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**TITLE:** High-precision U-Pb zircon geochronological constraints on the End-Triassic Mass Extinction, the late Triassic Astronomical Time Scale and geochemical evolution of CAMP magmatism (*Invited*)

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**ABSTRACT BODY:** Mass extinction events that punctuate Earth's history have had a large influence on the evolution, diversity and composition of our planet's biosphere. The approximate temporal coincidence between the five major extinction events over the last 542 million years and the eruption of Large Igneous Provinces (LIPs) has led to the speculation that climate and environmental perturbations generated by the emplacement of a large volume of magma in a short period of time triggered each global biologic crisis. Establishing a causal link between extinction and the onset and tempo of LIP eruption has proved difficult because of the geographic separation between LIP volcanic deposits and stratigraphic sequences preserving evidence of the extinction. In most cases, the uncertainties on available radioisotopic dates used to correlate between geographically separated study areas often exceed the duration of both the extinction interval and LIP volcanism by an order of magnitude. The "end-Triassic extinction" (ETE) is one of the "big five" and is characterized by the disappearance of several terrestrial and marine species and dominance of Dinosaurs for the next 134 million years.

Speculation on the cause has centered on massive climate perturbations thought to accompany the eruption of flood basalts related to the Central Atlantic Magmatic Province (CAMP), the most aerially extensive and volumetrically one of the largest LIPs on Earth. Despite an approximate temporal coincidence between extinction and volcanism, there lacks evidence placing the eruption of CAMP prior to or at the initiation of the extinction. Estimates of the timing and/or duration of CAMP volcanism provided by astrochronology and Ar-Ar geochronology differ by an order of magnitude, precluding high-precision tests of the relationship between LIP volcanism and the mass extinction, the causes of which are dependent upon the rate of magma eruption.

Here we present high precision zircon U-Pb ID-TIMS geochronologic data for eight CAMP flows and sills from the eastern U.S. and Morocco. These data are used first to independently test the astronomically calibrated time scale and sediment accumulation rates within the Triassic-Jurassic rift basins along the eastern North America. The U-Pb, paleontological, magnetostratigraphic and astronomical data are combined to constrain the onset and duration of the CAMP and clarify the temporal relationship between the CAMP and the ETE. The

dataset together allows more precise estimates of eruptive volume per unit time, a requirement for rigorous evaluation of climate-driven models for the extinction.

**KEYWORDS:** [1115] GEOCHRONOLOGY / Radioisotope geochronology.

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### **Additional Details**

**Previously Presented Material:**

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