NEW APPROACHES FOR RAPID ANALYSIS AND TRACING OF FLUIDS AND THEIR LIGANDS IN REGIONAL MINERAL SYSTEMS

MINEX CRC PROGRAM 3

National Drilling Initiative

PHD PROJECT

University of South Australia

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RESEARCH PROJECT

The tracing of mineral systems in the ancient rock record is often reliant on collecting datasets using the mineralogy or trace element characteristics of rocks and minerals surrounding a mineral deposit. This approach may work in the immediate vicinity of a deposit in high fluid flow regimes, but in distal settings or fluid-poor systems, the analysed volume is likely to be rock-buffered. This can either completely hide the signature of the mineral system or potentially even produce false positives. Direct analysis of fluids preserved within the rocks has a much greater potential to identify the distal components of a mineral system as it provides the potential to limit the influence of rock-buffering on ligand and isotope systematics. Traditional methods of fluid inclusion analysis (i.e. the captured fluids) are reliant on time consuming methods such as microthermometry and/or hard-to-access methods such as PIXE.

Recent advances in mass spectrometry mean that laser ablation inductively coupled plasma time-of-flight mass spectrometry has the potential to revolutionise the volume of data that can be collected on fluid inclusions and mineral trace element chemistry in regional-scale surveys. These methods will be developed using new equipment at UniSA and applied to target NDI regions with an initial focus on the Curnamona Province.