

Zircon U-Pb Constraints on Volcanic-plutonic Connections and Conundrums in the White Mountain Batholith

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The age and origin of anorogenic silicic magmatism in the Jurassic White Mountain Magma Series (New Hampshire, USA) remains problematic with respect to our current understanding of the tectonic evolution of the Eastern North American Margin. Recent work (1, 2) has shown that the fundamental chronological boundary conditions for its magmatic duration differ significantly from those in the published literature and have significant tectonic implications. In this project we densely sampled the eastern half of the largest igneous complex associated with this province, the White Mountain Batholith, which contains a record of multiple episodes of both volcanic and intrusive events. We used zircon U-Pb geochronology via LA-ICP-MS to place constraints on the tempo of magmatism and test whether it occurred over a protracted time interval (>15 Myr) or relatively briefly (< 3 Myr). Preliminary results suggest that its duration is brief, occurring between ca. 185-182, nearly 15 Myr younger than the onset of magmatism in the western region of the batholith. These results are consistent with CA-ID-TIMS ages for units in the study area also obtained by this group. At least two igneous complexes elsewhere in the province, but outside the White Mountain Batholith, have similar ages and suggest that the ca. 185 – 182 Ma event was more widespread. We also provide new geochronological constraints for two supposed intra-caldera sequences (the Moat Volcanics) by dating several samples at various stratigraphic heights as well as at intrusive contacts. The results of this study will have broad implications to both the origin of this enigmatic igneous province as well as the post-rift evolution of the Eastern North American Margin.

1. Kinney, S.T., et al (2018), Causal implications of new geochronological constraints on Mesozoic post-rift magmatism in New England. Goldschmidt 2018 Abstracts. 2. Town, C. F., et al. (2019), New zircon U-Pb geochronological data from the Moat Volcanics, White Mountains, New Hampshire - Implications for rift and/or plume related magmatism. Geological Society of America Abstracts with Programs.