Geophysical Research Abstracts
Vol. 13, EGU2011-4938, 2011
EGU General Assembly 2011

Carbon cycling at the Triassic-Jurassic boundary in the Danish Basin

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The end-Triassic mass extinction event (201.6 Ma) coincides with the eruption of the Central Atlantic Magmatic Province (CAMP). With an estimated total volume of $2.3*10^6$ km^3 CAMP represents one of the largest LIPs of the Phanerozoic and is thought to have released >8000 Gt of CO_2 and 2300 Gt of SO_2.
For the TJ boundary interval several reference C-isotope records exist. These carbon isotope records obtained from organic and inorganic substrates provide evidence for a highly instable carbon cycle, with repeated perturbations contemporaneous to turnovers amongst both marine and terrestrial biota over the TJ boundary interval (Ward et al., 2001; Hesselbo et al., 2004; Guex et al., 2004; Pálfy et al., 2007; Williford et al., 2007). From the Danish Basin a new high resolution δ^{13}Corg-isotope record obtained from the palynostratigraphically constrained Triassic–Jurassic (TJ) boundary succession displays an interval with 2.5–3 ‰ more positive values around the TJ boundary, punctuated by one distinct negative excursion. Correlation with other reference curves from St Audrie′s Bay (UK) and Kuhjoch (Austria) demonstrates that the so called "initial excursion" at St. Audrie′s Bay corresponds to a negative C-isotope excursion associated with the FO of *Psiloceras spelae* at Kuhjoch. The C-isotope data from Stenlille also indicate that the so called "main excursion" is not an excursion, but the declining limb of a large positive excursion that straddles the TJ boundary interval. This new correlation is supported by palynostratigraphy, palynofloral changes, macrofloral changes and ammonite biostratigraphy, and further constrained by geochronological ages from New York Canyon and Peru (Schoene et al. 2010). The new correlation indicates that the onset of the CAMP volcanism took place close to the level of the last occurrence of *Choristoceras marshi* and conodonts (except UK) at the first negative C-isotope peak in the Rhaetian, and that the terrestrial ecosystem collapse coincided with positive C-isotope values prior to the TJ boundary. This first positive C-isotope interval is not recognized in the organic C-isotope records from Nevada and British Columbia. It is possibly a supraregional effect of a physiological response in land plants to SO_2 degassing from the CAMP volcanism, in analogy to recent plant responses to stress from industrial pollution. Plant turnover and the FO of *P. spelae* occur within the second negative C-isotope excursion (initial) and mark the onset of reorganisations of the terrestrial and marine ecosystems which continued throughout the following second positive C-isotope interval. Lower C-isotope values that characterize most of the Hettangian appear to correspond to the stabilization of terrestrial ecosystems and renewed radiation in the marine realm.