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OPTICALLY STIMULATED LUMINESCENCE SENSITIVITY OF QUARTZ AND FELDSPAR AS A PROXY TO QUANTIFY THE AMAZON RIVER SAND SUPPLY

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Resumo

The Amazon fluvial system is the largest drainage network (7,050,000 km²) of the Earth, comprising areas with different bedrock, relief, tectonic regime, climate, vegetation and land use. These characteristics proportionate high variability in the type, yield and flux of sediments to the Amazon river. Find a proxy to quantify the sand load supplied to the Amazon river by its main tributaries is challenging. This is a first step to understand climate and tectonic controls on the Amazon river sand flux through time. We collected surface sand samples from the downstream sectors of the major tributaries of the Amazon river (Solimões, Negro, Madeira and Xingu rivers). Recent studies have been shown that optically stimulated luminescence (OSL) sensitivity of quartz allows to discriminate sands from different sources. To test the OSL sensitivity (light emitted for a given radiation dose) as a proxy for sands supplied to the Amazon river, the collected samples were wet sieved to acquire the 0.125-0.250 mm grain size. Firstly, sand aliquots with the same volume were illuminated to bleach the natural OSL signal. Then, the OSL sensitivity was measured in 12 aliquots per sample using infrared (IR) and blue (BL) light stimulation after 10 Gy of beta radiation dose. The IR-OSL sensitivity is related to K-feldspar content while the BL-OSL sensitivity indicates the sedimentary reworking (burial-erosion cycles) of quartz grains. The sands from the Solimões and Madeira rivers respectively show relatively high to moderate IR-OSL sensitivity and low BL-OSL sensitivity. The sands from the Negro and Xingu rivers stand out due to their low IR-OSL and moderate to high BL-OSL sensitivities. The combination between the IR and BL-OSL signals allows to discriminate the sands derived from these four Amazon river tributaries. These sand types can be described by mixing of two provenance end members represented by feldspar-rich/low reworked quartz and feldspar-poor/high reworked quartz sands. The OSL sensitivity of the Amazon river sands presents a best fit with signals obtained for the Solimões and Madeira river sands. Preliminary calculation indicates that around 87% of the Amazon river sands are supplied by the Solimões river and 13% by the Negro river in the sector downstream the Solimões-Negro confluence and upstream the Madeira river mouth. Thus, OSL sensitivity is promising as a proxy for changes in sand volume derived from the main tributaries of the Amazon river.