

Temporal Relation Between the Triassic/Jurassic Mass Extinction and the Central Atlantic Magmatic Province

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The age of several continental floodbasalt provinces coincides with that of major mass extinctions, suggesting a possible causal relation. Recently, it has been shown that the Triassic-Jurassic mass extinction (199.6 ± 0.3 Ma; Palfy et al., 2000) is contemporaneous with the Central Atlantic magmatic province (CAMP; 199 ± 2 Ma; Marzoli et al., 1999). The Triassic-Jurassic extinction event is one of the most important of the Phanerozoic (Sepkoski, 1996), and is associated with a fourfold increase in atmospheric CO₂ which caused a 3-4 °C temperature increase and could have resulted in the 95% species extinction of Triassic megaflora (McElwain et al., 1999).

The CAMP is presently defined by the remnants of tholeiitic continental basalts that occur in once-contiguous parts of North America, Africa, South America, and, according to our new results, of south-western Europe. These continents were the site of a widespread magmatic activity (> 7 million square km) which preceded the disruption of Pangea and the opening of the Central Atlantic Ocean in Early-Jurassic times. ⁴⁰Ar/³⁹Ar plateau ages of CAMP basalts range from 205 to 190 Ma, with a main cluster of ages at around 199 Ma. Preserved lava flows are relatively rare, and have been dated between 203 and 190 Ma, again with a main cluster at about 197-199 Ma.

Despite this broad temporal coincidence between the age of the CAMP and the Triassic-Jurassic mass extinction, it has been shown that CAMP lava flows of eastern North-America (Fowell and Olsen, 1993) and Europe (our data) overlay sedimentary rocks with earliest Jurassic fossils or pollens. Therefore, it has been suggested that the entire CAMP volcanism postdates the extinction event by a few thousands of years, and that there is no causal relation between the magmatic event and the biotic turnover. However, the oldest ages for CAMP lava flows on the Moroccan High Atlas have been Ar/Ar dated by Sebai et al. (1991) at 203.1 ± 0.7 (age recalculated for Fish Canyon sanidine neutron fluence monitor = 28.02 Ma; Renne et al., 1998), and are therefore apparently older than the Tr/J boundary. Our ongoing combined geochronological-palynological studies of these lava flows and of the associated sedimentary rocks will further test this temporal

relation.

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