



# Contemporaneous ultramafic and felsic intrusive and extrusive magmatism in the Archaean Boorara Domain, Eastern Goldfields Superterrane, Western Australia, and its implications

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## Abstract

Two komatiite emplacement styles are recognized in the Boorara Domain of the Kalgoorlie Terrane, Eastern Goldfields Superterrane, Yilgarn Craton, Western Australia. (1) Large volume, dominantly cumulate-textured komatiite bodies, interpreted as high-level intrusions based on the presence of symmetrical spinifex-cumulate textural zonation, together with apophysal injection and xenolith incorporation along the top and basal margins of the komatiite. (2) Extrusive komatiite lavas exhibit asymmetrical textural zonation, with the top chilled flow margin preserving a fine-grained, fractured crust that coarsens downward into a supercooled former olivine spinifex zone and then into pseudomorphed olivine (now serpentine) orthocumulate texture above a thin basal chilled margin.

The intrusive komatiite unit is observed to be intercalated with quartz- and feldspar-phyric dacite. The two lithologies exhibit primary irregular contacts against each other; komatiite apophyses have been injected into the dacite and magma mingling has occurred. These features are indicative of liquid–liquid interaction between the two units and komatiite magmatism is interpreted to have been contemporaneous with dacitic magmatism. The dacite was emplaced first and the komatiite intruded the dacite before it solidified.

The reconstructed stratigraphy of the Boorara Domain comprises a basal unit of quartzfeldspathic turbidite beds, conformably overlain by high Mg tholeiite basalt, the intercalated dacite and komatiite units overlie the lower tholeiitic basalt with an unobserved contact, an upper komatiitic basalt unit overlies the komatiite and at the stratigraphic top of the sequence are felsic volcanoclastic turbidite units with felsic porphyry intrusions. These greenstone lithologies were emplaced within a deep submarine basin as indicated by carbonaceous metapelite units intercalated throughout the sequence.

The tectonic-scale processes operating in, and around, the Boorara Domain depocentre include derivation of the komatiite unit from a likely mantle plume source. The contemporaneous dacite magmatism is interpreted to be the result of melting of pre-existing Archaean crust during plume ascension, although the exact composition of the primitive crust is yet to be determined.

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## 1. Introduction

The Archaean Kalgoorlie Terrane of the Eastern Goldfields Superterrane, Yilgarn Craton, Western Australia (Fig. 1), is characterized by large volumes

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