Oceanic anoxic event at the Carnian/Norian boundary interval in the Black Bear Ridge section, British Columbia, Canada

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The Black Bear Ridge section in northeastern British Columbia consists of a continuously exposed succession through the upper Carnian and lower Norian, and has been proposed as a candidate Global Stratotype Section and Point (GSSP) for the Carnian/Norian boundary (CNB). In order to infer the late Carnian to early Norian environmental changes in the western Canadian continental margin, the stratigraphic variations of isotope $^{87}Sr/^{86}Sr$, $\delta^{13}C$, and $\delta^{18}O$ values and redox sensitive elements (V, Ni and Cr) in the CNB interval of the Black Bear Ridge section were examined. The study section is located along the north shore of Williston Lake in northeastern British Columbia. The Black Bear Ridge section represents a distal ramp facies deposited in a passive margin environment along the western margin of the North American craton. The stratigraphic interval across the CNB displays a temporal positive shift in the $\delta^{13}C$ values, with a synchronous increase in the redox indices (V/V+Ni and V/Cr ratios). The coincidence of the increase in $\delta^{13}C$ values and V/V+Ni and V/Cr indices suggests that positive carbon isotope shift in the CNB interval is attributed to the increasing of marine organic carbon burial rates in response to the anoxic conditions. Increased $\delta^{13}C$ values for carbonate rocks at the CNB has been also reported from the Upper Triassic sections in Europe (e.g., Pizzo Mondello section, Sicily), which suggests the more widespread development of anoxic conditions in the CNB interval between the Pacific and the Tethyan Oceans. The present geochemical data and recent conodont biostratigraphic works at Black Bear Ridge show that the onset of oceanic anoxic event may have been responsible for the faunal turnover event at the CNB. The cause of this anoxic event is enigmatic but the $^{87}Sr/^{86}Sr$ and $\delta^{13}C$ isotope data largely excludes the possible cause of the oceanic anoxic event triggered by dissociation of methane hydrates and degassing due to large-scale volcanic activity.

Keywords: Limestone, Triassic, Canada

