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Timing is everything – implications of a new correlation of Triassic–Jurassic boundary successions and the Central Atlantic Magmatic Province

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Understanding mass extinctions requires a clear insight into the stratigraphy of boundary sections, which allows for long-distance correlations and correct distinction of the sequence of events. However, even after the ratification of a Global Stratotype Section and Point, global correlations of Triassic–Jurassic boundary (TJB) successions are hampered by the fact that many of the traditionally used fossil groups were severely affected by the end-Triassic mass extinction (ETE). Recently, a new correlation of key TJB successions in Europe, U.S.A. and Peru, based on a combination of biotic (palynology and ammonites), geochemical (δ13Corg) and radiometric (U/Pb ages) constraints, was presented. This new correlation has an impact on the causality and temporal development during the end-Triassic event, as it indicates that the bulk of the hitherto dated, high-titanium, quartz normalized volcanism of the Central Atlantic Magmatic Province (CAMP) preceded or was contemporaneous to the onset of the mass extinction. It further shows that the maximum phase of the mass extinction, which affected both the terrestrial and marine ecosystems, was associated with a major regression and repeated, enhanced earthquake activity in Europe. A subsequent transgression resulted in the formation of hiati or condensed successions in many areas in Europe. Later phases of volcanic activity of the CAMP, producing low titanium, quartz normalized and high-iron, quartz normalized basaltic rocks, continued close to the first occurrence of Jurassic ammonites and the defined TJB. This new correlations enables a reconstruction of the sequence of events; including records of e.g. pCO_2 from soil carbonates and plant fossils, rare earth elements, biomarkers, charcoal, which allows an insight into the causality of this biotic crises.