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Timescales of plutonic-subvolcanic-volcanic connection in a Mio-Pliocene long-lived igneous system (Tuscany): zircon CA-ID-TIMS dating

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The genetic link between plutonic and volcanic realms is a key for understanding timescales of igneous plumbing systems, and precise geochronological records are pivotal in estimating the duration of processes at different levels in such plumbing systems. The Campiglia igneous complex, Tuscany, offers exposures of the full range of emplacement levels (plutonic, subvolcanic, volcanic) of mantle- and crust-derived magmas. Magma emplacement occurred astride the Miocene-Pliocene boundary. New high-precision U-Pb CA-ID-TIMS, zircon geochronological data, coupled with LA-HR-ICP-MS zircon dates for the whole Campiglia system define a short crystallization time span for zircon from the peraluminous granite pluton (~100 ka), intermediate for the shallow-level mafic porphyry (~450 ka), and longer for the rhyolite (~700 ka), at odd with what commonly expected. The oldest ages for the three units are the same, leading to hypothesize the occurrence of a bimodal deep reservoir remaining in melt-present conditions for some 700 ka. In this framework, early-crystallized zircons were cannibalized by younger melt batches that were sequentially extracted from the reservoir.