	*granodiorite*	***biotite TF***	*J = 0.005173 ± 0.50%*		*wt = 5.7 mg*	*#175KD29*		
1450	100	96.1	0.193665	6.329	6.7	181	**58.12**	**± 0.06**
TA-36	*tonalite*	***biotite TF***	*J = 0.005202 ± 0.50%*		*wt = 4.0 mg*	*#167KD29*		
1450	100	94.2	0.224037	6.433	17.4	37	**59.38**	**± 0.05**
TA-37	*granodiorite*	***biotite TF***	*J = 0.005129 ± 0.50%*		*wt = 6.1 mg*	*#179KD29*		
1450	100	96.6	0.352050	6.426	17.7	51	**58.50**	**± 0.03**
YE-25	*granodiorite*	***biotite TF***	*J = 0.005175 ± 0.50%*		*wt = 5.4 mg*	*#173KD29*		
1450	100	99.3	0.319902	8.627	31.3	134	**78.79**	**± 0.03**
Oficina Regional Hermosillo								
FA-4	*rhyolite tuff*	***biotite TF***	*J = 0.005197 ± 0.50%*		*wt = 2.3 mg*	*#171KD29*		
1450	100	78.9	0.128676	2.644	46.3	91	**24.62**	**± 0.09**
FA-5	*microdiorite*	***biotite TF***	*J = 0.005201 ± 0.50%*		*wt = 5.6 mg*	*#161KD29*		
1450	100	92.7	0.261125	2.950	4.3	55	**27.47**	**± 0.05**
DATA-3	*rhyolite tuff*	***biotite TF***	*J = 0.005203 ± 0.50%*		*wt = 4.5 mg*	*#150KD29*		
1450	100	89.0	0.264577	2.745	50.6	144	**25.59**	**± 0.04**
Oficina Regional Morelia								
RA-104	*diorite*	***biotite TF***	*J = 0.005200 ± 0.50%*		*wt = 4.0 mg*	*#153KD29*		
1450	100	96.5	0.219440	6.640	22.0	22	**61.24**	**± 0.03**
Oficina Regional Oaxaca								
PQ-06	*rhyolite tuff*	***biotite TF***	*J = 0.005130 ± 0.50%*		*wt = 6.0 mg*	*#177KD29*		
1450	100	64.7	0.313195	1.680	99.5	76	**15.48**	**± 0.02**
Oficina Regional Saltillo								
CA-CI-79	*diorite*	***biotite TF***	*J = 0.005204 ± 0.50%*		*wt = 6.5 mg*	*#157KD29*		
1450	100	96.4	0.411054	4.582	20.4	203	**42.51**	**± 0.02**
CA-CI-85	*monzonite?*	***biotite TF***	*J = 0.005200 ± 0.50%*		*wt = 6.1 mg*	*#169KD29*		
1450	100	80.3	0.253222	4.435	91.2	138	**41.13**	**± 0.05**
MB-114	*sienite*	***biotite TF***	*J = 0.005203 ± 0.50%*		*wt = 3.1 mg*	*#165KD29*		
1450	100	79.0	0.180365	3.231	54.5	191	**30.07**	**± 0.02**
SMD-03	*sienite*	***biotite TF***	*J = 0.005198 ± 0.50%*		*wt = 5.3 mg*	*#155KD29*		
1450	100	86.5	0.266389	4.815	15.6	38	**44.59**	**± 0.05**

Ages calculated assuming an initial $^{40}Ar/^{36}Ar = 295.5 \pm 0$.
All precision estimates are at the one sigma level of precision.

Table 4. $^{40}Ar/^{39}Ar$ step-heating data obtained using the VG 1200 spectrometer.

Step	Temp. °C	%^{39}Ar of total	Radiogenic Yield (%)	$^{39}Ar_k$ (Moles x 10^{-12})	$^{40}Ar^*/^{39}Ar_k$	Apparent K/Ca	Apparent K/Cl	Apparent Age (Ma)	Error (Ma)
Oficina Regional Chihuahua									
DHP-12	*orthogneiss*	***hornblende***	*J = 0.005099 ± 0.50%*	*wt = 248.0 mg*	*#148KD29*				
A	1100	18.2	97.6	0.095233	52.889	0.09	19	430.73	± 0.40
B	1125	16.2	98.6	0.084824	92.634	0.06	18	697.88	± 0.62
C	1150	32.7	98.9	0.170670	135.530	0.04	24	947.75	± 1.02
D	1250	19.0	99.2	0.099280	132.522	0.04	19	931.32	± 1.03
E	1450	13.8	99.1	0.072300	140.043	0.04	19	972.13	± 0.73
Total Gas		100.0	98.7	0.522307	113.549	0.05	21	824.03	
	65.5% of gas on plateau-like in 1150 through 1450 steps						**Average Age =**	**954.70**	**± 4.14**
Oficina Regional Chilpancingo									
VH-134	*grabbro*	***hornblende***	*J = 0.005096 ± 0.50%*	*wt = 218.0 mg*	*#181KD29*				
A	1000	4.2	52.7	0.040099	9.239	0.30	152	82.99	± 0.34
B	1100	10.5	80.0	0.099434	11.073	0.04	71	99.03	± 0.22
C	1125	4.2	77.5	0.039427	10.707	0.06	39	95.84	± 0.55
D	1150	6.9	89.1	0.065663	11.292	0.06	29	100.93	± 0.36
E	1175	12.7	90.1	0.120716	11.922	0.07	29	106.41	± 0.17
F	1200	11.8	93.2	0.112037	11.730	0.07	38	104.74	± 0.18
G	1250	18.1	92.7	0.171483	11.933	0.07	36	106.50	± 0.16
H	1450	31.5	89.9	0.298368	12.588	0.06	30	112.16	± 0.16
Total Gas		100.0	87.6	0.947227	11.814	0.07	42	105.47	
	No Plateau Age								
Oficina Regional Culiacan									
TA-35	*granodiorite*	***hornblende***	*J = 0.005100 ± 0.50%*	*wt = 252.9 mg*	*#147KD29*				
A	1100	10.8	69.8	0.066388	5.652	0.04	16	51.27	± 0.24
B	1125	31.2	86.6	0.191543	6.107	0.04	11	55.33	± 0.08
C	1150	32.5	92.8	0.199185	6.157	0.05	10	55.77	± 0.10
D	1250	25.4	93.2	0.155959	6.149	0.04	11	55.71	± 0.09
Total Gas		100.0	88.5	0.613075	6.085	0.05	11	55.13	
	No Plateau Age								
TA-36	*tonalite*	***hornblende***	*J = 0.005155 ± 0.50%*	*wt = 240.2 mg*	*#145KD29*				
A	1100	18.6	63.0	0.092512	6.052	0.03	3	55.42	± 0.68
B	1125	27.6	86.2	0.137557	6.393	0.04	4	58.49	± 0.23
C	1150	21.3	92.9	0.105963	6.336	0.04	3	57.98	± 0.12
D	1250	17.2	91.3	0.085450	6.301	0.03	3	57.67	± 0.17
E	1450	15.3	84.8	0.076126	6.269	0.03	3	57.38	± 0.41
Total Gas		100.0	84.0	0.497608	6.283	0.04	3	57.50	
	53.8% of gas on plateau in 1150 through 1450 steps						**Plateau Age =**	**57.85**	**± 0.31**
TA-37	*granodiorite*	***hornblende***	*J = 0.005157 ± 0.50%*	*wt = 248.3 mg*	*#146KD29*				
A	1100	6.6	64.6	0.062433	6.056	0.05	6	55.48	± 0.20
B	1125	19.1	85.2	0.179368	6.270	0.06	5	57.41	± 0.11
C	1150	42.3	94.3	0.397725	6.414	0.06	5	58.71	± 0.08
D	1175	9.3	93.5	0.086993	6.083	0.06	5	55.72	± 0.10
E	1250	12.4	93.4	0.116073	6.234	0.06	5	57.08	± 0.12
F	1450	10.3	87.0	0.097179	6.244	0.05	5	57.17	± 0.15
Total Gas		100.0	89.6	0.939771	6.292	0.06	5	57.61	
	100% of gas on plateau-like in 1100 through 1450 steps						**Average Age =**	**57.24**	**± 0.31**

Table 4. $^{40}Ar/^{39}Ar$ step-heating data obtained using the VG 1200 spectrometer.–Continued

Step	Temp. °C	%^{39}Ar of total	Radiogenic Yield (%)	$^{39}Ar_k$ (Moles x 10^{-12})	$^{40}Ar^*$/$^{39}Ar_k$	Apparent K/Ca	Apparent K/Cl	Apparent Age (Ma)	Error (Ma)
Oficina Regional Culiacan (cont.)									
YE-25	*granodiorite*	***hornblende***	*J = 0.005101 ± 0.50%*		*wt = 246.9 mg*	*#149KD29*			
A	900	45.9	93.9	0.654103	9.832	0.09	9	88.28	± 0.10
B	1000	27.7	97.3	0.394367	9.604	0.09	9	86.29	± 0.04
C	1100	10.5	96.8	0.149163	9.429	0.09	9	84.74	± 0.13
D	1250	5.6	95.9	0.079456	9.150	0.09	9	82.30	± 0.14
E	1450	10.4	95.5	0.148627	9.610	0.09	9	86.33	± 0.16
Total Gas		100.0	95.5	1.425716	9.666	0.09	9	86.82	
	100% of gas on plateau-like in 900 through 1450 steps						**Average Age =**	**86.07**	**± 0.47**
Oficina Regional Morelia									
PL-272	*grabbro*	***hornblende***	*J = 0.005092 ± 0.50%*		*wt = 217.0 mg*	*#180KD29*			
A	900	45.3	69.1	0.046767	24.291	0.01	13	210.38	± 1.92
B	1250	18.6	71.4	0.019208	22.901	0.01	16	198.98	± 1.06
C	1450	36.1	76.4	0.037295	26.232	0.01	15	226.17	± 0.81
Total Gas		100.0	72.2	0.103270	24.733	0.01	14	213.99	
	100% of gas on plateau-like in 900 through 1450 steps						**Average Age =**	**215.28**	**± 1.13**
RA-162	*granodiorite*	***hornblende***	*J = 0.005153 ± 0.50%*		*wt = 247.1 mg*	*#143KD29*			
A	1100	2.8	83.1	0.037229	5.652	0.08	24	51.79	± 0.24
B	1150	31.8	95.5	0.423400	6.255	0.08	18	57.23	± 0.10
C	1175	36.9	98.1	0.491769	6.238	0.08	17	57.08	± 0.08
D	1250	13.9	97.3	0.185859	6.140	0.08	18	56.20	± 0.19
E	1300	14.6	95.9	0.195247	6.106	0.08	18	55.89	± 0.54
Total Gas		100.0	96.4	1.333504	6.194	0.08	17	56.68	
	97.2% of gas on plateau-like in 1150 through 1300 steps						**Average Age =**	**57.03**	**± 0.31**
Oficina Regional Oaxaca									
PQ-04	*granodiorite*	***hornblende***	*J = 0.005103 ± 0.50%*		*wt = 115.5 mg*	*#144KD29*			
A	1125	21.3	100.0	0.083221	2.018	0.05	8	18.48	± 8.32
B	1150	33.5	87.2	0.130537	1.852	0.06	2	16.97	± 0.02
C	1175	19.2	86.4	0.074868	1.542	0.07	6	14.14	± 0.18
D	1200	6.6	73.9	0.025845	0.998	0.07	7	9.16	± 0.55
E	1250	19.4	75.9	0.075533	1.628	0.06	7	14.93	± 0.34
Total Gas		100.0	86.7	0.390004	1.721	0.06	5	15.77	
	No Plateau Age								

Ages calculated assuming an initial $^{40}Ar/^{36}Ar = 295.5 \pm 0$.
All precision estimates are at the one sigma level of precision.
Ages of individual steps do not include error in the irradiation parameter J.
No error is calculated for the total gas age.

