

In-situ LA-ICP-MS U-Pb dating of shear deformation in the East Pilbara Terrane

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The tectonic evolution of Archaean terranes is highly debated due to difficulty in resolving sequences of metamorphic and deformation events. Archean terranes are bimodal, mafic dominant supercrustals and felsic orthogneisses. The felsic orthogneisses have typically undergone polyphase deformation. Establishing the timing of these deformation events can provide important, quantitative constraints for the evolution of Earth's early crust (Anhaeusser, 2014).

Here we investigate a titanite-bearing orthogneiss from the margin of the Muccan Granitoid Complex previously studied by Wiemer et al. (2016), to assess if U-Pb dating of the titanite can constrain the timing of the deformation that generated the gneissic fabric. Within the sample two distinct populations of titanite grains are identified. Small (10s μm), metamorphic titanite is elongated and aligned with the global shear foliation. Another larger (100s μm) population displays magmatic textures and is found in more competent lozenges, but shows complex crystal-plastic deformation textures.

Here we plan to link careful microstructural observations with in-situ LA-ICP-MS dating to assess if 1) the titanite preserves two age populations; a magmatic age and a deformation age, or 2) one age population, where the magmatic titanites have been reset during deformation. In addition the study will assess the technique of in-situ titanite dating of deformation events in complex Archaean terranes.

References

- Anhaeusser, C.R., 2014. *Journal of African Earth Sciences* **100**, 684-732
- Wiemer, D., Schrank, C.E., Murphy, D.T., Hickman, A.H., 2016. *Precambrian Research* **282**, 121-138.