THE CENTRAL ATLANTC MAGMATIC PROVINCE (CAMP: CAUSES AND CONSEQUENCES)

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ABSTRACT: The Central Atlantic magmatic province (CAMP) was emplaced at ca. 201 Ma, shortly before the break-up of Pangea and the opening of the Central Atlantic Ocean. Its remnants occur as dykes, sills, and lava flows over a total surface of 10 million square km in South and North America, Africa and Europe. Detailed magneto- chemo- and bio-stratigraphic and gechronologic studies indicate that the short-lived peak activity of CAMP volcanism started before and straddled the Triassic-Jurassic boundary (at least in morocco and in canada) and thus triggered possibly the end-Triassic mass extinction event through emission of volcanic SO_2 or CO_2. The environmental effects of CAMP volcanism are increased by the basaltic eruptions occurring as short-lived, violent pulses as well as by the large aeral extent of the province.
The preserved magmatic rocks are mostly low-Ti and few high-Ti basalts and basaltic andesites. They show all geochemical feattures tyoical of within-plate continental basalts, such as moderately enriched to near-flat REE patterns, negative Nb and positive Pb anomalies. Sr-Nd-Pb isotopic compositions fall in a restricted field for most low-Ti basalts (e.g., $^{87}Sr/^{86}Sr_{201Ma}$ = 0.705-0.706; epsilonNd =+1-2; $^{206}Pb/^{204}Pb_{201Ma}$ = 18.4-18.6), except for some low-Ti dykes from the U.S.A. (characterized by low $^{206}Pb/^{204}Pb_{201Ma}$, ca. 17.5) and except for high-Ti basalts which show generally more depleted compositions, close to Mesozoic Atlantic MORBs. Since Os isotopic compositions (0.125-.0135, generally) exclude a significant role for crustal contamination, the enriched component of CAMP basalts reflects an enriched mantle source. This may have been metasomatized by subducted sediments recycled within the upper(most) mantle. For the low-$^{206}Pb/^{204}Pb_{201Ma}$ dykes, an involvement of recycled (Archean?) continental lower crust is the most likely explanation. The depleted mantle-end member is most likely the ambient upper mantle or the sub-continetal lithosphere with DMM-like composition. In summary, geochemical data do not show evidence of involvement of deep-mantle plume material in the genesis of CAMP basals, even though we can not exclude the presence of a mantle-plume as heat source.

KEYWORDS: END-TRIASSIC MASS EXTINCTION, BASALT, MANTLE PLUME