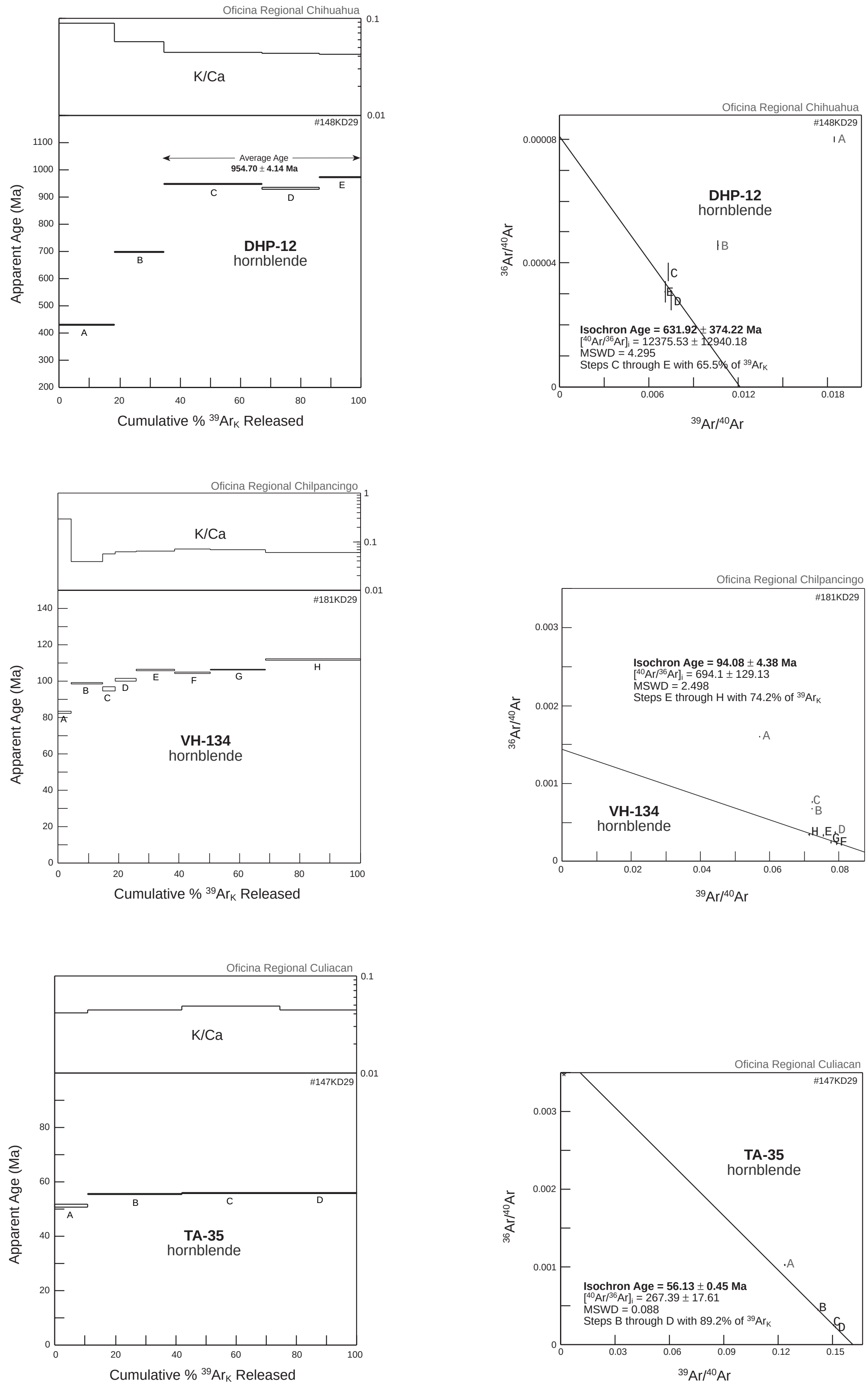


Figure 11. $^{40}Ar/^{39}Ar$ age spectra and inverse-isotope correlation diagrams for samples collected by CRM geologists from different areas in Mexico. These data were produced using the VG 1200 spectrometer at the USGS Thermochronology laboratory in Denver, Colorado.

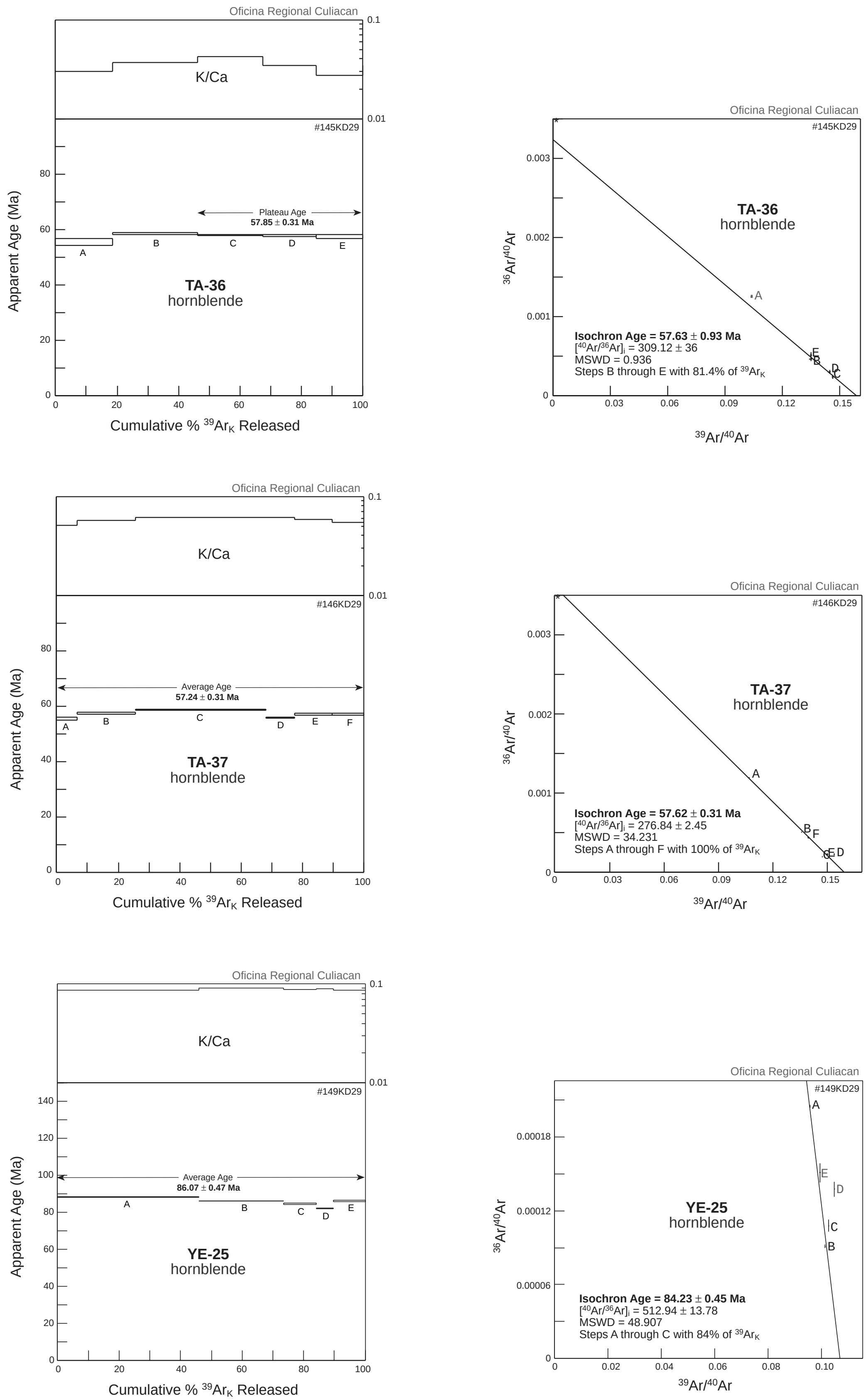


Figure 11. $^{40}Ar/^{39}Ar$ age spectra and inverse-isotope correlation diagrams for samples collected by CRM geologists from different areas in Mexico. These data were produced using the VG 1200 spectrometer at the USGS Thermochronology laboratory in Denver, Colorado.–Continued

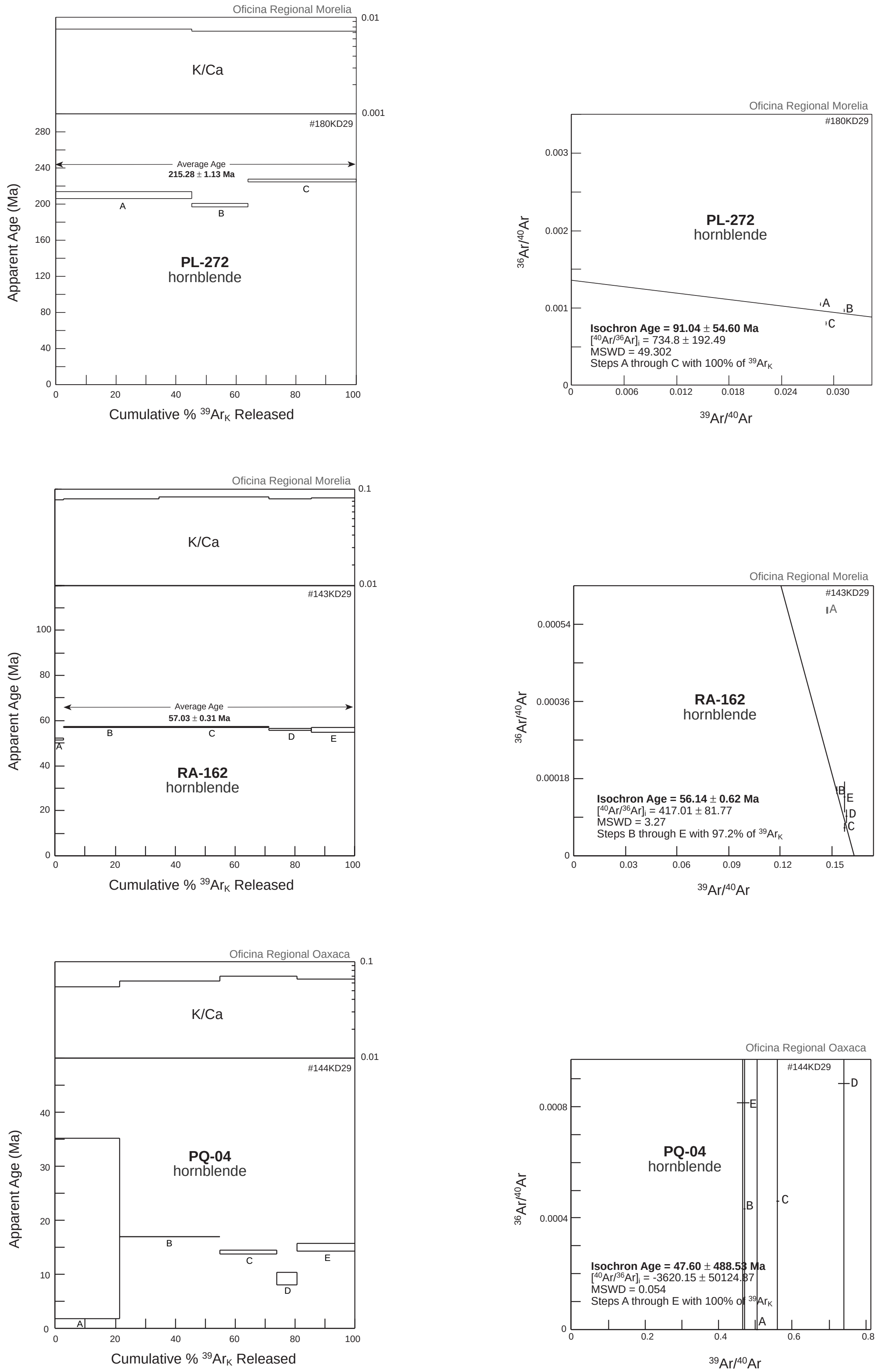


Figure 11. ^{40}Ar/^{39}Ar age spectra and inverse-isotope correlation diagrams for samples collected by CRM geologists from different areas in Mexico. These data were produced using the VG 1200 spectrometer at the USGS Thermochronology laboratory in Denver, Colorado.–Continued

Table 5. $^{40}Ar/^{39}Ar$ step-heating data obtained using the MAP 216 spectrometer.

