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ブナ成熟林における土壌圏有機物分解:ギャップモザイク構造を考慮して
Effects of gap-mosaic structures on biodegradation of organic matter in soil ecosystems in old-growth forest

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Old-growth forests serve as a global carbon sink, but they are not protected by international treaties, because it is generally thought that ageing forests cease to accumulate carbon in live woody tissues (kira & shidei 1967; Odum 1969). Recently studies reported however, old-growth forests can continue to accumulate carbon, contrary to the longstanding view that they are carbon neutral (Luyssaert et al. 2008; Lewis et al. 2009). If this is true, most of carbon may move into non-living pools such as litter (leaf and woddy detritus) and soil. In addition, Old-growth forests generally have higher spatial heterogeneous structures (gap-mosaic structures). These forests structural properties may be greatly contributed to the carbon cycling of old-growth forests. In this study, we therefore focused on determining the litter decomposition rates and chemical properties of soil organic matter (SOM) in three stages of forest standings plots of old-growth forest to clarify the relationship between spatial heterogeneous and organic matter decomposition in surface soil ecosystems.

We conducted this study on Kayanodaira Research Station, Shinshu University, Japan (a permanent plot of 1 ha was set on a research station in 2005). The study area has a seasonal cool-temperate climate. The dominant species are *Fugus crenate* Blume (300˜500 age). From November 2010, three experimental plots (15 m^2) were established by differences of vegetation conditions to gap, young, and mature sites. Litter decomposition rate was estimated by litterbag methods from Novenber 2010 to October 2011. Characterization of SOM was performed by optical properties. All investigation was performed 5 replicate.

Litter mass remaining rate during 350 days decreased from gap (86.8) > young (82.1) > mature (81.6) at L layer and decreased from gap (94.6) > young (89.0) > mature (85.5) at FH layers. Degree of biodegradation of SOM estimated from aliphaticity (Alkyl C:O-alkyl C ratio) in gap site showed significantly lower values. These results strongly suggest that gap structure slow the microbial activities in soil ecosystems in old-growth forest.