The 1.59-0.51 Ma South Auckland volcanic field (SAVF) represents the complete history of a young monogenetic basalt field; which preceded the active Auckland volcanic field. There are at least 82 volcanic centres in the SAVF comprising maars and tuff rings, scoria cones, lava shields, lava flows, and combinations of these. The location and style of volcanism is controlled by faults and the distribution of country rock aquifers. There are about 38 maars and tuff rings which vary from 0.5 to 2.7 km in diameter. This presentation summarises key eruption processes across recently studied phreatomagmatic centres in the SAVF, from facies studies of exposed tuff ring successions.

Each tuff ring succession, up to 60 m thick, contains a unique stratigraphy of intercalated (a) diffuse- to well- thin to medium bedded vitric lapilli tuff facies, recording a dominance of pyroclastic fall, and surge-modified fall processes; and (b) planar-, wavy and cross-laminated to thin-bedded vitric tuff facies, recording pyroclastic surge-dominant processes. Isolated or concentration zones of lithic blocks, and basalt bombs and blocks commonly occur. A common characteristic across several tuff rings is the vertical gradation towards the finer-grained surge-dominant facies. Juvenile clasts show a wide range of vesicularities (e.g. 1-48%, Barriball Rd tuff ring). Country rock-derived lithics and crystals (<20% of clasts) indicate the influence of aquifers in driving phreatomagmatism. Variations in the constructive history of tuff rings across SAVF reflects the complex interplay of varying magma volumes and ascent rates, aquifer water supply rates and the evolution of vent geometries.