Step	Temp. °C	%^{39}Ar of total	Radiogenic Yield (%)	$^{39}Ar_k$ (Moles)	$^{40}Ar^*/^{39}Ar_k$	Apparent K/Ca	Apparent K/Cl	Apparent Age (Ma)	Error (Ma)
Oficina Regional Chihuahua									
POD-02	*andesite*	***plagioclase***	*J = 0.005160 ± 0.50%*	*wt = 51.0 mg*	*#125KD29*				
A	650	0.0	0.8	2.59E-16	8.096	0.12	1	73.82	± 49.85
B	750	0.8	25.7	5.05E-15	3.332	0.26	8	30.75	± 1.30
C	850	1.7	77.8	1.07E-14	3.558	0.15	95	32.82	± 0.54
D	950	5.7	90.9	3.65E-14	3.576	0.12	170	32.98	± 0.17
E	1050	11.6	95.0	7.40E-14	3.504	0.11	200	32.32	± 0.10
F	1150	20.6	96.2	1.31E-13	3.503	0.11	200	32.32	± 0.07
G	1250	23.0	97.4	1.47E-13	3.513	0.11	157	32.41	± 0.07
H	1350	17.7	94.9	1.13E-13	3.506	0.10	150	32.34	± 0.08
I	1450	9.4	91.4	5.99E-14	3.502	0.11	120	32.31	± 0.12
J	1550	6.9	86.9	4.40E-14	3.473	0.10	82	32.04	± 0.15
K	1650	2.6	68.2	1.64E-14	3.381	0.09	67	31.20	± 0.39
Total Gas								32.34	
82.3% of gas on plateau in 1050 through 1450 steps							**Plateau Age =**	**32.35**	**± 0.05**
POD-02	*andesite*	***volcanic matrix***	*J = 0.005153 ± 0.50%*	*wt = 59.6 mg*	*#135KD29*				
A	550	0.3	0.9	5.76E-15	2.589	0.58	8	23.91	± 11.65
B	650	1.9	8.7	4.26E-14	2.042	2.14	25	18.88	± 0.92
C	750	2.5	38.4	5.48E-14	3.070	2.38	42	28.31	± 0.28
D	850	7.8	79.5	1.72E-13	3.976	1.92	79	36.58	± 0.09
E	950	21.7	93.7	4.77E-13	3.758	1.48	120	34.60	± 0.05
F	1050	25.0	97.2	5.50E-13	3.600	1.66	117	33.16	± 0.04
G	1150	19.9	95.8	4.38E-13	3.572	2.88	68	32.90	± 0.05
H	1250	14.6	88.0	3.22E-13	3.570	3.03	34	32.88	± 0.06
I	1350	3.8	73.0	8.39E-14	3.567	0.56	25	32.85	± 0.13
J	1450	1.9	53.3	4.10E-14	3.597	0.12	16	33.13	± 0.26
K	1550	0.5	41.5	1.09E-14	3.617	0.21	9	33.31	± 0.74
L	1650	0.1	31.7	2.27E-15	3.524	0.22	18	32.46	± 3.20
Total Gas								33.22	
65.2% of gas on plateau in 1050 through 1450 steps							**Average Age =**	**33.07**	**± 0.05**
DHP-14	*granodiorite*	***K-feldspar***	*J = 0.005200 ± 0.50%*	*wt = 4.9 mg*	*#127KD29*				
A	550	0.7	1.1	3.34E-15	6.920	0.47	1	63.77	± 23.89
B	600	0.0	-0.7	1.22E-16	-0.434	1.03	3	-4.08	± 59.86
C	650	0.0	16.8	2.43E-16	5.094	-8.92	3	47.16	± 29.72
D	700	0.1	21.0	4.03E-16	4.080	1.47	3	37.88	± 17.77
E	750	0.2	21.7	7.63E-16	2.819	1.95	4	26.25	± 9.48
F	800	0.3	36.4	1.70E-15	3.094	4.50	6	28.79	± 4.26
G	850	0.6	46.9	3.22E-15	3.429	4.38	11	31.89	± 2.27
H	900	1.3	51.4	6.55E-15	3.472	16.08	23	32.28	± 1.14
I	950	2.2	59.4	1.12E-14	3.436	8.03	43	31.94	± 0.67
J	1000	3.3	56.5	1.68E-14	3.417	13.81	44	31.77	± 0.47
K	1025	3.0	74.8	1.51E-14	3.458	7.54	86	32.15	± 0.49
L	1050	2.8	75.6	1.43E-14	3.481	11.93	125	32.37	± 0.51
M	1075	3.8	60.0	1.94E-14	3.459	14.46	73	32.16	± 0.41
N	1100	2.6	87.5	1.31E-14	3.510	20.42	211	32.63	± 0.56
O	1150	4.7	56.4	2.37E-14	3.527	20.40	78	32.79	± 0.35
P	1200	6.8	58.1	3.43E-14	3.526	24.17	94	32.78	± 0.26
Q	1250	4.4	62.2	2.24E-14	3.555	19.76	162	33.05	± 0.36
R	1350	16.3	64.7	8.29E-14	3.516	23.97	54	32.68	± 0.15
S	1450	20.0	59.8	1.02E-13	3.522	20.04	33	32.74	± 0.16
T	1650	26.9	49.4	1.36E-13	3.591	17.39	32	33.38	± 0.20
Total Gas								32.99	
64.4% of gas on plateau in 1025 through 1450 steps							**Plateau Age =**	**32.69**	**± 0.10**

Table 5. $^{40}Ar/^{39}Ar$ step-heating data obtained using the MAP 216 spectrometer.–Continued

Step	Temp. °C	%^{39}Ar of total	Radiogenic Yield (%)	$^{39}Ar_k$ (Moles)	$^{40}Ar^*/^{39}Ar_k$	Apparent K/Ca	Apparent K/Cl	Apparent Age (Ma)		Error (Ma)
Oficina Regional Durango										
BO-1012	*andesite? vitrophere*	***plagioclase***	*J = 0.005164 ± 0.50%*	*wt = 58.0 mg*	*#124KD29*					
A	650	0.3	0.9	1.55E-15	3.218	0.43	1	29.74	±	15.23
B	750	0.8	25.3	5.02E-15	2.347	0.64	2	21.73	±	1.23
C	850	1.2	55.1	7.27E-15	2.420	0.32	7	22.41	±	0.82
D	950	3.3	76.6	1.96E-14	2.523	0.18	44	23.35	±	0.31
E	1050	7.2	87.7	4.32E-14	2.546	0.15	130	23.57	±	0.14
F	1150	11.9	91.3	7.13E-14	2.537	0.14	212	23.48	±	0.10
G	1250	17.2	94.5	1.03E-13	2.545	0.14	204	23.55	±	0.07
H	1350	22.9	92.7	1.37E-13	2.548	0.15	193	23.58	±	0.06
I	1450	20.0	91.1	1.20E-13	2.581	0.16	170	23.89	±	0.07
J	1550	10.4	84.8	6.22E-14	2.619	0.15	135	24.23	±	0.11
K	1650	4.8	64.7	2.85E-14	2.637	0.13	128	24.40	±	0.23
Total Gas								23.71		
	64.8% of gas on plateau in 650 through 1350 steps						**Plateau Age =**	**23.54**	**±**	**0.05**
IR-585	*andesite? vitrophere*	***plagioclase***	*J = 0.005163 ± 0.50%*	*wt = 52.0 mg*	*#121KD29*					
A	650	1.1	11.0	7.64E-15	4.896	1.41	4	45.03	±	1.99
B	750	3.0	63.4	2.17E-14	4.710	1.18	6	43.35	±	0.36
C	850	3.3	67.0	2.37E-14	3.140	0.44	28	29.02	±	0.32
D	950	6.5	79.1	4.65E-14	3.212	0.22	84	29.67	±	0.17
E	1050	8.8	91.3	6.38E-14	3.431	0.17	161	31.68	±	0.12
F	1150	14.2	95.3	1.02E-13	3.443	0.16	207	31.79	±	0.09
G	1250	21.7	95.7	1.57E-13	3.355	0.16	202	30.98	±	0.07
H	1350	22.4	93.4	1.62E-13	3.320	0.16	193	30.66	±	0.07
I	1450	13.2	91.8	9.50E-14	3.326	0.16	196	30.72	±	0.09
J	1550	4.6	80.4	3.30E-14	3.339	0.16	133	30.84	±	0.23
K	1650	1.2	42.5	8.86E-15	3.423	0.14	96	31.61	±	0.84
Total Gas								31.43		
	80.3% of gas on plateau-like in 1050 through 1450 steps						**Average Age =**	**31.06**	**±**	**0.05**
SP-405	*basalt*	***volcanic matrix***	*J = 0.005153 ± 0.50%*	*wt = 57.6 mg*	*#133KD29*					
A	550	0.4	1.4	6.99E-15	1.572	0.52	2	14.55	±	4.88
B	650	2.6	20.0	4.92E-14	1.244	1.01	8	11.53	±	0.31
C	750	3.9	52.8	7.35E-14	1.278	1.52	10	11.84	±	0.15
D	850	9.7	86.1	1.85E-13	1.285	2.20	15	11.90	±	0.06
E	950	30.3	94.8	5.76E-13	1.211	2.91	45	11.23	±	0.02
F	1050	12.2	90.8	2.32E-13	1.171	1.19	52	10.86	±	0.05
G	1150	7.2	93.9	1.37E-13	1.158	0.82	31	10.73	±	0.07
H	1250	18.6	91.6	3.54E-13	1.140	0.59	23	10.57	±	0.03
I	1350	14.2	83.4	2.71E-13	1.130	0.13	8	10.48	±	0.05
J	1450	0.7	62.2	1.37E-14	1.165	0.13	12	10.80	±	0.70
K	1550	0.2	32.0	2.93E-15	1.156	0.11	14	10.71	±	3.25
L	1650	0.0	8.2	9.11E-16	1.386	0.10	19	12.84	±	10.49
Total Gas								11.02		
	82.5% of gas on plateau-like in 950 through 1350 steps						**Average Age =**	**10.95**	**±**	**0.02**

Table 5. $^{40}Ar/^{39}Ar$ step-heating data obtained using the MAP 216 spectrometer.–Continued

