PB-LOSS MAPPING:
A NEW TOOL TO TRACK FLUID MOBILITY IN SPACE AND TIME

PHD PROJECT

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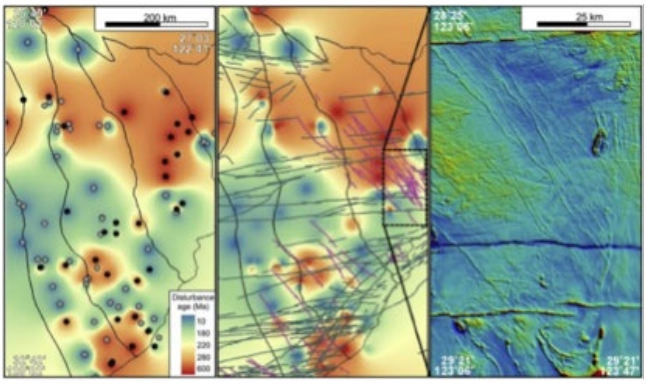

Spatial interpolation (IDW) of the best estimates of the time of U-Pb disturbance. Left: sample locations; those samples denoted with filled circles have well-defined age probability structures. Grey filled circles represent other samples. Centre: overlay of the location of east-west dykes (green) and northwest-southeast dykes (purple). Right: aeromagnetic image of an enlargement of a section of the Eastern Goldfields Superterrane intruded by northwest-southeast dykes that correlate with a ~ 600 Ma U-Pb zircon disturbance. Enlargement area indicated by dashed lines.

RESEARCH PROJECT

Zircon is a ubiquitous refractory mineral that contains uranium (U) and lead (Pb). Zircon U–Pb geochronology has become a keystone tool across Earth science, arguably providing the gold standard in resolving deep geological time as the U-Pb isotopic system has multiple chronometers including 238U/206Pb, 235U/207Pb and 207Pb/206Pb systems. Frequently the U-Pb zircon age reflects the timing of magmatic crystallization. However, under certain circumstances radiogenic Pb can be lost from the zircon crystal rendering the crystallization age determination incorrect. However the systematics of the Pb loss process can leave characteristic patterns in U-Pb isotope space. This pattern in isotope space is highly informative yet it is seldom interrogated to its full extent and can be modelled to best evaluate the timing of radiogenic-Pb loss. The timing of Pb loss may reflect the influence of reactive fluids which may be important in metallogenesis. This work will evaluate the timing of radiogenic-Pb mobility across Australia leveraging the huge amount of data currently available with an aim to determine if there is both a spatial and temporal association between Pb mobility and other geological processes including for example mineralization, fault density, dyke emplacement etc. The spatial relationship between the time of Pb mobility may provide a new tool to date otherwise difficult to date events as this approach has the potential to see through cover to underlying geological events that may have driven radiogenic-Pb mobility.

PARTICIPATING ORGANISATIONS

Government of South Australia
Department for Energy and Mining

Australian Government
Geoscience Australia

Geological Survey of Western Australia