Two CAMP Explosive Eruptions

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Among the peculiar aspects of the Central Atlantic Magmatic Province (CAMP) is the rarity of ashes. We report on the only two unambigous airfalls of likely CAMP origin. The ~5 mm thick Pompton Ash, is identified at 10 sites over 200 km in eastern North America. It is overlain by a ~1 mm ash identified at 7 of these sites. These occur in deep-water microlaminated, organic-rich (TOC ~4%), fossil-fish bearing phase of a climatic precession-paced lake-level cycle, in the Newark – Hartford, Tr-J rift basins.

The Pompton Ash is graded, comprised of sharply euhedral, plagioclase laths in an originally glass matrix, fine-grained feathery feldspars, carbonate, and sub-mm volcanic spherules at its base. Pyrite averages 13.4% in this ash compared to a background average of 1.9%, with δ34S values of -0.8 to 33.0‰ compared to background of -21.2 to -6.6‰. It has a modest Ir anomaly of ~120 ppt against a background of ~30 ppt; εNd values averaging -5.4 vs. -9.2 local- and -10.6 basin-scale background; a small Hg anomaly of 143.0 ppb against 94.0 ppb background; and REE pattern resembling the Hampden, Hook Mt., and "recurrent" basalts. The smaller ash appears similar, with smaller grains size, but we have as yet little chemistry.

The ashes stand out in μ-XRF scans as excursions in S and Fe, inversely correlated to Ca, undoubtably tracking pyrite. Profiles from slabs 142 km apart are similar at the sub-mm-scale, and there is no discernable thickness change over 200 km, but the little ash is missing at one of the northern sites. This suggests that the source of the ashes were: 1) point-source mega-eruptions of the CAMP very far away (e.g., south Florida); 2) a closer point source positioned "just so"; or 3) a linear source such as a dike, parallel to the rift-trend. The astrochronological age of the ash registered against the published zircon CA-ID-TIMS U-Pb ages is 201.04 Ma, within error of the giant Foum Zuid dike of Morocco, which fits in position. It remains to be seen if that dike is a candidate in terms of chemistry. If if the ashes' source can be identified, these ashes would shed considerble light on the eruptive dynamics of the CAMP.