

**Environment, Timing and Petrogenesis of a
Middle Proterozoic Volcanic Suite:
Port Victoria South Australia**

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Abstract

The Middle Proterozoic volcanic assemblage at Pt. Victoria South Australia is representative of a subaqueous eruptive sequence intrusive to sediments which are likely to be of a deep water basinal origin. The felsic rhyodacites are characteristic of A-type granitoids, alkali enriched in incompatible elements and anorogenic. The basic amphibolites are tholeiitic in nature. Both rock types characterise an intra plate tectonic environment supported by incompatible element Y vs Nb and Y+Nb Vs Rb discrimination plots which indicate in the case of the rhyodacites that they originate in a within plate setting. The petrogenesis of the A-type rhyodacites is considered in light of current models including partial melting of a tonalitic to granodioritic source, a residual igneous source and Assimilation and Fractional Crystallisation (AFC). On the basis of trace element modelling and other indicators of fractionation, AFC of a mantle derived source is believed to best account for the observed A-type compositions. ϵ_{Nd} values indicate a short crustal pre history and a dominant mantle component providing more support for AFC than either partial melting or a residual source. The volcanics at Pt. Victoria are common to much of the Proterozoic volcanic activity having close affinities to other suites of a similar time frame, the Moonta porphyry and Tidnamurkana volcanics. They also share the character that much of the activity between 1870 and 1500 Ma in South Australia and elsewhere in Australia are commonly A-type. The unifying theme for the above considerations is their implications to crustal growth in the Proterozoic. Was it a situation of recycling of existing Archean crust or was it generation of new crustal material by an alternative mantle source? On the basis of tectonic environment, relation to other volcanics in the same time frame and petrogenesis by AFC from an initial mantle source, the evidence from Pt. Victoria indicates that the Proterozoic was a period of significant addition of new crustal material.

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