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OSL SENSITIVITY IN QUARTZ AS A NEW TOOL FOR FINGERPRINTING PROVENANCE AND TRACKING SURFACE PROCESSES: PERSPECTIVES FROM THE NORTHERN ANDES UPLIFT

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Provenance analysis allows the detection of erosional windows in active orogens by tracking sediment populations in their adjacent basins, providing useful information to track orogenic uplift and exhumation. One prominent example is found in the northern Andes, where rock uplift formed the current Amazon basin headwaters. In recent years luminescence sensitivity has arisen as a potential technique for provenance analysis. Optically stimulated luminescence (OSL) sensitivity in quartz is modified by irradiation-exposure cycles which occur normally in soil profiles, linking sensitivity with source area denudation rates and sedimentary recycling. Luminescence sensitivity has been successfully used to discriminate sediments and to fingerprint provenance in modern deposits, but it has been barely tested in ancient ones. Here, we characterize an entire exhumed crustal section in the northern Andes of Colombia with a well-known provenance history, in terms of luminescence sensitivity, spanning rocks from the whole Phanerozoic eon. This approach allows us a direct source-to-sink analysis which serves as a proof-of-concept of the applicability of the luminescence sensitivity as a provenance tool, attempting to track changes in source area denudation rates and sedimentary recycling. Results from blue-light optically stimulated luminescence sensitivity ($\%BOSL_F$) reproduce some of the main patterns of changes in provenance during the formation of the Northern Andes. Increasing trends in $\%BOSL_F$ occurs both in the Upper Cretaceous and Neogene rocks, the first associated with the arrival of detritus from low-denuded areas of the Guiana craton, and the second related to a progressive orogeny unroofing and the subsequent sedimentary cover recycling. Whereas substantial drops in both the Lower Cretaceous and Paleocene are in agreement with the onset of highly-denuded Andean sedimentary sources. These latter sources first appear in Lower Cretaceous rocks, associated with the exhumation of the Andean basement along the rift shoulders of a back-arc basin. Upsection, Andean-sourced sediments appear in Paleocene rocks, reflecting the coeval shortening and deformation in the Andean volcanic arc that induced the onset of Andean sedimentary contribution to a regional foreland basin. Analyzing $\%BOSL_F$ trends upsection allows for linking changes in OSL sensitivity with provenance, which is important to propose sensitivity as a tool to track changes in source area surface processes.

KEYWORDS: SENSITIVITY, PROVENANCE, DENUDATION RATES, RECYCLING, NORTHERN ANDES