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# The magmatic evolution of the Holocene eruptions of Mt. Melbourne, Antarctica: constraints from proximal pyroclastic sequences

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Melbourne volcano is one of the three active volcanoes in northern Victoria Land, Antarctica. The youngest eruption age is estimated as between 1862 and 1922 based on the depth of the ice cap where tephra layers found at the western lower part of the Mt. Melbourne. However, reconstructing the recent eruptive history and constraining their ages are problematic due to its burial and glacier-clad outcrops and extremely young eruptions. A combined tephrostratigraphic and geochemical studies carried out on juvenile products of several proximal pyroclastic sequences. Results were used to understand the compositional evolution and magma feeding sytem of the Melbourne volcano. At least three eruption episodes are recognized. The oldest (eruption phase 3) and the youngest (eruption phase 1) events produced bimodal trachyandesitic and trachytic lavas. However, the second eruption phase represented by the summit welded pumice deposit is considered as a product of large explosive eruption occurred at 1280 C.E., and shows a trachytic composition. The youngest eruption material is represented by tarchyandesitic scoria and trachytic pumice, and found on top of the summit craters. The three episodic pyroclastic trachytes show an evolution trend towards systematically decreasing $SiO_2$ contents. Compositions of olivine, pyroxene and feldspar of the three trachytes also show that they have crystallized from more mafic magma towards eruption phase 1. This can be interpreted as a result of refilling of a felsic magma chamber by a hotter more mafic magma. Hybrid mingling trachytic lava containing angular trachyandesitic scoria fragments also provides an evidence for the existence of a continuous plumbing and interaction system of a trachyandesite-trachyte magma beneath the Melbourne volcano.