



High-resolution stable-isotope record of the Middle Devonian (Eifelian-Givetian boundary) Kačák Event

D.R. Gröcke (1) and P.J. van Hengstum (1)

Stable-Isotope Biogeochemistry Laboratory (SIBL), McMaster University, Canada
(grocke@mcmaster.ca, vanhenp@mcmaster.ca)

The Kačák Event in the Middle Devonian (Eifelian-Givetian (EG) boundary) is a period of global anoxia resulting in the deposition of black shales in a diverse array of facies. Conodont stratigraphy in the North American Appalachian Basin has proven to be problematic in constraining the EG boundary, although a conodont faunal change across this boundary can be identified *otomari* Event. The Hamilton Group outcropping in Hungry Hollow, Ontario - including the top of the Arkona Shale, Hungry Hollow, and base of the Widder Formations - is a 22m sedimentary succession spanning the Middle Devonian. Conodont biostratigraphy for this section makes it difficult to define the EG boundary but the *otomari* Event can be adequately illustrated. High-resolution isotopic analysis of bulk inorganic carbonate and organic material of this sedimentary succession records a significant negative $\delta^{13}\text{C}$ excursion that is synchronous with TOC values up to 14%. We identify this negative $\delta^{13}\text{C}$ excursion as the global anoxia associated with the Kačák Event. The rapid negative $\delta^{13}\text{C}$ excursion is recorded by a shift in carbonate and organic of c. 2 per mil and c. 3 per mil respectively, and recovers to pre-excursion values within 60cm. However, the carbonate $\delta^{13}\text{C}$ record shows a significant positive excursion of c. 1.5 per mil, the organic record does not and in fact after reaching pre-excursion values trends gradually thereafter to more negative values. A $\Delta\delta$ curve for this section shows a dramatic increase over the Kačák Event, suggesting an increase in pCO_2 , which may be a driving mechanism behind the abundance of Middle Devonian black shale deposits. Our high-resolution isotopic record suggests that the Kačák Event can be isotopically identified, and we encourage such a record to be produced from the GSSP and other mid-Devonian sites. Isotopic and stratigraphic similarities between the Kačák Event and Mesozoic oceanic anoxic events suggests a possible causal link that should be further investigated.