Differentiating zircon xenocrysts and antecrysts in Mesozoic igneous rocks: issues and implications for understanding the evolution of large magmatic systems

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From a suite of twenty one late-Mesozoic silicic volcanic and granitic rock samples from Hong Kong, inherited zircons have been recognised in fifteen samples based on age data using in-situ SHRIMP U-Pb analyses combined with CL imagery. The ages of these inherited grains are either late Mesozoic or much older (Palaeozoic to Archaean). The older Palaeozoic and Archaean zircon grains are definitively xenocrysts, incorporated into the host magma from surrounding basement rocks[1,2]. For the late Mesozoic inherited grains, a first order observation is that they are roughly coincident in age with the major local magmatic episodes identified by previous studies[3,4]. These grains are interpreted to represent crystals that grew in earlier magmatic pulses and were then recycled in subsequent magmatic episodes. For these recycled grains, distinguishing between antecryst and xenocryst types is challenging because resolvably large age gaps (a few Myr to ~20 Myr) exist between the inherited cores and the host units. In other studies[e.g. 1,5], the age differences were used as one of the key criteria for discriminating these two types of inherited grains. The data presented here suggest that identification of xenocrysts, antecrysts and autocrysts in part is a function of the age resolution and temporal precision of geological controls. Caution must be taken when the presence of inferred-recycled dated zircons is used to determine the 'residence time' of a magma chamber or the duration of pluton assembly in the case of intrusive rocks.

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