Detrital zircon populations versus age populations: fingerprinting Eastern Himalayan bedrock sources by micro-texturally driven U-Pb LA ICP-MS geochronology

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Zircon grains in a siliciclastic sedimentary rock are monomineralic clasts individually representing one or more growth events in their igneous, metamorphic or detrital source rock. Zircons eroded from a single rock source define an age population that is characteristic of that specific source. Mixing of detritus from different sources and potential sediment recycling add complexity to the final U-Pb age pattern of detrital zircon samples, which typically comprise a number of "peaks", defined to a greater or lesser extent by the age resolution and spatial resolution of the dating method used. A further complication is that a single "peak" in a detrital age pattern may result from the overlap of mineral growth events related to coeval but geologically distinct, possibly unrelated events in the bedrock sources feeding the detritus. Detrital zircon U-Pb data can be used as a first order discrimination tool to track sediment provenance at the regional scale. However, trying to turn "peak" ages into geological age populations in the absence of additional context (e.g. compositional, morphological, micro-textural information) can result in misleading geological interpretations and the *a priori* assumption must be that any age interpretation is constrained at the 2s uncertainty level (including systematic uncertainty) and cannot be improved upon using weighted mean statistics.

We couple microtextural grain information from modern detrital sand samples to U-Pb data determined on the same samples to identify zircon populations that can be associated with distinct Eastern Himalayan geological events at the orogen scale. The work synthetizes the analysis of thousands of CL-images of zircon grains and their U-Pb ages, the latter previously published by the same authors of this contribution.