



Stratigraphy, geochronology and evolution of the Mt. Melbourne volcanic field (North Victoria Land, Antarctica)

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Mt. Melbourne (2,732 ma.s.l.) is a large quiescent stratovolcano located in Northern Victoria Land (Antarctica) and is one of a handful of volcanoes on the Antarctic plate with the potential for large-scale explosive eruptions. The early, Lower Pleistocene, volcanism was largely alkali basaltic to hawaiitic in composition and monogenetic in style, producing tens of small scoria cones and lava flows scattered over a wide area across the Transantarctic Mountains (Random Hills Period). During the Middle Pleistocene, volcanic activity focused to the area of the Mt. Melbourne stratovolcano, where several monogenetic centres show the transition from early subglacial/ subaqueous conditions to emergent subaerial conditions (Shield Nunatak Period). The oldest exposed deposit associated with the early activity of the Mt. Melbourne stratovolcano (Mt. Melbourne Period) is a trachytic subaerial ignimbrite dated at 123.6 ± 6.0 ka, which reflects the establishment of a crustal magma chamber. Above the ignimbrite a succession of alkali basaltic, hawaiitic, and subordinate benmoreitic lavas and scoria cones is exposed, dated at 90.7 ± 19.0 ka. The most recent deposits are exposed at the top of Mt. Melbourne, where the crater rim is composed of trachytic to rhyolitic pumice fall deposits, which are also extensively dispersed around the volcano, originated from Plinian-scale eruptions. The most recent explosive deposit proved difficult to date accurately because very low quantities of radiogenic ^{40}Ar were released, resulting in imprecise plateau ages of 50 ± 70 and 35 ± 22 ka.