**SUPPLEMENTARY FILE 1**

# ANALYTICAL PROCEDURES

For the paper / *del artículo*

## Magmatic evolution of the La Huerta Plutonic Complex, Jalisco: A 80–70 Ma record of arc magmatism along the Mexican Cordillera

by / *por*

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**ANALYTICAL PROCEDURES**

**Microprobe Analyses**

Detailed petrographic descriptions of 35 samples were performed under transmitted polarized light in polished thin sections. Mineral compositions of representative samples were analyzed in thin sections, prior carbon coated, with a JEOL JXA-8900R Superprobe at the Laboratorio Universitario de Petrología (LUP), Instituto de Geofísica (IG), Universidad Nacional Autónoma de México (UNAM). Operating conditions were an accelerating voltage of 15 kV, a beam current of 10–12 Na, and a beam diameter of 2–10 μm. The concentrations were acquired by applying on-peak counting times of 30 s, and an off-peak counting time of 5–30 s. Mineral compositions of La Huerta leucogabbros were obtained from Panseri (2007).

**Major and Trace Element Analyses**

Major elements whole-rock compositions were acquired by XRF analyses with a Rigaku ZSX Primus II spectrometer at the Laboratorio Nacional de Geoquímica y Mineralogía (LANGEM), Instituto de Geología (IGeol), UNAM, according to Lozano-Santa Cruz and Bernal (2005). Whole-rock trace elements concentrations were determined by ICP-MS at the Laboratorio de Estudios Isotópicos (LEI), Centro de Geociencias (CGEO), UNAM, following the procedures described by Mori *et al.* (2009). Some samples were commercially analyzed by Activation Laboratories, Ancaster, Canada.

**Rb-Sr and Sm-Nd Isotopic Analyses**

Rb-Sr and Sm-Nd isotopes of whole-rock and mineral samples were obtained by Thermal Ionization Mass Spectrometry (TIMS) at Laboratorio Universitario de Geoquímica Isotópica (LUGIS), Instituto de Geofísica, UNAM. Sr and Nd analyses were performed with a Thermo Scientific TRITON PLUS nine-collector TIMS, whereas Rb and Sm were obtained with a Finnigan MAT 262 eight-collector TIMS. Both measurements were performed in static mode. Samples of Rb, Sr, Sm, Nd were loaded as chlorides on rhenium filaments and were measured as metallic ions. Each measurement run consists of 30 isotopic ratios for Rb and Sm, and 60 and 70 isotopic ratios for Sr and Nd, respectively. Sr and Nd isotopic ratios were corrected for mass fractionation via normalization to $^{87}Sr/^{88}Sr=0.1194$ and $^{146}Nd/^{144}Nd=0.7219$, respectively. Standards measured in LUGIS were NBS 987 (Sr): $^{87}Sr/^{86}Sr=0.710250\pm12$ ($\pm1\sigma_{abs}$, n=60); La Jolla (Nd): $^{143}Nd/^{144}Nd=0.511846 \pm 3$ ($\pm1\sigma_{abs}$, n=13). The relative uncertainty for $^{87}Rb/^{86}Sr$ is ±2 % and for $^{147}Sm/^{144}Nd$ is ±1.5 %, and the relative reproducibility (1σ) for Rb, Sr, Sm, Nd concentrations via isotope dilutions is ±4.5 %, ±1.8 %, ±3.2 %, and ±2.7 %, respectively. Nd model ages were calculated with the parameters of Depleted Mantle from Schaaf *et al.* (1994): $^{147}Sm/^{144}Nd = 0.2128$ and $^{143}Nd/^{144}Nd = 0.513089$.

**U-Pb Geochronology**

The U-Pb data of zircon and titanite, as well as the trace element concentrations in zircons, were acquired by LA-ICP-MS at the Laboratorio de Estudios Isotópicos (LEI), Centro de Geociencias, UNAM, with a Resonetics M-50 excimer laser ablation system coupled to a Thermo iCapQc ICP-MS (Solari *et al.*, 2010). The data reduction, as well as the ages, and errors were performed according to Petrus and Kamber (2012). Analyzed spots were ~23 and 20 micrometers in zircons and titanites, respectively. Zircon and titanite crystals were separated by crushing, sieving, magnetic, and handpicking sequence techniques (Díaz-Rocha, 2019). Based on cathodoluminescence images, a textural/morphological analysis was performed in zircons, to select the best areas to be ablated. Cathodoluminescence imaging was acquired with a JEOL IT300SEM coupled with a Gatan ChromaCL2 system at the Laboratorio de Microscopía Electrónica y Microanálisis, Universidad Autónoma de Guerrero. The images were acquired with an accelerated voltage of 12 kV and an acquisition time of 1800–2200 μs. IsoplotR (Vermeesch, 2018) was used to calculate concordia diagrams and mean ages, the best age was calculated according to the parameters and recommendations of Gehrels *et al.* (2008) and Spencer *et al.* (2016). In the case of U-Pb titanite dating, the best age was calculated after common lead correction, according to Storey *et al.* (2006).

