Geophysical Research Abstracts
Vol. 14, EGU2012-13359, 2012
EGU General Assembly 2012

Carbon-cycle disturbances and environmental change preceding the end-Triassic mass extinction

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The end-Triassic mass extinction [$\sim$201.3 Ma], marked by marine and terrestrial ecosystem collapse and global marine biodiversity loss, coincides with the onset of extensive volcanic activity and emplacement of the Central Atlantic Magmatic Province (CAMP). Massive and rapid greenhouse gas release from basalts, subsurface organic rich strata and ocean-floor clathrates, had a profound impact on the global exogenic carbon cycle and caused dramatically increased atmospheric pCO_2 values. A recent study however suggests global carbon cycle disturbance already (possibly $\sim$100 kyr) before the end-Triassic mass extinction. 13C depleted atmospheric carbon injection at this event may have resulted from Late Triassic dike and sill intrusions possibly releasing thermogenic methane from subsurface organic-rich sediments. We now studied an extended, up to 1 million year long, Late Triassic marine sedimentary record from the western Tethian Eiberg basin (Northern Calcareous Alps, Austria). Sediments were deposited in the deepest part of the Eiberg basin (very close to the base Jurassic Global Stratotype Section and Point at Kuhjoch).
High-resolution δ13CTOC, δ13CCARB-Bulk and δ13CCARB-Brachiopods from this record show distinct 1-2‰ δ13C negative excursions throughout the latest Triassic. This suggests disturbance of the global exogenic carbon cycle already long before the end-Triassic mass extinction. Regular alternations between (laminated) black-shales and carbonate deposition also indicate periodic changes in the palaeo-environment. Variations in the δ18OCARB record, coinciding with δ13C negative excursions, suggest climatic warming. But, distinct negative shifts may also indicate increased fresh-water input along the upper-Triassic western Tethys continental margin. Volcanic activity and palaeo-environmental change occurring already before the end-Triassic mass extinction, may have progressively weakened marine ecosystems, ultimately leading to large-scale marine biodiversity loss.