**Title**: Origin of the internal basement massif of the Guatemala Suture Zone: evidence from U-Pb geochronology and Sm-Nd and Lu-Hf isotope systematics

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**Analytical procedures**

**U-Pb isotope and chemical analysis of zircon**

Zircon separation was performed at the Centro de Geociencias, UNAM, Mexico, using standard methods based on density and magnetic properties. Zircon grains were mounted in epoxy resin and polished to approximately half of the smallest crystal thickness. Cathodoluminescence (CL) images of the zircon mounts were acquired with a JEOL IT300 scanning electron microscope (SEM) equipped with a Gatan ChromaCL2 system at the Laboratorio de Microscopía Electrónica, Universidad Autónoma de Guerrero, Mexico.

U-Pb zircon analyses were conducted by laser ablation inductively-coupled plasma mass spectrometry (LA-ICPMS) at the Laboratorio de Estudios Isotópicos (LEI) of the Centro de Geociencias, UNAM, using a Thermo ICap Qc quadrupole ICPMS, coupled with a Resonetics M050 193 nm excimer laser workstation. A “squid” signal homogenizer was employed right after the ablation cell, before the ablated material entered the plasma. 350 ml of He was used as a carrier gas, mixed downstream with 4.5 ml of N2. A frequency of 5 Hz was utilized during this work, with a constant on-target fluence of 6 J/cm2, monitored at the beginning and end of each analytical session with an external energy monitor and systematically employing, throughout the entire duration of this study, an analytical spot of 23 μm. Reference zircon 91500 (ca. 1062 Ma) (Wiedenbeck et al., 1995) was employed as external reference material, whereas Plešovice zircon was used as a monitor standard (ca. 337 Ma) (Sláma et al., 2008). Initial Pb correction was not performed, because the 204Pb signal is swamped by the isobaric interference of 204Hg present in the ICP carrier gas. However, the potential contribution of common Pb was evaluated using the 207Pb/206Pb ratios, carefully graphing all the analyses on the Tera-Wasserburg diagram. Raw data were reduced offline using Iolite 4 software (Paton et al., 2011), including all the error calculations and propagation, and employing the VizualAge data reduction scheme of Petrus and Kamber (2012). The secondary Plešovice standard zircon yielded a mean 206Pb/238U age of 338.2 ± 1.7 Ma, in agreement with its accepted age. All the data were plotted employing the free software IsoplotR (Vermeesch, 2018).

For trace element concentration determination, NIST 610 glass was employed as the external calibration standard (Pearce et al., 1997), and the stoichiometric abundance of SiO2 in zircon (32.86 wt.%) as an internal standard. The accuracy of each set of compositional measurements was checked using the 91500-zircon standard. During the analytical run, trace element standards bracketed ten unknown analyses. Data reduction and processing were done using the Iolite 4 software. All standard analytical measurements are within two standard deviations of accepted values.

**Whole rock Sm-Nd and Lu-Hf isotope analysis**

Sample processing for Sm-Nd and Lu-Hf isotope analysis were performed in PicoTrace cleanlab facilities at Departamento de Geología, CICESE, Mexico, following procedures based on Sprung et al. (2010) and González-Guzmán et al. (2016). An amount between 80 and 150 mg of whole-rock powder was weighed into a digestion vessel and spiked with mixed 149Sm-145Nd and 176Lu-180Hf tracers. After dissolution with a HF-HNO3-HClO4 (4:2:1) mixture in a Parr acid digestion vessel, evaporation, and sample-spike equilibration, the sample was loaded with 3 N HCl on Teflon columns filled with 2 mL of Eichrom Ln-Spec resin in order to elude sequentially matrix Light Rare Earth Elements (LREE; for further separation of Sm-Nd), Heavy Rare Earth Elements (HREE), Ti, and Zr before Hf collection. A second cleanup was performed for both the HREE- and the Hf-cuts to improve Lu/Yb on the HREE-cut, and to eliminate the Lu-tail on the Hf-cut. Separation of Sm and Nd was performed following procedures of Weber et al. (2012), using quartz-glass columns filled with DOWEX AG 50W-X8 resin to separate REE and then Ln-Spec resin to collect Sm-Nd.

Samarium and neodymium isotopes were measured on a Finnigan MAT 262 and a Thermo Triton Plus TIMS, respectively, installed at Laboratorio Universitario de Geoquímica Isotópica (LUGIS), UNAM. Measurements of Lu and Hf isotope ratios were carried out on a Thermo Neptune Plus multi collector ICP-MS at LEI, UNAM. Isotope dilution analyses, corrections, and data reduction were achieved according to methods described in Weber et al. (2018). During analytical sessions, the La Jolla Nd standard yielded a mean 143Nd/144Nd value of 0.511845 ± 0.000001 (1σ) (n = 3) and the JMC-475 Hf standard gave a mean 176Hf/177Hf value of 0.282149 ± 0.000006 (n = 23). Values of 143Nd/144Nd and 176Hf/177Hf were normalized to the well-accepted 143Nd/144Nd = 0.511860 for the La Jolla standard and to the JMC-475 reference value of 0.282160 for 176Hf/177Hf, respectively. Total uncertainties are estimated around 0.003% for both 143Nd/144Nd and 176Hf/177Hf, 0.5% for parent/daughter ratios, and 2% for element concentrations.

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