This abstract is part of the session of 10-minute talks

# Rare-element pegmatites in the Mineral Systems Atlas

by

P Duuring


Rare-element pegmatites are important hosts for Li, Cs and Ta mineralization in Western Australia, with examples including the world-class Greenbushes, Pilgangoora and Wodgina deposits. The Minerals Geoscience branch has undertaken an analysis of the rare-element pegmatite mineral system by reviewing existing literature to define critical geological processes controlling genesis, hence to define mappable proxies that can be translated into a series of geographic information system layers in the Geological Survey of Western Australia Mineral Systems Atlas.

Critical processes for rare-element pegmatites include: i) generation of magmas that are fertile as sources for fluids and metals; ii) presence of coeval crustal-scale structures that could provide pathways for magmatic–hydrothermal fluids; iii) cooling and chemical diffusion in fractionating granitic magmas to concentrate rare elements into residual melts that feed compositionally and texturally zoned pegmatites; iv) uplift and erosion of crustal profiles sufficient to expose, but not destroy, rare-element pegmatites.

Mappable proxies for fertile magmas include: i) S-type granites that are enriched in Li, Cs, Ta, Rb, Sn, F, Be, Nb, Ga, Fe, Ti and rare earth elements; ii) granites containing indicator minerals, such as fluorite, cordierite, tourmaline, garnet, white potassium feldspar and green muscovite; iii) granites manifesting high ratios of Li/Mg, Cs/K, Rb/K and Ta/Nb. Mappable proxies for pegmatitic fluid pathways would include distribution maps for faults, fractures, foliation or bedding. Cooling and chemical fractionation in granitic melts may be identified by mapping diagnostic regional mineral and chemical zonation patterns in granites and pegmatite mineralogy.