



Supraregional seismites in Triassic - Jurassic boundary strata

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The end-Triassic mass extinction event (201.564 Ma) was synchronous with the earliest volcanic phase during the emplacement of the Central Atlantic Magmatic Province (CAMP), a large igneous province (LIP) formed during the initial breakup of Pangea. Volcanic degassing of CO₂ and other volatile gases, and/or thermogenic methane, from the CAMP is generally regarded as the main cause of the end-Triassic biotic crisis. However, discrepancies in the durations of the ETE (50 Kyrs) and the CAMP volcanism (600 Kyrs) as well as temporal offsets between carbon cycle perturbations and biotic turnovers suggest a more complex scenario that require further studies of the temporal succession of events in Triassic-Jurassic (TJ) boundary strata. Here, we present and examine multiple episodes of soft-sediment deformation (seismites) within uppermost Rhaetian marine and terrestrial strata of Denmark, Sweden and Germany. These seismites are stratigraphically constrained by palynology and C-isotopes to the latest Rhaetian, and are synchronous to the single seismites layer from the UK, which similarly predates the T/J boundary, and has been explained by an extraterrestrial bolide impact. Instead, we argue that the multiple episodes of soft-sediment deformation, interbedded by undisturbed strata, were formed from repeated intense earthquake activity restricted to an interval within the latest Rhaetian bracketed by two negative excursions in $\delta^{13}\text{C}$ and also containing palynological evidence for deforestation and fern proliferation. The fact that these biotic changes coincide with repeated seismic activity has implications for the end-Triassic extinction and the CAMP scenario. We discuss the temporal position of the seismites in regards to other end-Triassic events, and argue that their supraregional distribution in pre-TJ-boundary strata of NW Europe may be linked to intensified earthquake activity during CAMP emplacement, rather than an extraterrestrial impact.