Step	Temp. °C	%^{39}Ar of total	Radiogenic Yield (%)	$^{39}Ar_k$ (Moles)	$^{40}Ar^*/^{39}Ar_k$	Apparent K/Ca	Apparent K/Cl	Apparent Age (Ma)		Error (Ma)
Oficina Regional Hermosillo										
2D-04	*andesite porphyry*		***plagioclase***	*J = 0.005167 ± 0.50%*		*wt = 58.2 mg*	*#122KD29*			
A	650	0.2	0.8	6.20E-16	4.516	0.15	1	41.61	±	25.08
B	750	2.1	13.4	7.79E-15	3.741	0.17	7	34.54	±	1.24
C	850	6.0	49.4	2.21E-14	2.952	0.14	96	27.31	±	0.25
D	950	13.8	79.6	5.15E-14	2.921	0.10	214	27.02	±	0.11
E	1050	19.2	86.9	7.17E-14	2.897	0.08	204	26.80	±	0.08
F	1150	14.5	86.5	5.42E-14	2.898	0.07	202	26.81	±	0.10
G	1250	7.3	78.6	2.71E-14	2.914	0.08	135	26.96	±	0.16
H	1350	7.8	45.2	2.91E-14	2.902	0.09	103	26.85	±	0.24
I	1450	16.9	14.2	6.30E-14	2.955	0.06	51	27.34	±	0.77
J	1550	9.4	17.0	3.52E-14	3.186	0.06	47	29.46	±	0.70
K	1650	2.8	19.5	1.05E-14	3.467	0.06	47	32.03	±	0.78
Total Gas								27.55		
	85.5% of gas on plateau in 850 through 1450 steps						**Plateau Age =**	**26.89**	**±**	**0.06**
Oficina Regional Oaxaca										
MR-001	*andesite porphyry*		***volcanic matrix***	*J = 0.005185 ± 0.50%*		*wt = 61.0 mg*	*#131KD29*			
A	550	0.3	0.5	1.08E-15	3.036	0.17	4	28.18	±	25.82
B	650	1.4	4.8	5.22E-15	2.551	0.23	9	23.71	±	2.33
C	750	3.1	26.3	1.17E-14	2.115	0.25	37	19.67	±	0.39
D	850	9.1	39.0	3.46E-14	1.712	0.25	44	15.95	±	0.17
E	950	17.1	57.0	6.47E-14	1.946	0.34	210	18.11	±	0.10
F	1050	13.5	72.0	5.11E-14	1.881	0.34	261	17.51	±	0.08
G	1150	8.5	69.9	3.23E-14	1.881	0.33	174	17.51	±	0.09
H	1250	17.6	62.7	6.69E-14	1.837	0.31	138	17.10	±	0.09
I	1350	17.5	33.7	6.64E-14	1.861	0.09	57	17.32	±	0.19
J	1450	9.8	19.2	3.72E-14	1.961	0.07	43	18.25	±	0.41
K	1550	1.5	13.6	5.56E-15	2.164	0.08	30	20.13	±	0.79
L	1650	0.7	13.8	2.79E-15	2.623	0.09	34	24.37	±	1.27
Total Gas								17.71		
	74.2% of gas on plateau-like in 950 through 1350 steps						**Average Age =**	**17.51**	**±**	**0.05**
MR-001	*andesite porphyry*		***plagioclase***	*J = 0.005165 ± 0.50%*		*wt = 49.0 mg*	*#123KD29*			
A	650	0.0	-0.9	8.71E-17	-6.999	0.67	3	-66.42	±	57.92
B	750	0.7	7.1	5.86E-15	2.471	0.30	20	22.88	±	1.56
C	850	2.4	31.8	2.02E-14	1.805	0.34	95	16.74	±	0.26
D	950	5.0	53.0	4.13E-14	1.814	0.32	180	16.82	±	0.13
E	1050	9.0	63.3	7.51E-14	1.848	0.24	231	17.14	±	0.09
F	1150	10.2	72.4	8.49E-14	1.839	0.20	228	17.05	±	0.07
G	1250	9.6	75.5	7.96E-14	1.846	0.29	225	17.12	±	0.07
H	1350	11.9	62.6	9.87E-14	1.822	0.56	164	16.90	±	0.08
I	1450	24.4	33.2	2.02E-13	1.842	0.29	96	17.08	±	0.18
J	1650	26.7	24.6	2.22E-13	2.074	0.09	55	19.22	±	0.29
Total Gas								17.65		
	72.5% of gas on plateau-like in 850 through 1450 steps						**Average Age =**	**17.03**	**±**	**0.04**

Table 5. $^{40}Ar/^{39}Ar$ step-heating data obtained using the MAP 216 spectrometer.–Continued

Step	Temp. °C	$\%^{39}Ar$ of total	Radiogenic Yield (%)	$^{39}Ar_k$ (Moles)	$^{40}Ar^*/^{39}Ar_k$	Apparent K/Ca	Apparent K/Cl	Apparent Age (Ma)	Error (Ma)
Oficina Regional Oaxaca (cont.)									
MR-003	*andesite*	***volcanic matrix***	*J = 0.005148 ± 0.50%*	*wt = 45.5 mg*	*#134KD29*				
A	550	0.9	3.3	1.55E-14	1.746	0.99	12	16.15	± 2.20
B	650	1.4	34.1	2.47E-14	1.477	1.16	33	13.66	± 0.21
C	750	1.4	68.9	2.48E-14	1.907	0.99	39	17.62	± 0.12
D	850	5.6	89.2	9.66E-14	2.455	0.80	99	22.65	± 0.05
E	950	23.3	96.4	3.99E-13	2.506	0.68	232	23.13	± 0.03
F	1050	28.2	98.1	4.84E-13	2.409	0.86	234	22.24	± 0.03
G	1150	21.1	96.8	3.61E-13	2.384	1.20	138	22.01	± 0.03
H	1250	11.6	92.7	1.99E-13	2.346	1.04	41	21.66	± 0.04
I	1350	4.1	82.5	7.00E-14	2.144	0.54	23	19.80	± 0.06
J	1450	1.5	66.8	2.57E-14	1.975	0.40	21	18.25	± 0.12
K	1550	0.5	59.1	8.50E-15	1.981	0.41	22	18.30	± 0.32
L	1650	0.3	39.5	4.42E-15	2.045	0.38	24	18.89	± 0.60
Total Gas								21.92	
	89.9% of gas on plateau-like in 850 through 1250 steps						**Average Age =**	**22.31**	**± 0.03**
Oficina Regional Saltillo									
LED-1	*basalt*	***volcanic matrix***	*J = 0.005185 ± 0.50%*	*wt = 49.5 mg*	*#132KD29*				
A	550	0.0	0.3	1.26E-17	5.659	-0.20	1	52.17	± 295.43
B	650	0.5	0.6	2.64E-15	0.177	0.27	2	1.66	± 2.09
C	750	1.1	12.7	5.82E-15	0.378	0.38	4	3.53	± 0.57
D	850	2.8	24.3	1.55E-14	0.259	0.34	8	2.42	± 0.22
E	950	19.0	51.9	1.05E-13	0.238	0.42	22	2.22	± 0.04
F	1050	40.8	62.8	2.24E-13	0.226	0.45	47	2.11	± 0.02
G	1150	12.1	47.0	6.65E-14	0.242	0.25	27	2.26	± 0.06
H	1250	11.0	39.6	6.06E-14	0.231	0.18	19	2.16	± 0.07
I	1350	11.8	9.4	6.62E-14	0.139	0.02	16	1.30	± 0.18
J	1450	0.7	11.9	3.93E-15	0.360	0.03	14	3.36	± 0.84
K	1550	0.2	6.0	8.42E-16	0.576	0.04	15	5.38	± 3.87
L	1650	0.1	7.0	6.19E-16	1.793	0.07	32	16.70	± 5.62
Total Gas								2.11	
	85.7% of gas on plateau-like in 850 through 1250 steps						**Average Age =**	**2.15**	**± 0.02**
MB-99	*gabbro-diorite*	***plagioclase***	*J = 0.005186 ± 0.50%*	*wt = 46.2 mg*	*#120KD29*				
A	650	0.0	0.5	1.25E-16	18.129	0.05	0	162.09	± 158.59
B	750	0.7	6.3	2.89E-15	2.997	0.19	4	27.83	± 3.06
C	850	1.7	38.1	7.03E-15	3.430	0.11	17	31.80	± 0.94
D	950	5.2	66.0	2.15E-14	3.538	0.07	43	32.80	± 0.32
E	1050	10.6	86.7	4.39E-14	3.506	0.06	117	32.51	± 0.17
F	1150	16.7	90.6	6.88E-14	3.520	0.06	142	32.63	± 0.12
G	1250	15.8	88.2	6.53E-14	3.505	0.08	107	32.49	± 0.12
H	1350	23.7	78.0	9.73E-14	3.362	0.17	46	31.18	± 0.10
I	1450	17.1	72.9	7.05E-14	3.372	0.13	28	31.27	± 0.13
J	1550	5.9	60.5	2.43E-14	3.626	0.05	15	33.61	± 0.31
K	1650	2.5	28.9	1.05E-14	3.750	0.03	15	34.75	± 0.78
Total Gas								32.13	
	50.8% of gas on plateau in 650 through 1250 steps						**Plateau Age =**	**32.56**	**± 0.08**

Table 5. $^{40}Ar/^{39}Ar$ step-heating data obtained using the MAP 216 spectrometer.–Continued

Step	Temp. °C	%^{39}Ar of total	Radiogenic Yield (%)	$^{39}Ar_k$ (Moles)	$^{40}Ar^*/^{39}Ar_k$	Apparent K/Ca	Apparent K/Cl	Apparent Age (Ma)	Error (Ma)
Oficina Regional Saltillo (cont.)									
SMD-01	*granite porphyry*		***white mica***	*J = 0.005130 ± 0.50%*		*wt = 6.2 mg*	*#187KD29*		
A	550	0.1	3.1	1.25E-15	2.852	7	2	26.20	± 7.21
B	650	0.2	18.0	2.27E-15	3.415	16	4	31.33	± 2.87
C	750	0.6	50.1	5.99E-15	3.888	26	50	35.63	± 0.69
D	800	0.9	65.8	8.21E-15	3.797	26	95	34.80	± 0.46
E	850	1.7	81.2	1.62E-14	3.658	41	110	33.54	± 0.32
F	900	3.3	91.3	3.18E-14	3.623	72	107	33.23	± 0.12
G	950	5.0	94.7	4.84E-14	3.610	148	137	33.10	± 0.12
H	1000	4.5	91.5	4.36E-14	3.598	167	121	32.99	± 0.11
I	1025	2.9	87.5	2.79E-14	3.580	264	142	32.84	± 0.14
J	1050	3.5	82.7	3.36E-14	3.577	123	126	32.81	± 0.15
K	1100	40.8	91.2	3.92E-13	3.561	110	125	32.66	± 0.06
L	1150	28.8	95.1	2.77E-13	3.567	79	104	32.71	± 0.05
M	1200	3.1	93.9	2.95E-14	3.664	5	29	33.60	± 0.15
N	1250	4.4	91.3	4.20E-14	3.592	65	91	32.94	± 0.12
O	1300	0.1	39.5	4.99E-16	4.789	1	8	43.79	± 6.86
P	1350	0.0	29.2	3.04E-16	4.999	2	13	45.68	± 9.09
Q	1450	0.0	6.5	1.65E-16	1.379	2	8	12.71	± 18.31
R	1650	0.0	20.5	2.52E-16	3.817	1	9	34.98	± 13.77
Total Gas								32.83	
	76.0% of gas on plateau in 1025 through 1150 steps						**Plateau Age =**	**32.71**	**± 0.05**
SMD-01	*granite porphyry*		***K-feldspar***	*J = 0.005141 ± 0.50%*		*wt = 3.9 mg*	*#185KD29*		
A	500	0.1	3.2	2.84E-16	6.201	5	1	56.62	± 22.97
B	550	0.2	9.0	8.83E-16	4.408	11	2	40.43	± 6.71
C	600	0.4	36.7	2.00E-15	3.113	64	6	28.64	± 2.74
D	650	0.9	71.6	4.78E-15	3.464	90	24	31.85	± 1.19
E	700	2.0	89.0	1.05E-14	3.633	81	128	33.38	± 0.48
F	750	3.6	92.6	1.91E-14	3.562	128	168	32.74	± 0.30
G	800	5.7	95.5	3.00E-14	3.545	70	158	32.59	± 0.20
H	850	7.2	96.3	3.80E-14	3.562	68	176	32.74	± 0.18
I	900	7.2	96.7	3.79E-14	3.558	80	174	32.71	± 0.15
J	950	6.8	96.6	3.58E-14	3.551	87	186	32.64	± 0.20
K	1000	6.2	97.0	3.24E-14	3.557	75	177	32.69	± 0.17
L	1050	5.4	97.5	2.85E-14	3.553	15	79	32.66	± 0.20
M	1100	5.1	95.8	2.67E-14	3.549	43	160	32.62	± 0.20
N	1150	4.6	90.9	2.39E-14	3.560	32	130	32.72	± 0.23
O	1200	4.9	88.7	2.60E-14	3.597	7	49	33.06	± 0.21
P	1250	5.7	78.7	2.98E-14	3.575	21	105	32.86	± 0.22
Q	1300	11.1	81.3	5.84E-14	3.546	38	109	32.59	± 0.13
R	1350	15.4	78.2	8.10E-14	3.553	95	118	32.66	± 0.13
S	1400	5.7	69.7	2.97E-14	3.606	80	122	33.14	± 0.22
T	1550	1.7	47.9	9.11E-15	3.686	21	97	33.87	± 0.89
U	1650	0.2	35.1	9.88E-16	3.435	8	81	31.59	± 5.78
Total Gas								32.76	
	92.4% of gas on plateau in 500 through 1350 steps						**Plateau Age =**	**32.70**	**± 0.06**

