Geophysical Research Abstracts
Vol. 16, EGU2014-14588, 2014
EGU General Assembly 2014

Long-term oceanic changes prior the end-Triassic mass extinction

Marie-Emilie Clémence (1), Wolfgang Mette (1), Nicolas Thibault (2), and Christoph Korte (2)

(1) Institute of Geology, University of Innsbruck, Innrain 52, 6020 Innsbruck, Austria (Marie-Emilie.Clemence@uibk.ac.at),
(2) Institute for Geosciences and Natural Resource Management, University of Copenhagen, Denmark

A number of potential causes and kill mechanisms have been proposed for the end-Triassic mass extinction such as palaeoclimatic and sea-level variations, massive volcanism and ocean acidification. Recent analysis of the stomatal index and density of fossil leaves and geochemical research on pedogenic carbonate nodules are suggestive of rising atmospheric CO_2 concentration and fluctuating climate in the Rhaetian. It seems therefore probable that the end-Triassic event was preceded by large climatic fluctuations and environmental perturbations in the Rhaetian which might have partly affected the composition and diversity of the terrestrial and marine biota prior to the end-Triassic interval. The Northern Calcareous Alps (NCA) has long been favored for the study of the Rhaetian, since the GSSP of the Triassic/Jurassic (T/J) boundary and other important T/J sections are situated in this region. However, the most famous Rhaetian sections in the NCA are composed of carbonates from the Koessen Formation and were situated in a large isolated intraplatform Basin (the Eiberg Basin), bordered to the south-east by a well-developed coral reef in the NW of the Tethys border. Several Rhaetian sections composed of marls and shales of the Zlambach Formation were deposited at the same time on the other side of this reef, in the oceanic Halstatt Basin, which was in direct connection to the Tethys.
Here, we present new results on sedimentology, stable isotope and trace element analysis of both intraplatform and oceanic basin deposits in the NCA. Intraplatform Rhaetian sections from the Koessen Formation bear a few minor intervals of shales with enrichments in organic matter, some of which are associated to carbon isotopic excursions. Oceanic sections from the Hallstatt Basin are characterized at the base by very cyclic marl-limestone alternations. Higher up in the section, sediments progressively turn into pure shale deposits and the top of the Formation is characterized by organic-rich, laminated black shales. This interval of black shales is associated with a 2 per mil negative carbon isotopic excursion and a strong warming as suggested by fluctuations in oxygen isotopes. Forthcoming geochemical and paleontological analysis on these two Formations should help us : (1) better constrain the stratigraphy of the Rhaetian in the NCA by correlating geochemical and climatic events that took place both in the intraplaform (Eiberg) and oceanic (Hallstatt) Basin, (2) decipher localized vs large Tethyan anoxic events and associated carbon-cycle perturbations and (3) constrain the possible influence of Rhaetian climatic perturbations on the biota before the end-Triassic mass extinction.