2765783

OSL and TL sensitivities of quartz in a marine sediment core as a source tracer and paleoclimate proxy

Vinícius Ribau Mendes[1]*, André Oliveira Sawakuchi[1], Paulo César Fonseca Giannini[1], Cristiano Mazur Chiessi[2],Stefan Mulitza[3], Yancheng Zhang[3]

[1] *Department of Sedimentary Geology, University of São Paulo, São Paulo, Brazil*
[2] *School of Arts, Sciences and Humanities, University of São Paulo, São Paulo, Brazil*
[3] *MARUM-Center for Marine Environmental Sciences, University of Bremen, Bremen, Germany*
* *Corresponding author:rebigeo@gmail.com*

Marine sediment cores are one of the best archives for climatic reconstructions. Still, defining the siliciclastic sediment source is a crucial and non-trivial issue to appropriately reconstruct continental climate based on marine cores. This is usually assessed based on radiogenic isotopes (e.g. Nd), magnetic properties (e.g. ARM/IRM) and major elements (e.g. Fe/K), but these proxies may also be influenced by the weathering type and intensity as well as sedimentary processes. Here, we propose that Optically Stimulated Luminescence (OSL) and Thermoluminescence (TL) sensitivities of quartz can be used as a proxy for sediment source. We measured the OSL and TL sensitivities of 120 samples from an 8m long marine sediment core collected 70km offshore Northeastern Brazil coast and deposited over the last 30,000 years. Additionally, 16 samples collected along the Parnaiba River, the most important river supplying sediments to the core site and three samples of coastal deposits were also analyzed. The core samples (0.5g) were treated with H_2O_2 and HCl to respectively remove organic matter and carbonates. Then, samples were diluted in 5ml of acetone after centrifugation and mounted in aluminum discs (three discs per sample) for OSL and TL measurements. Four drops of the solution (acetone + sediment) was used per disc to keep similar sample size. All measurements were performed in a Risø TL/OSL DA-20 reader equipped with a built-in beta source (dose rate of 0.136 Gy/s), bialkali PM tube and Hoya U-340 filters (290-340 nm). OSL measurements comprised bleaching using IR and blue LEDs (90% power for 100s), irradiation with a 30Gy beta dose, preheat at 200°C for 10s, IR stimulation (100s at 125°C) and blue LEDs stimulation (100s at 125°C). The sensitivity of the fast OSL component was determined through the integration of the first second of light emission, which was normalized by the total OSL sensitivity, represented by integration of the total (100s) OSL decay curve. After the OSL measurements, the aliquots were heated up to 250°C to eliminate the natural TL signal. Then, a 30Gy beta dose was given again and the TL curve was obtained heating the samples until 250°C in a 5°C/s rate. The sensitivity related to the 110°C TL peak was calculated through the integral of 80-120°C interval of the TL glow curve. Samples were not heated over this temperature to avoid sensitivity changes. The variations in sensitivity (particularly the TL 110°C peak) observed along the core correlates well with climatic changes described for Northeastern Brazil, with periods of increased continental precipitation (e.g. Heinrich Stadial 1, 2 and the Younger Dryas) showing higher quartz sensitivity. In our presentation, we will discuss the applicability of OSL and TL sensitivities of quartz from marine sediments collected off Northeastern Brazil as a source tracer and paleoclimate proxy for the last 30 ka.

Asia Pacific Luminescence and Electron Spin Resonance Dating Conference - APLED (4.: 2015 : Adelaide)