REVEALING CONTRASTING CHANGES IN THE PROVENANCE OF THE NEOPROTEROZOIC SEDIMENTARY COVER OF THE RÍO DE LA PLATA CRATON, ARGENTINA

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The mineralogical and geochemical variations recorded between Sierras Bayas and La Providencia groups (SBG and LPG) are inquired in this work to identified probable source rocks. The Barker Surface, a regional karstic surface related to the Gaskiers event, separates the two groups.

Siliciclastic detrital components of LPG were described in field outcrops and subsurface to be compared with previous data of SBG (cf. Zimmermann et al., 2011). Mineralogy was determined by petrography, X-ray diffraction (XRD) and Scanning electron microscopy (SEM-EDS). Samples for geochemical analysis were selected avoiding alterations and analyzed with X-ray fluorescence and Mass Spectrometer with Inductively Coupled Plasma.

Detrital components of SBG (conglomerates, sandstones and shales) mainly comprises poly- and monocrystalline quartz (metamorphic), altered alkali feldspars, micas (muscovite) and clay minerals (illite). Detrital components of LPG (shales and siltstones) are monocrystalline quartz (volcanic), unaltered feldspars (scarce to moderate), micas (muscovite and biotite), clay minerals (illite, chlorite and interlayered chlorite/smectite = CS), and very scarce volcanic lithoclasts.

Major element geochemistry of SBG show texturally controlled variations; on the contrary, fine grained samples of LPG have similar concentrations in all samples. CIA values of LPG vary between 74 and 77, and ICV is 0.87 on average. TiO_2 is ~0.3% in SBG and ~ 0.80% in LPG. Zr is ~ 250 ppm and ~140 ppm on average, respectively, and Ti/Zr ratios are < 20 in SBG and > 40 in LPG. SBG geochemistry revealed a variable degree of alteration, high maturity and moderate to high recycling of components. CIA and ICV of LPG are comparable to PAAS and indicate moderate alteration and immature rocks, respectively.

Normalized to chondrites REE patterns of LPG show marked negative Eu anomalies, high LREE/HREE ratios, and flat HREE pattern. Conversely, the SBG display slightly negative Eu anomalies and low LREE/HREE ratios. In the La–Th–Sc, Th–Sc–Zr/10, and La/Sc versus Ti/Zr diagrams, the fine-grained samples of the LPG largely plot within continental and oceanic arc fields. On the other hand, SBG shows an affinity to rifted/passive margin basinal tectonic setting.

LPG records an important contribution of chlorite, turning upwards to smectite (diagenetically transformed to CS). The control of the detrital/diagenetic origin of these clays was determined using a SEM, and their elemental concentration and ratios were acquired with an EDS.

It is known that detrital contribution for the SBG was exclusively from the Paleoproterozoic basement in a cratonic passive/rifting margin (felsic granitoid rocks; Zimmermann et al., 2011). Regarding possible source areas of LPG, low-grade metamorphic rocks were recorded in Punta Mogotes Formation. In addition, active arcs were mentioned linked to the Kalahari-Río de La Plata cratons close up. Future studies such as U-Pb detrital zircon dating and greater amount of whole-rock geochemical data, would shed light on the provenance of the LPG, allowing an extensive comparison to the SBG and would contribute to gain insights into the paleotectonic framework of these basins.

Zimmermann, U., Poiré, D.G., Gómez-Peral, L.E., 2011. Neoproterozoic to Lower Palaezoic successions of Tandilia System in Argentina: Implication for the palaeotectonic framework of southwest Gondwana. IJES 100: 489-510.