

SUPPLEMENTARY FILE 1

to the paper

New age constraints on magmatism and metamorphism of the
Western Sonobari Complex and their implications for an
earliest Late Cretaceous orogeny on northwestern Mexico

by

**Alicia Sarmiento-Villagrana, Ricardo Vega-Granillo,
Oscar Talavera-Mendoza, and Jesús Roberto Vidal-Solano**

published in

Revista Mexicana de Ciencias Geológicas, 2016, 33(2), p. 170-182.

SI. METHODS

Sampling and analytical methods

Sixteen of the most representative samples of orthogneisses and plutonic rocks of the Western Sonobari Complex were collected for U-Pb geochronology. The samples were collected during several field sessions between 2012 and 2014.

Zircon separation

For zircon separation about five and six kilograms of fresh rock shards of each sample were collected. Some samples were prepared at the University of Arizona and several in the Universidad Autónoma de Guerrero laboratories. The procedures for zircon separation are described in Gehrels et al. (2006, 2008, 2009); they consisted of the following steps: First, the sample was reduced down to gravel size with a jaw crusher. Subsequently, the samples were reduced down to sand size (~0.063 – 2 mm) with a roller mill machine. Then, the heaviest minerals were separated from the lighter ones in a Wilfley table. The magnetic minerals were separated using a Frantz LB1 magnetic separator. The non-magnetic fraction was processed through Heavy Liquid Separation (using Methylene Iodide technique) in order to obtain just the zircons. The zircons were mounted in a 1-inch-diameter epoxy plug together with Sri Lanka, and R33 standard zircon and the surface was polished to expose the interior portions of most grains. Low resolution CL (cathodoluminescence) images were acquired from all dated samples in a Hitachi 3400N SEM. The CL images were used to characterize chemical zoning and identify core-rim relationship and inherited zircons. Forty to eighty zircons from each sample were analyzed.

Data acquisition and reduction

The U-Pb analyses were performed at the Arizona LaserChron Center of the University of Arizona. The analyses involved ablation of zircons with a Photon Machines Analyte G2 excimer laser using a spot diameter of 30 microns. In sample SFO-20 a spot diameter of 15 microns was used for the analysis of recrystallized zircon rims. The ablated material was carried with helium gas into the plasma source of a Nu HR MC-ICPMS, which is equipped with a flight tube of sufficient width that U, Th, and Pb isotopes are measured simultaneously. All measurements were made in static mode, using a Faraday detectors.

Data reduction took place off-line using a raw count data imported into an Excel spreadsheet. Data were corrected for downhole laser fractionation, elemental fractionation, and common Pb correction (see Thompson et al., 2012 for more detailed explanation). Fractionation of U, Th and Pb was corrected by comparing the standards (SL and R33) that were analyzed between every five unknown zircons. The uncertainty of the weighted mean was approximately 1% (2-sigma). Final data reduction and calculation of weighted mean ages, concordia ages and tuff-zirc ages, was done using Isoplot (Ludwig, 2003).

REFERENCES

- Gehrels, G., Valencia, V., Pullen, A., 2006, Detrital Zircon Geochronology by Laser Ablation Multicollector ICPMS at the Arizona LaserChron Center, in Olszewski, T., ed., *Geochronology: Emerging Opportunities: Paleontology Society Papers*, Volume 12, p. 67-76
- Gehrels, G.E., Valencia, V., Ruiz, J., 2008, Enhanced precision, accuracy, efficiency, and spatial resolution of U-Pb ages by laser ablation-multicollector-inductively coupled plasma-mass spectrometry: *Geochemistry, Geophysics, Geosystems*, v. 9, Q03017, doi:10.1029/2007GC001805.
- Gehrels, G., Rusmore, M., Woodsworth, G., Crawford, M., Andronicos, C., Hollister, L., Patchett, J., Ducea, M., Butler, R. Klepeis, K. Davidson, C., Mahoney, B., Friedman, R., Haggart, J., Crawford, W., Pearson, D., Girardi, J., 2009, U-Th-Pb geochronology of the Coast Mountains Batholith in north-coastal British Columbia: constraints on age, petrogenesis, and tectonic evolution: *GSA Bulletin*, v. 121, no. 9/10, p. 1341-1361.
- Ludwig, K., 2003, *Isoplot 3.00*. Special Publication 4, 70 pp., Berkeley Geochronology Center, Berkeley, Calif.
- Thompson, S.N., Gehrels, G.E., Ruiz, J., Buchwaldt, R., 2012, Routine low-damage apatite U-pb dating using laser ablation-multicollector-ICPMS: *Geochemistry, Geophysics, Geosystems*, 13(2), doi 10.1029/2011GC003928.