Table 5. $^{40}Ar/^{39}Ar$ step-heating data obtained using the MAP 216 spectrometer.–Continued

Step	Temp. °C	%^{39}Ar of total	Radiogenic Yield (%)	$^{39}Ar_k$ (Moles)	$^{40}Ar^*/^{39}Ar_k$	Apparent K/Ca	Apparent K/Cl	Apparent Age (Ma)		Error (Ma)
Oficina Regional Saltillo (cont.)										
SMD-02	*basalt*	***volcanic matrix***	*J = 0.005161 ± 0.50%*		*wt = 52.1 mg*	*#130KD29*				
A	550	1.0	1.3	9.50E-15	1.322	0.14	6	12.27	±	4.17
B	650	1.5	21.1	1.47E-14	3.104	0.17	16	28.67	±	0.64
C	750	1.7	53.1	1.61E-14	4.995	0.34	44	45.92	±	0.39
D	850	4.3	82.9	4.17E-14	5.218	0.42	141	47.94	±	0.15
E	950	16.3	88.5	1.58E-13	5.089	0.46	208	46.77	±	0.09
F	1050	19.0	93.1	1.84E-13	5.060	0.65	207	46.51	±	0.07
G	1150	8.2	89.2	7.95E-14	5.127	0.58	153	47.12	±	0.10
H	1250	17.5	93.0	1.70E-13	5.054	0.58	126	46.45	±	0.07
I	1350	27.7	91.6	2.69E-13	4.927	0.08	66	45.30	±	0.08
J	1450	2.3	89.0	2.21E-14	4.947	0.11	61	45.48	±	0.21
K	1550	0.3	47.4	3.06E-15	4.363	0.10	78	40.18	±	1.42
L	1650	0.3	20.7	2.85E-15	3.481	0.10	91	32.12	±	1.71
Total Gas								45.62		
97.0% of gas on plateau-like in 750 through 1450 steps							**Average Age =**	**46.45**	**±**	**0.07**
Oficina Regional San Luis Potosi										
PV-003	*trachyte porphyry*	***K-feldspar***	*J = 0.005197 ± 0.50%*		*wt = 5.7 mg*	*#129KD29*				
A	1050	4.6	0.3	3.71E-16	1.335	0.46	0.58	12.47	±	23.87
B	1075	3.9	0.6	3.12E-16	2.586	1.08	0.60	24.08	±	23.29
C	1100	3.6	1.9	2.89E-16	6.291	0.50	0.78	58.03	±	22.70
D	1150	3.7	4.8	2.98E-16	12.594	0.42	0.90	114.36	±	18.86
E	1200	3.6	0.2	2.89E-16	0.302	3.15	1.56	2.83	±	17.18
F	1250	7.2	2.2	5.77E-16	2.707	1.76	1.08	25.20	±	9.83
G	1350	8.3	5.0	6.65E-16	3.995	0.97	1.84	37.07	±	7.43
H	1450	13.5	6.5	1.08E-15	3.408	8.77	2.20	31.67	±	4.73
I	1650	51.5	14.1	4.13E-15	2.593	3.98	5.83	24.15	±	1.29
Total Gas								33.00		
84.1% of gas on plateau in 1200 through 1650 steps							**Plateau Age =**	**24.60**	**±**	**1.20**

Ages calculated assuming an initial $^{40}Ar/^{36}Ar = 295.5 \pm 0$.
All precision estimates are at the one sigma level of precision.
Ages of individual steps do not include error in the irradiation parameter J.
No error is calculated for the total gas age.

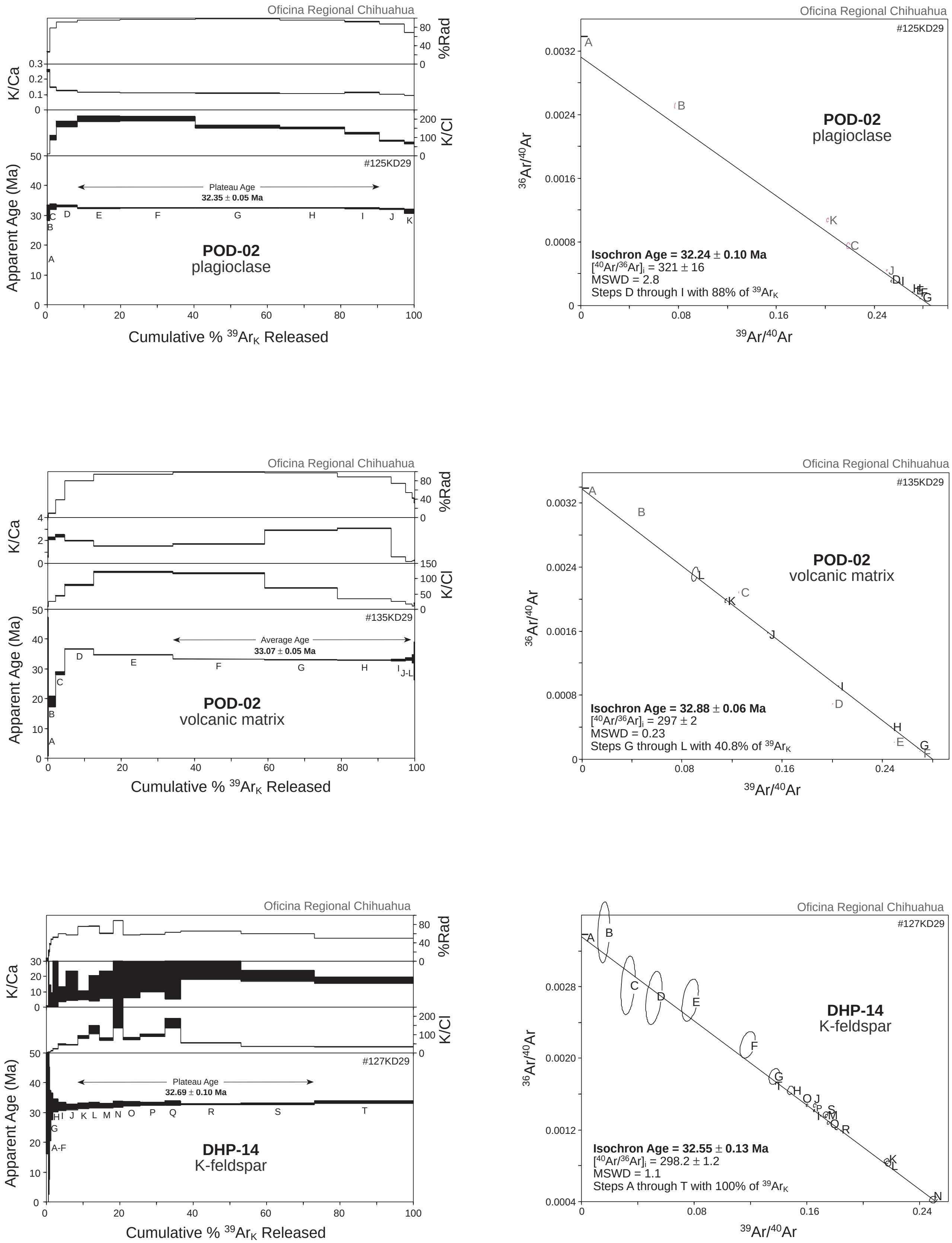


Figure 12. $^{40}Ar/^{39}Ar$ age spectra and inverse-isotope correlation diagrams for samples collected by CRM geologists from different areas in Mexico. These data were produced using the MAP 216 spectrometer at the USGS Thermochronology laboratory in Denver, Colorado.

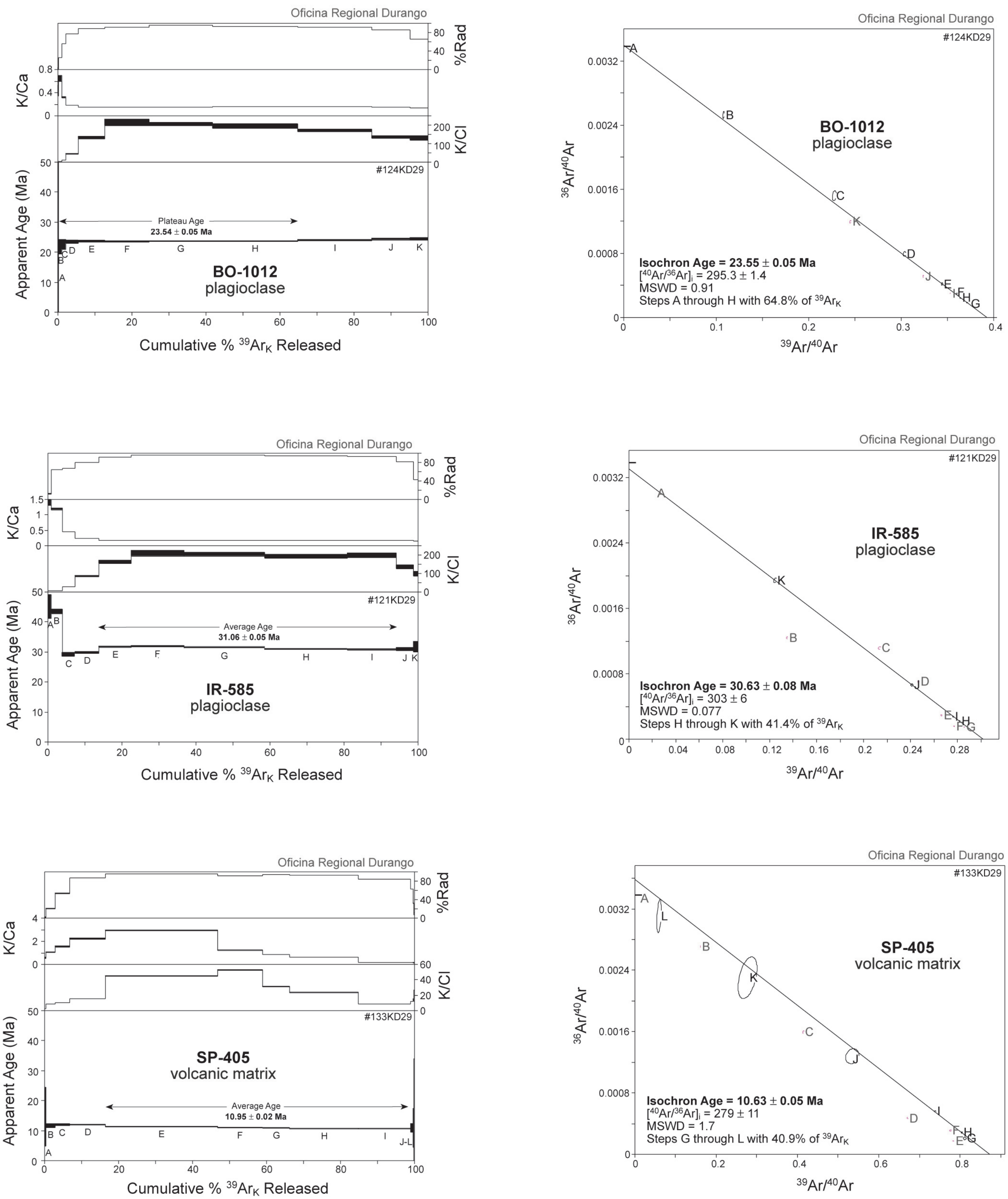


Figure 12. $^{40}Ar/^{39}Ar$ age spectra and inverse-isotope correlation diagrams for samples collected by CRM geologists from different areas in Mexico. These data were produced using the MAP 216 spectrometer at the USGS Thermochronology laboratory in Denver, Colorado.–Continued

