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Stable carbon and radiocarbon isotopic signatures of plant derived biomarkers in forest fine aerosol

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Accurate estimate of carbon isotopic discrimination (Δ) by photosynthesis is important to evaluate the magnitude and spatial distribution of terrestrial uptake of carbon dioxide. The temporal and regional patterns of Δ in terrestrial biosphere have been little known because of its subject to considerable uncertainty. In this study, we measured ^{13}C and ^{14}C isotopic compositions of plant-derived molecule (n-Fatty acids and n-Alkanes) in forest aerosols and plant material (forest canopy: *Quercus crispula* Blume and *Betula ermanii* Cham, forest understory: *Sasa senanensis*) in order to evaluate direct mean Δ values at the ecosystem-level and plant biosynthetic fractionation. We collected fine aerosol samples at a few week intervals from August 2003 to November 2004 during the growing season at Takayama Experimental site (36˚80'N, 137˚26'E, 1420m a.s.l.) in a cool-temperate deciduous forest in Japan.

Aerosol organic molecule exhibited high abundance of C_{16}, $C_{18;n}$ n-Fatty acids (FAs). Short chain FAs (C_{16} and C_{18}) had variations with ^{13}C depletion during the early and mid growing season with an amplitude of ca. 3.5 ‰, (from -28.5‰ to -26‰). The δ^{13}C values of long chain FAs (C_{24}-C_{30}) and n-Alkanes (C_{25}-C_{31}) were constant through out the growing season. Δ values calculated by δ^{13}C values derived plant showed significant seasonality in short chain FAs, ranging from maximum values of 15.4‰ for the mid growing season to minimum of 12.1‰ for the late growing season. On the other hand, the δ^{13}C values of long chain FAs and n-Alkanes were constant at ca. 18‰ of FAs and ca. 17‰, respectively. Relationships between plant wax-based

discrimination by plant photosynthesis and ecosystem carbon budget (GPP, NEP etc) estimated by the eddy covariance method were also investigated. The ^{14}C signatures of molecule from aerosol will also be reported in the conference.