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Middle Devonian biotic crisis in the Carnic Alps: results of the Project FWF P23775-B17

KIDO, E.¹ & SUTTNER, T.¹

(1) University of Graz, Institute for Earth Sciences (Geology & Paleontology), Heinrichstrasse 26, A-8010 Graz, Austria; erika.kido@uni-graz.at

The FWF (The Austrian Science Fund) Project P23775-B17 focuses on the Middle Devonian climate perturbation and their effects on the tropical coral communities. In order to identify intervals related to climate change, sections of three different paleoenvironmental settings (pelagic, distal slope, and shallow water platform) in the Carnic Alps (Austria-Italy) were investigated in detail. Methods used include microfacies analysis, conodont biostratigraphy and the application of geochemistry (carbon and oxygen isotopes, TOC and sulfur content, major and trace elements) and geophysics (magnetic susceptibility and gamma-ray spectrometry).

The Hoher Trieb Formation (Eifelian - Frasnian) of Zuc di Malaseit Basso section (Mt. Zermula, Lanza, Italy) consists of gray to dark gray platy limestone beds with the intercalation of black shale and chert, which are accumulated at the distal slope. Within the *kockelianus* – *hemiansatus* conodont zones, three remarkable depressions of $\delta^{13}\text{C}_{\text{carb}}$, which correspond with increasing values of TOC and sulfur are observed. The second depression of $\delta^{13}\text{C}_{\text{carb}}$ between the beds ZMB23 to ZMB20 starts with the largest negative shift of carbon isotope values in the section, ranging from 2.2 to 0.1 ‰. Within these beds, a positive spike of MS value is observed just after a minor negative shift. Such a minor negative shift is also found in the Th/U values (GRS) of the same interval. We considered that the shifts observed in the carbon isotope, TOC and sulfur content, MS and GRS in beds ZMB23 to ZMB20 are related to paleoenvironmental changes which were associated with the late Eifelian Kačák Event.

The Valentin Limestone (Eifelian - Givetian) in the Wolayer Glacier section (Central Carnic Alps, Austria) is characterized by highly condensed but rhythmically deposited sediments. Except for one thin layer (70a middle) below the E/G boundary (SCHÖNLAUB, 1985), which shows fine grained peloidal packstone with rare tentaculites, the dominant facies is composed of tentaculitid wackestone. A pronounced negative excursion of MS from 43.39 to 27.71 ($10^{-9} [\text{m}^3 \cdot \text{kg}^{-1}]$) is observed between beds 70a base and 70 top across the layer 70a middle. TOC and sulfur content show increased values within the bed 70a. Although $\delta^{13}\text{C}_{\text{carb}}$ values show only a slight negative shift across the layer 70a middle, it is suggested that the layer 70a middle is associated with the Kačák Event.

The Hoher Trieb Formation in Lanza area intercalates two thick limestone breccia beds yielding silicified corals in the Eifelian – Givetian interval, which indicate high density gravitative flow (PONDRELLI et al., 2011). These beds are traceable in the Valentin Limestone, which was accumulated in a deeper environmental setting, as the beds indicating a gravitative flow are characterized by yielding iron-coated bioclasts such as corals, crinoids and brachiopod shells. The Kačák level is observed between limestone breccia beds in the Hoher Trieb Formation and between the beds which yield iron-coated bioclasts in the Valentin Limestone. Therefore the succession across the Eifelian-Givetian boundary is more or less comparable within the pelagic units.

The corals found in the Hoher Trieb Formation and the Valentin Limestone are assigned to the re-deposited materials derived from the Eifelian or Givetian shallow water limestone. In the Carnic Alps, the Eifelian and Givetian shallow water deposits are known in the Spinotti Limestone, *Amphipora* Limestone and the Kellergrat Limestone. The succession from the Spinotti Limestone to the Kellergrat Limestone shows the change in sediments which was deposited in peritidal setting that was followed by dark bituminous limestone rich in *Amphipora* and later succeeded by a well-developed reef communities. The Spinotti and Kellergrat limestones yields diverse frame building organisms like tabulate, rugose corals and stromatoporoids, whereas the *Amphipora* Limestone yields rugose corals predominately of *Dendrostella*. The change in the sediments and in the coral community might link to the changing environmental conditions which were resulted from the Middle Devonian climate perturbations.

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