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The age correlation of carbon isotopic ratios from terrestrial woody material in the Late Cretaceous Mifune Group

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The age correlation of sedimentary sequence has been based on bio- and magnetostratigraphy. However it is difficult to correlate between marine and non-marine sequence due to the absence of marine fossils such as planktonic foraminifera, ammonites and inoceramids in non-marine sedimentary rocks. Recent studies have suggested that comparing the fluctuations of carbon isotopic ratios from the carbonates or the organic matters in sedimentary rocks is assumed to be a tool of direct correlation between marine and non-marine sequence. For example, Takashima et al. (2010) have supported that the fluctuations of carbon isotopic ratios from the terrestrial woody materials on the marine sequence in Pacific region correspond well with those from marine carbonates in Tethyan and Atlantic regions. Thus, there is the possibility that carbon isotopic ratios from the terrestrial woody materials in non-marine sequence show a similar fluctuation pattern.

In this study, sedimentary rocks mainly of mudstones and sandy-siltstones were collected from the lower part of the Lower Formation of Mifune Group, which formed non-marine condition, distributed in middle Kyushu. From these samples, woody materials were picked out under the binocular and carbon isotopic ratios ($\delta^{13}\text{C}$) of woody materials were measured by EA/IRMS.

The study section has been considered near the Cenomanian/Turonian boundary (Ikegami et al., 2007). $\delta^{13}\text{C}^{\text{wood}}$ values fluctuated from -27.2permil to -21.5permil with an average of -24.3permil in this section. $\delta^{13}\text{C}^{\text{wood}}$ curve showed two features: anomalous low values of $\delta^{13}\text{C}^{\text{wood}}$ (-27.2permil) followed by abrupt increasing of $\delta^{13}\text{C}$ values to over -22permil in upper part of section. As compare to the carbon isotope stratigraphy of $\delta^{13}\text{C}^{\text{wood}}$ from Yezo Group in Hokkaido which is marine sequence and its age correlation with European region is established based on biostratigraphy of planktonic foraminifera, fluctuation pattern of carbon isotope ratios in this studied section seems to be correlated to late Cenomanian. And it is not contradiction to the estimated age in the past study. The result support that comparing the fluctuation of carbon isotopic ratios from detrital woody materials is a useful tool to correlate directly marine and non-marine sequence and it is expected that the comparison of both can be established by an accumulation of carbon isotope data of terrestrial organic matter.

Keywords: carbon isotope, cretaceous