Botryoidal zircon crystal aggregates from the Rattlesnake Tuff, Oregon

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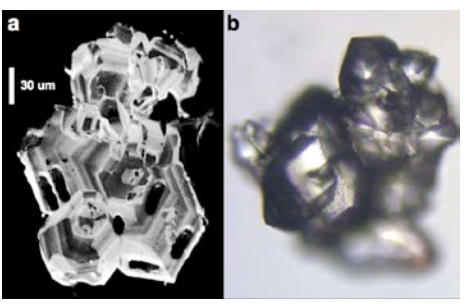
Botryoidal zircon crystals from the Rattlesnake Tuff (RST) are aggregates of numerous faceted crystals and crystallites that have generally low aspect ratios and oscillatory zoning that is often truncated by adjoining crystallites and overprinted by sector zoning. Randomly oriented crystallites are not crystallographically coherent. Aggregates may be weakly dendritic with short chains extending from one comparatively large crystal, or two or more moderate to large crystals bridged by smaller crystallites. Less than 5% of all RST zircon crystals are small and equant without complex growth textures and adjoining crystallites.

Unusual botryoidal morphology may be the result of rapid growth under conditions and dynamics that favoured zircon nucleation over crystallization, including composition, magma mingling, and hybridization [1]. Evidence for magma mingling in the RST system is demonstrated by pumice-scale diversity in rhyolitic glass compositions [2]. Trace elements in zircon constrain their origins in certain discrete magma compositions, and record changes in host magma from enriched cores to depleted rims. We will present evidence promoting a model of mixing and hybridization of contrasting peralkaline to peraluminous magma compositions, leading to rapid botryoidal zircon aggregate crystallization prior to the climactic eruption of the RST at 7.266 ± 0.010 Ma.



Cathodoluminescence (a) and transmitted light (b) images of two RST zircon crystal aggregates (200x magnification).

[1] Hort (1998) *Journal of Petrology* **39**, 1063-1076. [2] Streck & Grunder (1997) *Journal of Petrology* **38**, 133-163.