CAMP Ashes and the ETE

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The end Triassic extinction (ETE) was plausibly caused by a major pulse of the Central Atlantic Magmatic Province (CAMP). Continental, paleotropicical expression of the ETE is recorded by dramatic changes in sporomorph assemblages associated with multiple modest Ir anomalies at 6 localities in Eastern North America and Morocco, plausibly the residues of CAMP ashes or aerosols. Because minerals of these mafic ashes are usually obliterated by weathering, testing this hypothesis requires detecting their unique chemical traces in highly heterogeneous sedimentary regimes. As a step towards recognition of these signatures, we have conducted a simple preliminary experiment that asks, "Can we recognize the chemical signature of a CAMP ash, when we are sure there is an ash present?". The discovery of a suitable CAMP-related air-fall, the "Pompton Ash", sandwiched between the Holyoke-Preakness and Hampden-Hook Mt. basalts in Eastern North America, provides that opportunity.

Deposited in a deep-water lacustrine setting, and identified at 10 localities in two basins (Newark and Hartford) over a distance of more than 200 km, the 5 mm Pompton Ash is a graded, apparently andesitic tuff consisting of sharply euhedral, plagioclase laths in a matrix that was originally glass, fine-grained feathery feldspars, carbonate, and distinct sub-mm spherule-like volcanic grains at its base. Pyrite is very abundant, and the ash weathers to an expanded bright orange jarositic mush. The ash is characterized by a modest PGE anomaly with ~120 ppt Ir against a background of ~30 ppt and epsilon Nd values averaging -5.4 against a local background of -9.2 and a basin-scale background (Hartford) of -10.6. The REE pattern is indistinguishable from that of the Hampden, Hook Mt., and "recurrent" basalts.

The ash shows up very clearly in mico-XRF scans compared to the surrounding strata, but the signal is strongly dominated by the large amount of diagenetic pyrite in the interstices. The scans show that thickness of the ash does not change over its known extent, implying it is either the product of a distant, Yellowstone-scale supereruption, perhaps from the center of the CAMP plume near south Florida, or a smaller eruption closer and positioned exactly just-so. It is clear we can recognize this undoubted CAMP ash from its geochemical signature and this bodes well for identification of cryptic ashes more directly related to the ETE.