

Causal implications of new geochronological constraints on Mesozoic post-rift magmatism in New England

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The magmatic complexes of the White Mountain Magma Series (WMMS) collectively form the largest expression of post-orogenic, felsic magmatism on the Eastern North American Margin. Based upon early geochronological studies, they fall into two broad intervals: a 200 – 160 Ma Jurassic event and a ~130 – 100 Ma Cretaceous event. Much debate surrounds their formation, age distribution, and relationship to other regional tectonic features and events. A major obstacle in improving our understanding of the WMMS has been the tenuous temporal framework that constrains the timing and duration of its magmatic activity. In this study, we revise this framework and provide insight on and test hypotheses related to the following questions: 1) What is the total timing and duration of magmatism for each event and under what geodynamic settings did each form?; 2) What connection, if any, does the Jurassic event have to the Central Atlantic Magmatic Province?; 3) Was the Great Meteor Hotspot responsible for the formation of the Cretaceous event?

We present zircon U-Pb ages from both LA-ICP-MS and CA-ID-TIMS techniques to constrain the timing and duration of the Jurassic and Cretaceous magmatic events. Our results demonstrate that the Jurassic event occurred over a much shorter interval than previously published ages suggest. We present Ar-Ar ages in order to better understand this discrepancy. We also provide a definitive test of the Great Meteor Hotspot model as the cause of the Cretaceous event.