Carbon and hydrogen isotopes of C_{40} alkenones and C_{41} *n*-alkane from OAE2 interval of IODP Site U1516 in southern high latitude

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Coisiderable concentrations of C₄₀ alkenones (tetracontadienones) and C₄₁ normal alkane (n-alkane) were observed in black shale sediments from Oceanic Anoxic Event 2 interval of IODP Site U1516 in Southern high latitude. About five permil difference of carbon isotope values of the molecules indicates that they have separate origins. The carbon isotope stratigraphy of the C40 alkenones shows ~2.5-3 permil increase in the expected interval of well known carbon isotope excursion for OAE2, filling gap of a carbonate-free interval. Although its origin is not identified yet, C₄₁ n-alkane marks the highest concentration among detected n-alkanes in some samples and has characteristic carbon and hydrogen isotope values. The carbon isotope value ranging between -34 and -36 permil is not comparable to that of higher plant-derived C₂₉ n-alkane (between -26 and -30 permil) or algal C₁₈-C₂₀ n-alkanes (between -29 and -32 permil). Although its long and straight-chained structure comparable with C40 alkenones and their co-occurrences, C41 n-alkane cannot be a derivative of the alkenones. Carbon isotope values of the alkenones are largely different from that of C₄₁ n-alkane and rather close to that of terrestrial or algal n-alkanes. On the other hand, hydrogen isotope values of C₄₀ n-alkane are close to that of algal n-alkanes suggesting similar hydrological setting of their syntheses. Both C_{40} alkenones and C_{41} n-alkane show high concentration only in the black layers in the OAE2 interval. As source rock analysis by the on-board scientists showed high hydrogen index (HI) for the black mudstone layers from OAE2 interval, both C_{41} n-alkane and C₄₀ alkenones are interpreted to be algal in origin. It is concordant with the expected origin of long chain alkenones (haprophytes). It should also be noted that the concentration of n-alkanes derived from higher plants (C27, C29 and C31 n-alkanes) are also high in the black layers implying productivity not only of sea surface but also of land area both increased.

Keywords: OAE, Cretaceous, IODP, carbon isotope, hydrogen isotope, alkenone