

IMPROVED UNDERSTANDING OF DETRITAL ZIRCON AGES AND SEDIMENT SOURCE THROUGH COMBINED FISSION-TRACK AND U-PB DATING.

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Use of U-Pb dating techniques to determine sedimentary provenance of detrital zircon requires careful location of a beam (laser or ion) with respect to any structure that may be present within the analysed grain. This enables the most recent growth stage of the zircon to be analysed and the resultant age can be inferred to date the source lithology. However, several problems exist with this approach: Firstly, there is no means of directly testing whether the outermost growth stage is diagnostic of the grains previous host rock. Secondly, rounded or abraded detrital grains may have had overgrowths removed during erosion and transport, and therefore may give spurious old ages unrelated to the most immediate source terrain. Thirdly, grains may derive from a metamorphic terrain which is undetected because the U-Pb systems inherent high resistance to thermal resetting. To reduce these uncertainties it is recommended that detrital zircon U-Pb dating be combined with the low-temperature fission-track method. Adoption of a dual method approach, using the same samples and/or same grains, enables comparison between high and low temperature phases of a samples evolution and identification of U-Pb ages unrelated to the immediate source lithologies. Also, by using a combined method approach it is possible to constrain the processes controlling source exhumation and sediment flux, information that is integral to the formulation of robust sedimentary basin models.