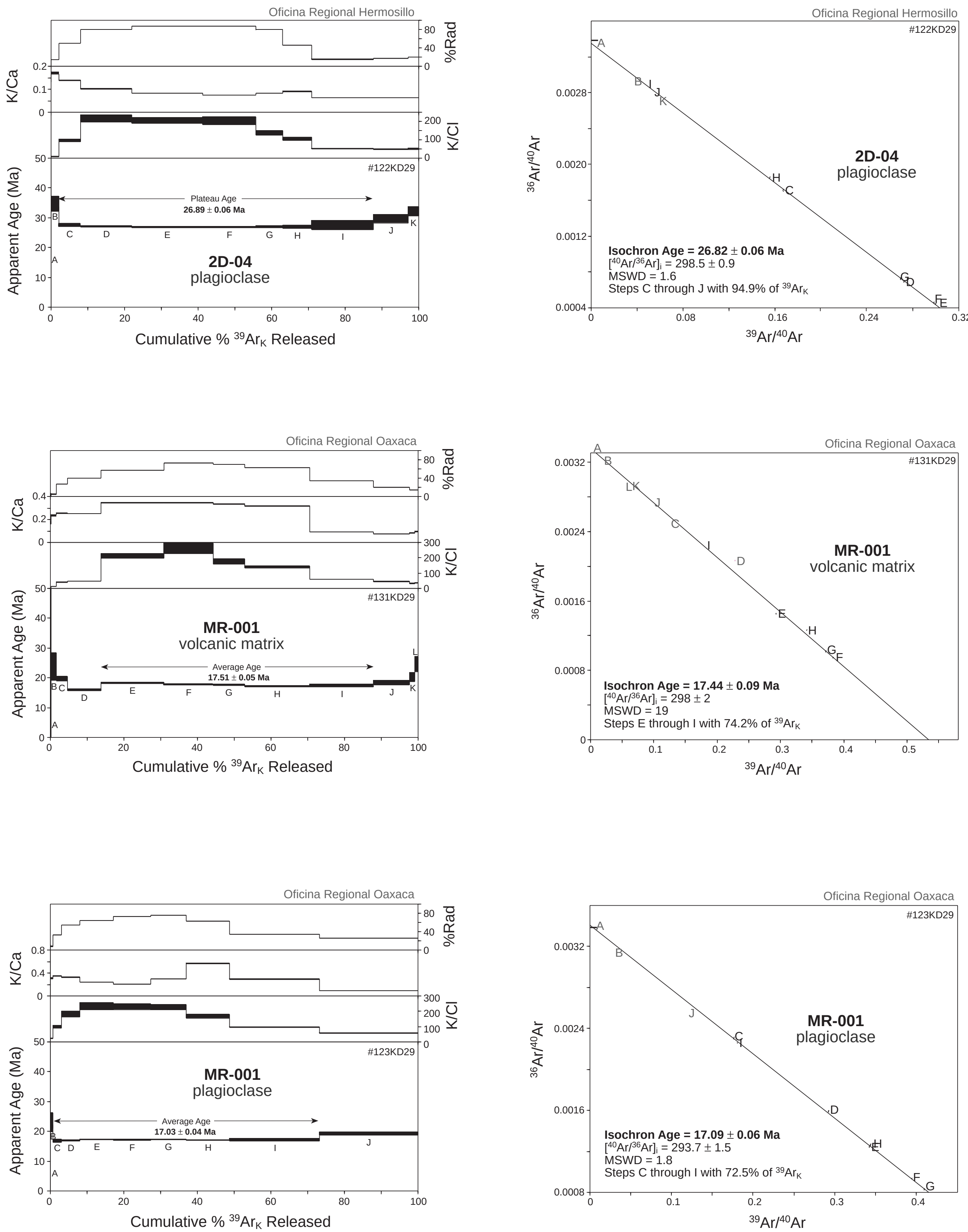


Figure 12. $^{40}Ar/^{39}Ar$ age spectra and inverse-isotope correlation diagrams for samples collected by CRM geologists from different areas in Mexico. These data were produced using the MAP 216 spectrometer at the USGS Thermochronology laboratory in Denver, Colorado.–Continued

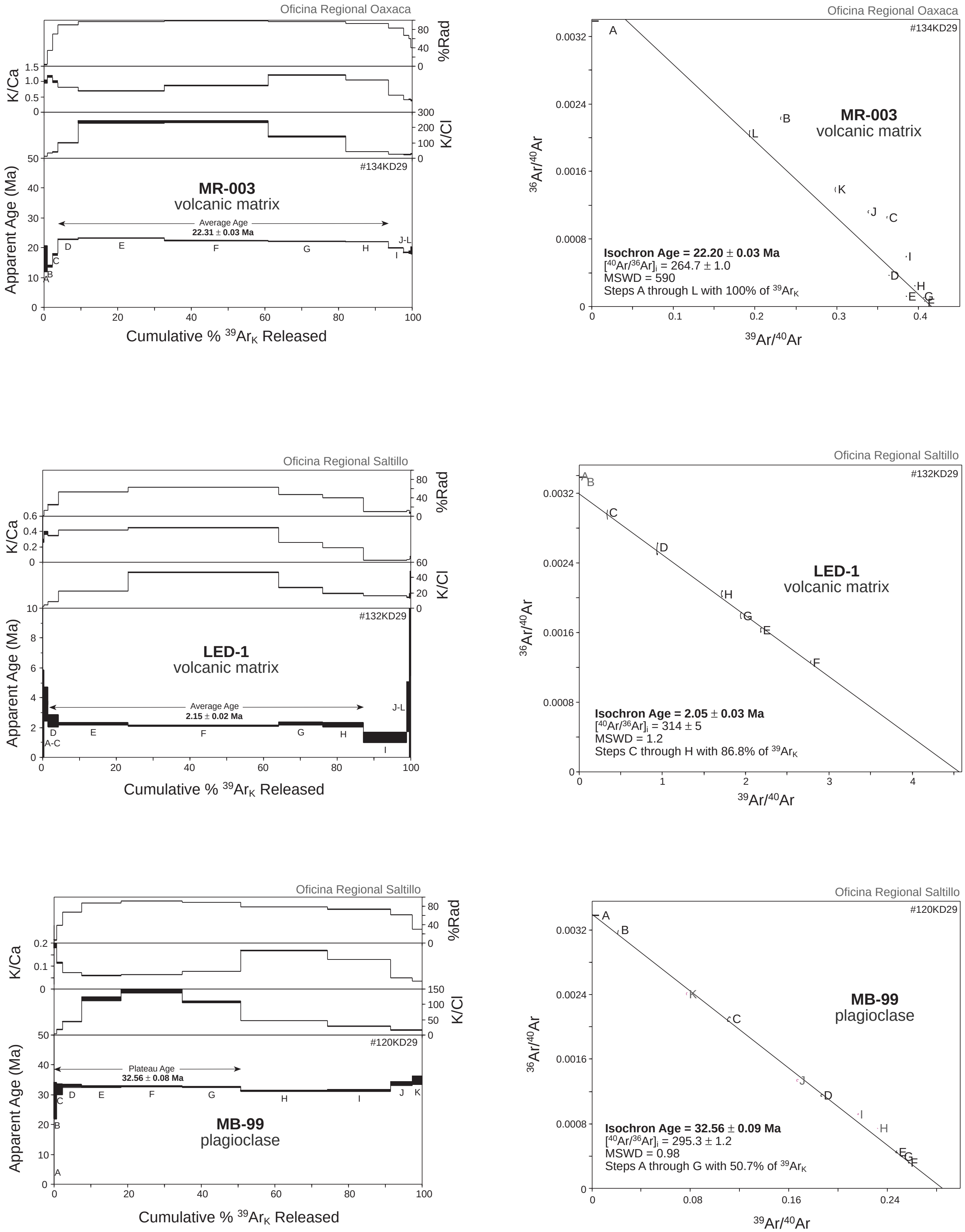


Figure 12. $^{40}Ar/^{39}Ar$ age spectra and inverse-isotope correlation diagrams for samples collected by CRM geologists from different areas in Mexico. These data were produced using the MAP 216 spectrometer at the USGS Thermochronology laboratory in Denver, Colorado.–Continued

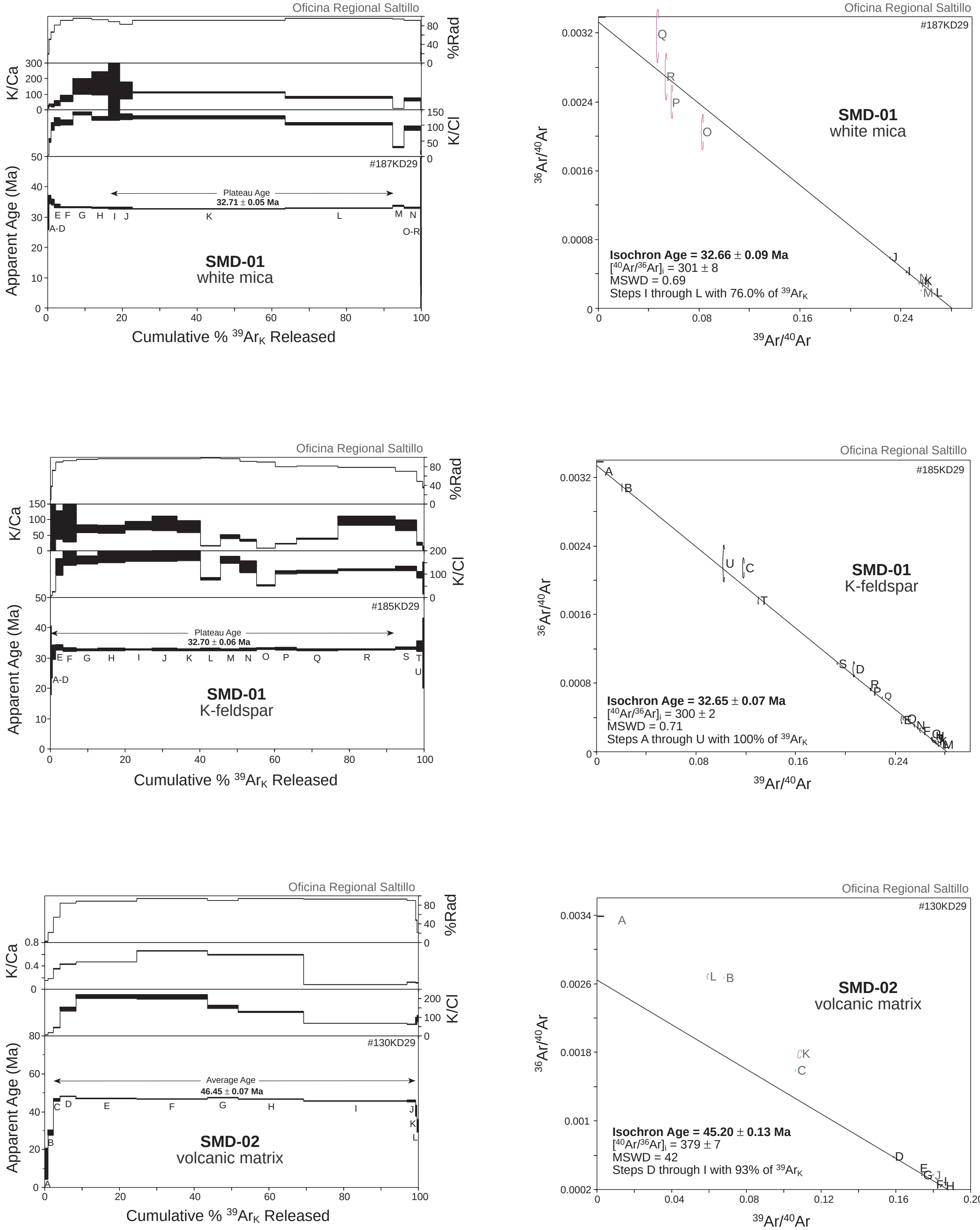


Figure 12. $^{40}Ar/^{39}Ar$ age spectra and inverse-isotope correlation diagrams for samples collected by CRM geologists from different areas in Mexico. These data were produced using the MAP 216 spectrometer at the USGS Thermochronology laboratory in Denver, Colorado.–Continued

