

Isotopic composition of single detrital carbonate grains in source-to-sink study (Ganga-Brahmaputra-Bengal sedimentary system).

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The aim of the study is to implement a new protocol to analyze the isotopic signatures of single detrital carbonates, with primary application in source-to-sink studies, and to fully exploit them as a provenance tracers. While single grain approach is standard in detrital thermochronology [e.g. 1,2], it has not been applied on major minerals using classic isotopic tracers.

In provenance studies, carbonate abundance and their O and C isotopic signatures partly reflects the geology of the source areas [e.g. 3,4], but depends also on chemical weathering processes acting during sediment transfer [e.g. 5]. Because isotopic analyses of bulk aliquot of carbonates mix grains with different origin and significance (e.g. pedogenetic, marine, diagenetic and detrital carbonates), part of the information carried by each detrital grain is lost.

This new protocol is tested on modern sediments of Ganga-Brahmaputra Rivers and turbiditic sediments from the Bengal Fan (IODP Expedition 354). Single grain isotopic fingerprint is expected to pinpoint sediment sources eroded in the Himalayan belt and to highlight sediment mixing from specific sources enhancing provenance resolution with respect to bulk approaches.

We apply an automated acid digestion with oversaturated orthophosphoric acid at 70°C followed by isotopic analyses of the evolved CO₂ with a Thermo Fisher Scientific MAT 253 mass spectrometer coupled with a Gasbench gas chromatograph [6]. For each sample 100 to 200 carbonate grains are analyzed to decipher the different origins involved in detrital sediments.

New data will allow us to identify the contribution of the Tethys Himalaya through time, detecting variations in the exposure of Tethys Himalaya, to better reconstruct the evolution of erosion processes in the Himalayan belt from its detrital record, paleoweathering and paleoclimate.

[1] doi.org/10.1038/s41598-018-25819-5

[2] doi.org/10.1130/B35031.1

[3] [doi.org/10.1130/0091-](https://doi.org/10.1130/0091-7613(2001)029<0023:HERITH>2.0.CO;2)

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[4] [doi.org/10.1016/S0012-821X\(02\)00822-1](https://doi.org/10.1016/S0012-821X(02)00822-1)

[5] doi.org/10.1016/j.epsl.2012.04.020

[6] doi.org/10.1038/nature13704