Terrestrial environment across the Cretaceous-Tertiary boundary recorded in sedimentary leaf wax n-alkanes

Shinya Yamamoto[1]; Takashi Hasegawa[2]; Ryuji Tada[3]; Kazuhisa Goto[4]; Shinji Yamamoto[5]; Hironobu Sakuma[3]; Takafumi Matsui[6]

[1] Natural Sci. & Technology, Kanazawa Univ.; [2] Dept. Earth Sci., Kanazawa Univ.; [3] DEPS, Univ. Tokyo; [4] DCRC, Tohoku Univ.; [5] Earth and Planetary Sci., Tokyo Univ; [6] Grad. Sch. of Frontier Sci., Univ. of Tokyo

The Cretaceous-Tertiary (K-T) mass extinction (65.5 Ma) is one of the largest mass extinction events in the Phanerozoic. A 15% to 56% of land plants and palynofloral taxa went extinct (Nichols, 2007), and it took more than several hundreds of thousand years for a reconstruction of diversified plant communities (Wolfe and Upchurch, 1987). On the other hand, 1.5 to 2.0 per mil negative excursion in marine and terrestrial sedimentary carbon isotope ratio ($d^{13}C$) across the K-T boundary indicates the disruption in global carbon cycle at that time (Hsu et al., 1982). However, the effect of the changes in global carbon cycle on the terrestrial vegetation has been stiil unclear. Long-chain *n*-alkanes are major constituents of higher plant epicuticular waxes, which are commonly found in marine sediments. They have recorded plant $d^{13}C$ values and are known to vary their chain-length distribution reflecting vegetation and environmental changes in the source area. In this study, we investigated stable carbon isotope ratio ($d^{13}C_{wax}$) and chain-length distribution of leaf wax *n*-alkanes (31/(29+31) ratio: relative abundance of *n*-C_{31} to the summed abundance of *n*-C_{29} and *n*-C_{31}) in hemipelagic K-T boundary sequence at Loma Capiro, Central Cuba to reveal terrestrial environmental changes and their relationships to the changes in global carbon cycle across the K-T boundary.

The 31/(29+31) ratio and the $d^{13}C_{wax}$ values both exhibit significant decrease at the lowermost part of the Paleocene. And these lowermost Paleocene samples are plotted into a distinct area in the $d^{13}C_{wax}$-31/(29+31) cross plot, compared with that in the Cretaceous and the rest of the Paleocene samples. This difference in the distribution area would reflect changes in source vegetation across the K-T boundary. In contrast, the $d^{13}C_{wax}$ shows positive correlation against the 31/(29+31) ratio within the distribution of lowermost Paleocene samples. this positive correlation suggests that the carbon isotope shift in the atmospheric carbon dioxide (CO_2) and associated environmental changes during the earliest Paleocene would decrease the $d^{13}C_{wax}$ values and the 31/(29+31) ratios. The results of this study, thus, indicate that the earliest Paleocene plants that recovering from the K-T mass extinction are further affected by environmental changes associated with the carbon cycle perturbation.