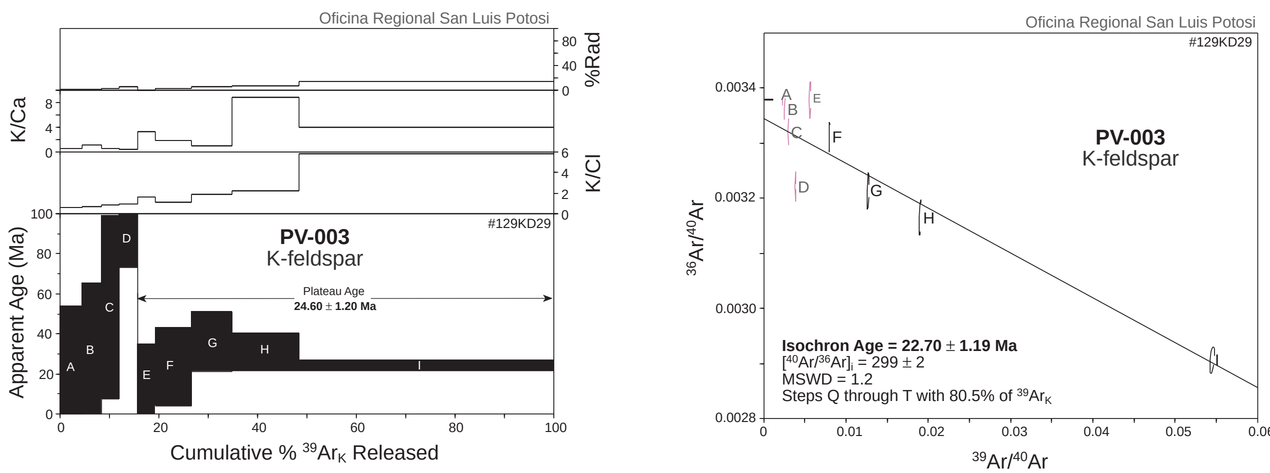


Figure 12. $^{40}Ar/^{39}Ar$ age spectra and inverse-isotope correlation diagrams for samples collected by CRM geologists from different areas in Mexico. These data were produced using the MAP 216 spectrometer at the USGS Thermochronology laboratory in Denver, Colorado.–Continued

Table 6. $^{40}Ar/^{39}Ar$ laser total fusion data of single-crystal sanidine obtained using the MAP 216 spectrometer.

Hole number	$^{39}Ar_k$ (Moles)	Radiogenic Yield (%)	$^{40}Ar^*/^{39}Ar_k$	K/Ca	K/Cl	Age (Ma)		Error (Ma)
Oficina Regional Chihuahua								
POD-01	*rhyolite*	***sanidine***	*J = 0.005117 ± 0.50%*	*#139KD29*				
11	1.48E-14	94.0	3.572	18.2	69	32.68	±	0.12
10	3.87E-14	99.3	3.577	8.2	186	32.72	±	0.06
1	6.67E-14	98.7	3.582	13.4	116	32.77	±	0.05
2	4.82E-14	98.3	3.584	20.4	57	32.78	±	0.06
8	3.03E-14	96.1	3.585	7.7	40	32.80	±	0.08
3	3.83E-14	98.8	3.585	16.4	93	32.80	±	0.06
4	3.17E-14	98.8	3.586	19.5	60	32.80	±	0.07
7	3.32E-14	99.3	3.588	6.2	110	32.83	±	0.07
5	2.59E-14	98.9	3.592	6.0	91	32.85	±	0.08
9	2.46E-14	95.7	3.594	6.0	60	32.87	±	0.09
6	3.19E-14	99.0	3.620	5.6	91	33.11	±	0.07
				Weighted Mean Age =		**32.82**	**±**	**0.04**
FDR-001	*rhyolite tuff*	***sanidine***	*J = 0.005078 ± 0.50%*	*#140KD29*				
11	1.42E-14	49.9	3.508	5.3	170	31.85	±	0.29
10	8.87E-15	67.8	3.522	4.6	172	31.99	±	0.25
12	2.33E-14	72.3	3.547	4.5	166	32.21	±	0.13
1	2.25E-14	79.8	3.551	20.6	200	32.24	±	0.12
13	1.12E-14	75.9	3.557	3.1	152	32.30	±	0.19
3	1.03E-14	69.1	3.576	7.2	207	32.47	±	0.22
9	1.76E-14	68.5	3.581	5.8	225	32.52	±	0.16
7	1.78E-14	84.6	3.592	7.3	168	32.61	±	0.13
6	*3.11E-14*	*77.1*	*3.606*	*6.9*	*197*	*32.74*	*±*	*0.11*
5	*1.25E-14*	*71.6*	*3.614*	*26.5*	*230*	*32.81*	*±*	*0.17*
2	*3.18E-14*	*84.1*	*3.616*	*16.1*	*196*	*32.83*	*±*	*0.10*
8	*1.48E-14*	*49.5*	*3.626*	*79.4*	*158*	*32.91*	*±*	*0.27*
4	*8.65E-15*	*80.0*	*3.650*	*3.4*	*200*	*33.13*	*±*	*0.24*
				Weighted Mean Age =		**32.34**	**±**	**0.07**
FVDA-01	*dacite*	***sanidine***	*J = 0.005119 ± 0.50%*	*#142KD29*				
9	2.82E-14	97.4	3.636	6.7	154	33.19	±	0.06
4	2.70E-14	97.1	3.634	15.3	76	33.26	±	0.07
8	2.69E-14	96.8	3.558	3.6	155	33.28	±	0.08
10	4.39E-14	98.9	3.627	12.6	195	33.31	±	0.06
3	3.29E-14	97.9	3.641	6.9	102	33.32	±	0.07
2	3.73E-14	95.9	3.644	7.6	109	33.34	±	0.07
12	3.77E-14	98.3	3.641	8.6	126	33.35	±	0.06
5	3.49E-14	97.6	3.648	10.0	151	33.38	±	0.06
6	2.48E-14	98.7	3.650	10.9	107	33.40	±	0.08
1	4.57E-14	89.0	3.652	8.9	75	33.41	±	0.08
				Weighted Mean Age =		**33.32**	**±**	**0.05**
FVDA-02	*rhyolite tuff*	***sanidine***	*J = 0.005204 ± 0.50%*	*#136KD29*				
2	*3.07E-14*	*81.4*	*3.450*	*8.3*	*28*	*32.11*	*±*	*0.11*
4	2.59E-14	88.6	3.511	3.5	83	32.67	±	0.09
3	2.55E-14	96.0	3.513	9.7	143	32.69	±	0.09
7	4.20E-14	87.3	3.517	5.8	87	32.72	±	0.08
1	3.17E-14	90.5	3.519	7.2	78	32.74	±	0.09
8	3.35E-14	93.5	3.527	11.5	38	32.81	±	0.08
6	4.89E-14	86.6	3.533	5.5	123	32.87	±	0.08
9	1.72E-14	80.0	3.550	4.3	74	33.03	±	0.15
5	*2.54E-14*	*78.0*	*3.554*	*3.6*	*96*	*33.06*	*±*	*0.12*
11	*3.60E-14*	*93.5*	*3.555*	*5.0*	*121*	*33.07*	*±*	*0.07*
10	*2.61E-14*	*91.8*	*3.630*	*5.0*	*107*	*33.76*	*±*	*0.10*

Table 6. $^{40}Ar/^{39}Ar$ laser total fusion data of single-crystal sanidine obtained using the MAP 216 spectrometer.–Continued

Hole number	$^{39}Ar_k$ (Moles)	Radiogenic Yield (%)	$^{40}Ar^*/^{39}Ar_k$	K/Ca	K/Cl	Age (Ma)	Error (Ma)
FVDA-02 (cont.) *rhyolite tuff* ***sanidine*** *J = 0.005204 ± 0.50% #136KD29*							
13	*3.28E-14*	*84.6*	*3.658*	*11.5*	*118*	*34.02*	*± 0.10*
12	*2.88E-14*	*91.6*	*3.663*	*10.5*	*117*	*34.06*	*± 0.09*
				Weighted Mean Age =		**32.77**	**± 0.05**
AMDT-01 *rhyolite* ***sanidine*** *J = 0.005204 ± 0.50% #138KD29*							
5	3.07E-14	97.1	4.039	7.7	193	37.52	± 0.08
1	2.78E-14	96.9	4.042	5.2	174	37.56	± 0.08
6	2.14E-14	95.9	4.047	8.4	201	37.60	± 0.10
13	1.22E-14	95.7	4.048	4.9	185	37.61	± 0.14
8	2.10E-14	98.5	4.049	552.5	198	37.62	± 0.09
9	1.15E-14	99.1	4.053	37.9	177	37.65	± 0.14
7	1.99E-14	96.0	4.054	9.2	190	37.66	± 0.10
3	3.88E-14	97.6	4.054	6.3	170	37.67	± 0.07
12	1.28E-14	99.1	4.054	2.7	242	37.67	± 0.15
2	2.38E-14	93.5	4.057	15.5	181	37.69	± 0.09
10	1.64E-14	98.3	4.058	78.7	162	37.70	± 0.12
4	3.36E-14	98.5	4.059	4.4	163	37.71	± 0.07
11	1.72E-14	97.5	4.061	10.5	164	37.73	± 0.12
				Weighted Mean Age =		**37.64**	**± 0.05**
Oficina Regional Culiacan							
YE-27 *rhyolite* ***sanidine*** *J = 0.005086 ± 0.50% #141KD29*							
6	*3.26E-16*	*15.7*	*1.768195*	*2.0*	*5.7*	*16.15*	*± 5.03*
5	1.88E-16	36.4	3.3956789	0.3	8.6	30.89	± 8.62
1	1.82E-15	58.8	3.4854468	3.5	25.8	31.70	± 0.93
8	1.03E-15	20.5	3.5621535	0.2	2.0	32.39	± 2.10
3	1.65E-15	82.9	3.6625415	6.8	7.5	33.30	± 0.96
2	8.69E-16	33.9	3.6783932	0.8	4.9	33.44	± 2.04
11	1.17E-15	42.8	3.7382216	1.6	5.1	33.98	± 1.69
7	2.00E-15	85.0	3.8667884	1.5	31.5	35.13	± 0.86
10	7.57E-16	39.4	4.1508013	0.2	4.4	37.69	± 2.53
9	*9.46E-16*	*32.9*	*4.7609672*	*0.6*	*4.5*	*43.16*	*± 2.07*
4	*8.20E-17*	*55.4*	*5.7476304*	*0.1*	*2.0*	*51.98*	*± 19.31*
				Weighted Mean Age =		**33.60**	**± 0.50**
Oficina Regional Hermosillo							
FA-4 *rhyolite tuff* ***sanidine*** *J = 0.005204 ± 0.50% #137KD29*							
9	*4.87E-14*	*78.1*	*2.594*	*15.9*	*191*	*24.19*	*± 0.08*
12	3.33E-14	97.2	2.622	5.9	203	24.45	± 0.06
11	2.71E-14	88.5	2.630	5.9	179	24.52	± 0.09
1	5.26E-14	91.9	2.635	3.9	182	24.57	± 0.06
13	1.58E-14	97.2	2.638	4.2	198	24.60	± 0.10
10	*1.62E-14*	*96.5*	*2.679*	*5.5*	*126*	*24.97*	*± 0.11*
7	*4.39E-14*	*92.7*	*2.763*	*8.3*	*156*	*25.76*	*± 0.06*
8	*6.39E-14*	*96.0*	*2.791*	*10.8*	*172*	*26.01*	*± 0.05*
4	*2.88E-14*	*84.2*	*2.869*	*4.1*	*180*	*26.73*	*± 0.10*
6	*1.16E-14*	*91.8*	*3.192*	*25.1*	*165*	*29.72*	*± 0.16*
5	*1.24E-14*	*94.9*	*3.318*	*1.9*	*150*	*30.88*	*± 0.15*
3	*1.67E-14*	*91.5*	*3.486*	*2.7*	*174*	*32.43*	*± 0.12*
2	*1.76E-14*	*69.0*	*3.843*	*1.0*	*184*	*35.72*	*± 0.19*
				Weighted Mean Age =		**24.53**	**± 0.05**

