TerraneChron®'s trajectory 2000-2030

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The *TerraneChron®* approach integrates *in situ* microanalysis of the U-Pb age, Hf-isotope and trace-element compositions of zircons from modern drainages, ancient sediments and targeted igneous rocks. It has been applied to a wide range of fundamental and strategic research studies that resulted in >270 CEMOC/CCFS publications in both high-impact journals and those relevant to mineral exploration. It has driven conceptual advances in understanding the evolution of the Earth's crust as well as delivering competitive advantages to the global exploration industry.

TerraneChron® was developed by the GEMOC team at the dawn of this century and represented a breakthrough concept linked to emerging analytical technology with direct applications for cost-effective routine exploration. It was inspired by the first convincing demonstration of high-precision *in situ* microanalysis of Hf isotopes in zircon [1] and an extensive study of zircon trace-element compositions and links to host rock types [2]. While the large datasets generated for igneous and particularly for detrital zircon populations can be used to address a range of geological questions, they also present significant challenges in terms of data reduction, graphical representation and relaible interpretation. There is a clear need for continuing development of quantitative techniques able to evaluate and compare multiple large datasets.

Other challenges to address are biases in the detrital zircon record due to the limited range of rock compositions that readily crystallize zircon, and to the high preservation potential of zircon and thus its persistence through mutiple cycles of erosion and sedimentation. Recent studies indicate that complementary isotopic and trace-element information collected on other accessory minerals (eg baddeleyite, rutile, apatite) offer a great potential to overcome these issues.

The future multi-mineral *TerraneChron®* approach will provide higher-reolution geochemical remote-sensing for analysing crustal evolution, geochemical fingerprinting of geodynamic processes and evaluating the economic potential of target terranes.

[1] Griffin *et al*. (2000) *Geochim. Cosmochim. Acta* **64**, 133-147. [2] Belousova *et al*. (2002) *Contrib. Mineral. Petrol.* **143**, 602-622.