



Circum-Atlantic CAMP volcanism at the Triassic-Jurassic boundary

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Combined bio-, magneto- and chemostratigraphic data show that eruption of the 200 Ma Central Atlantic magmatic province (CAMP) lava flows from the High Atlas of Morocco straddled the Triassic-Jurassic (T-J) boundary and originated from heterogeneous lithospheric and then from asthenospheric mantle sources (Marzoli et al., 2004). Similar timing and systematic geochemical evolution are now defined for several CAMP flow sections from the Middle Atlas and North-Eastern Morocco. According to new palynological data, the oldest lava flows from at least two Middle Atlas localities (Maaziz, Midelt) are emplaced on alternating gray and black siltstone layers which yield, up to the contact with the basalts a late Triassic sporomorph assemblage similar to that of the sediments in direct, normal contact with the oldest High Atlas basalts. This assemblage includes Triassic sporomorphs such as *P. densus* and *A. parvus* along with specimens of the circumpolles group (e.g. *G. meyeriana*, *C. torosus*, *C. murphyae*) and suggest thus synchronous onset of CAMP volcanism throughout Morocco. Despite a generally reduced thickness of the lava pile compared to the High Atlas, three, relatively complete Middle Atlas basalt piles (Maaziz, Oum R-bia, Midelt) show the same progressive up-section depletion of TiO₂ (ca. 1.4-1.5 to 1.1-1.0 wt%), Zr (ca. 120 to ca. 80 ppm) and light Rare Earth elements observed for the Lower to Upper lava flows of the High Atlas. Thus, synchronous eruption straddling the T-J boundary and similar time-related geochemical evolution of CAMP basalts is

suggested for the entire area now corresponding to central-northern Morocco (about 0.3 million square km) and is consistent with preliminary magnetostratigraphic data for the Middle Atlas CAMP.

Correlation with eastern North American (ENA) CAMP basalts is based on palynological data from the sedimentary successions of three continental basins (Hartford, Deerfield, Fundy) and on geochemical data for the basalts. In the more complete sedimentary successions of ENA Hartford basin, the palynological association occurring just below the oldest (Talcott basalt) up to the youngest CAMP lava flow (Hampden basalt) are similar and of likely latest Triassic age. However, these sporomorph associations are distinct (e.g., scattered presence of *P. densus*) and thus probably slightly younger than those at the base of the oldest Moroccan CAMP basalts. A slightly younger age for the onset of ENA compared to the Moroccan CAMP can not be resolved through Ar/Ar geochronology, but is consistent with magnetostratigraphic and new geochemical data, which suggest synchrony between the Moroccan Intermediate and the Hartford Talcott basalts.

In summary, widespread CAMP volcanism seems to occur before the T-J boundary and likely contributed to the end-Triassic extinction event.

References:

Marzoli A. et al. (2004). Synchrony of the Central Atlantic magmatic province and the Triassic–Jurassic boundary climatic and biotic crisis. *Geology* 32, 973–976.