Analyses in gray italics are not used to calculate the weighted mean age

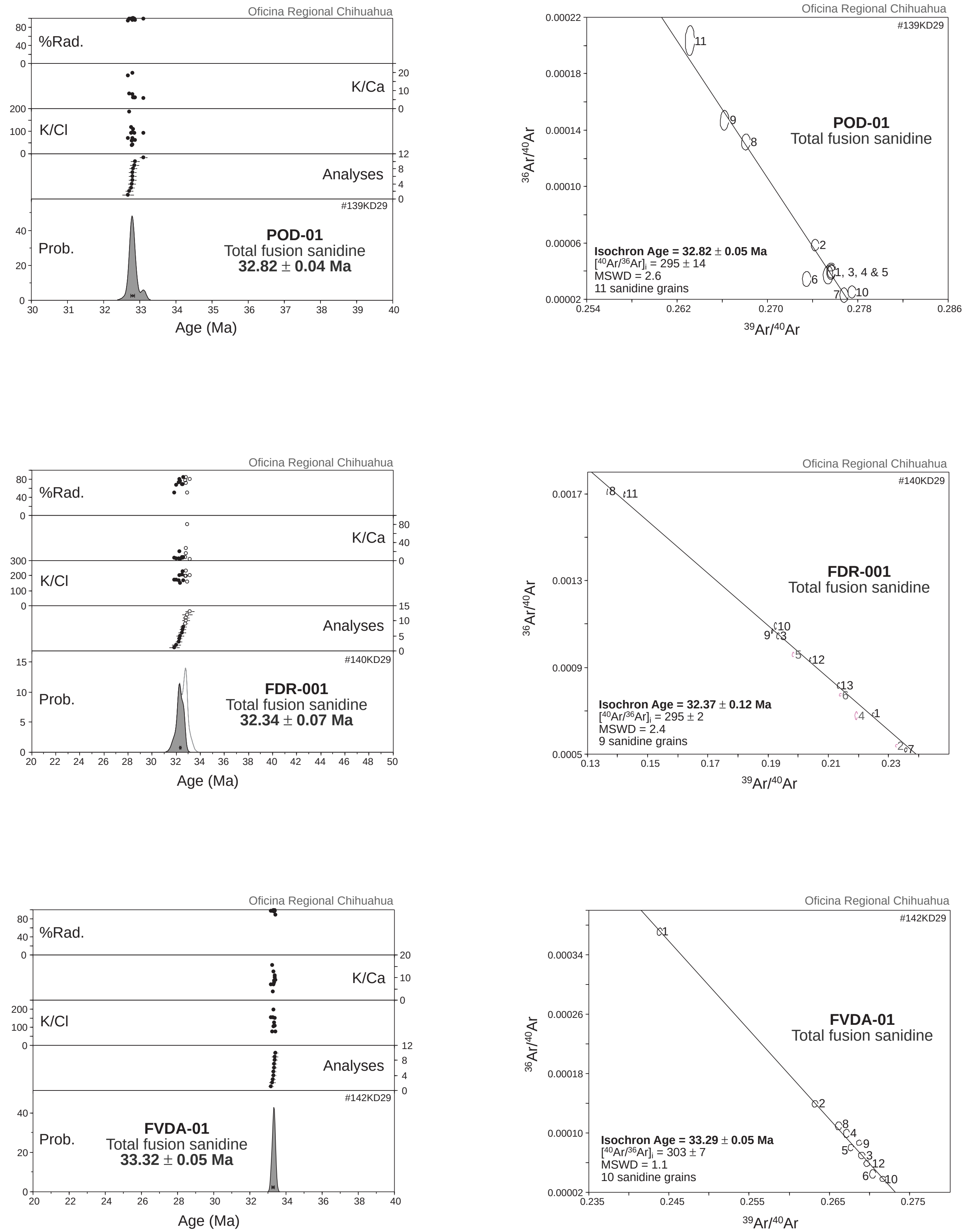


Figure 13. $^{40}Ar/^{39}Ar$ probability diagrams (ideograms) and inverse-isotope correlation diagrams for samples collected by CRM geologists from different areas in Mexico. These data were produced using the MAP 216 spectrometer (laser technique) at the USGS Thermochronology lab in Denver.

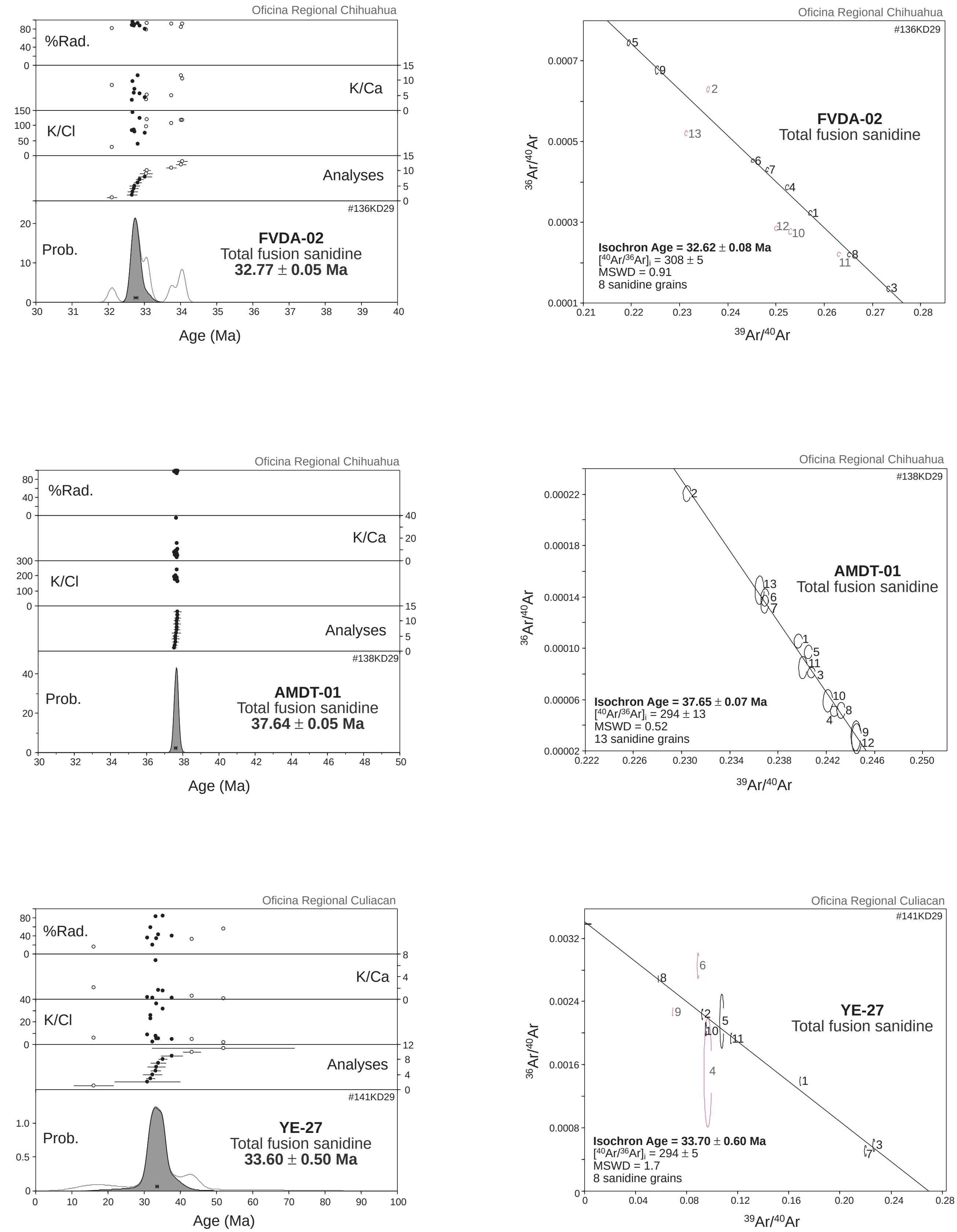
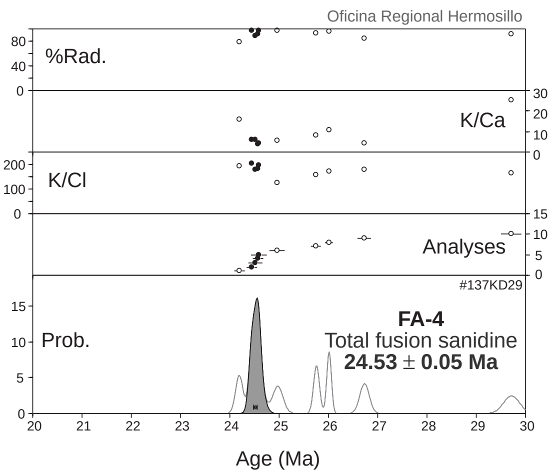


Figure 13. $^{40}Ar/^{39}Ar$ probability diagrams (ideograms) and inverse-isotope correlation diagrams for samples collected by CRM geologists from different areas in Mexico. These data were produced using the MAP 216 spectrometer (laser technique) at the USGS Thermochronology lab in Denver.–Continued



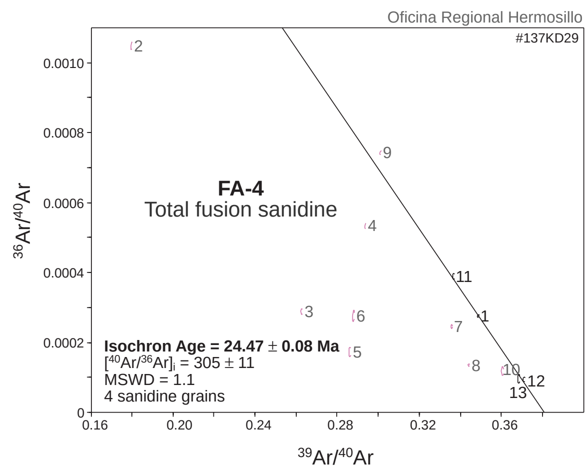


Figure 13. $^{40}Ar/^{39}Ar$ probability diagrams (ideograms) and inverse-isotope correlation diagrams for samples collected by CRM geologists from different areas in Mexico. These data were produced using the MAP 216 spectrometer (laser technique) at the USGS Thermochronology lab in Denver.–Continued