**$^{40}$Ar-$^{39}$Ar Dating Methodology**

Pyroxene crystals in the size fraction 595–841 μm were cleaned by leaching in $HNO_3$ 1N (30 min), followed by repeatedly rinsing with 18 MΩ water (30 min) in an ultrasonic bath, and a final rinse with high purity acetone.

Sample was irradiated at position 8C of the U-enriched research reactor of McMaster University in Hamilton, Ontario, Canada. The Fish Canyon Tuff sanidine standard FCT-2 (28.198 ± 0.044 Ma; Kuiper *et al.*, 2008) was co-irradiated as neutron fluence monitor. During irradiation, samples and monitors were covered with a Cd liner to block thermal neutrons. Analysis were carried out at Laboratorio Interinstitucional de Geocronología de Argón (LIGAr), Centro de Geociencias, UNAM-Campus Juriquilla, Mexico, with an IsotopX NGX multicollector noble gas mass spectrometer, using a 55 W Teledyne-CETAC Fusions 10.6 $CO_2$ laser for gas extraction, and an automated gas clean-up line with one cold finger and two SAES GP-50 getters. Ion beams were measured on an ion counter (m/z 36), and four Faraday collectors with 1012 Ω amplifiers (m/z 37 to 40). Repeated air measurements interspersed with sample unknowns were used to correct for mass discrimination and atmospheric Ar contamination, using an atmospheric $^{40}Ar/^{36}Ar$ ratio of 295.5. System blanks were measured before each air measurement and every two sample measurements. For data reduction, the software NGX-Red 1.0® and AgeCalc 1.0® developed at CICESE (Mexico) were used. Upon blank subtraction, the argon isotopic data were corrected for mass discrimination, and for calcium, potassium, and chlorine neutron-induced interference reactions. The parameters used to correct for neutron-induced interference reactions were: $(^{39}Ar/^{37}Ar)Ca = 6.50\times10^{-4}$; $(^{36}Ar/^{37}Ar)Ca = 2.55\times10^{-4}$; $(^{40}Ar/^{39}Ar)K = 0$. Mass 36 was also corrected for chlorine-derived $^{36}Ar$ ($^{35}Cl$ (n, γ) $^{36}Cl \rightarrow {}^{36}Ar + \beta$ with t½ = 3. 01×105 a). Isotopes $^{37}Ar$ and $^{39}Ar$ were corrected for radioactive decay. The decay constants recommended by (Steiger and Jäger, 1977) were used in all the calculations, and straight-line calculations were performed with the equations presented in (York *et al.*, 2004). Integrated ages were calculated by adding all fractions of the step-heating experiments. Correlation ages (tc) were calculated using the x-axis intercept value of $^{39}Ar/^{40}Ar$ *versus* $^{36}Ar/^{40}Ar$ inverse isochron diagrams. A plateau age (tp) is defined as the weighted mean of at least three consecutive fractions that agree within 2σ and represent 50 % or more of the $^{released}$ $^{39}Ar$. When the trapped initial $^{40}Ar/^{39}Ar$ value obtained from the y-axis inverse isochron intercept was not within 2σ uncertainty of the atmospheric value, the heating steps and plateau ages were recalculated using the $(^{40}Ar/^{39}Ar)i$ value obtained from the isochron. Age errors are reported at 1σ level and include the uncertainty in the J parameter. Errors of weighted means and regressions whose MSWD values are larger than the 0.05 probability cut-off value (Wendt and Carl, 1991), were expanded by multiplying the 1σ errors by the square root of the MSWD. Age errors are also given as 95 % confidence intervals (Supplementary File 4), calculated by multiplying the 1σ errors by the appropriate Student's t value.

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