

Coupled Biogeochemical Cycles

3. Fluxes of CH₄, CO₂, and N₂O from an Old-growth Evergreen Broadleaved Forest in Southern China: the Effects of Litter Harvesting

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ABSTRACT: Fluxes of CH₄, CO₂, and N₂O from forest soil were measured with enclosed chamber technique between April 2003 and March 2004 in an old-growth (more than 400 years old) evergreen broadleaved forest in Dinghushan Nature Reserve (23°09'21"~23°11'30"N, 112°30'39" ~112°33'41"E) in southern China. Two disposals including soil with litter and bare soil were settled with the intention of comparing the effects of litter harvesting. The relationships between fluxes and soil moisture and soil temperature were analyzed to investigate the dependence of gas fluxes on these key environmental variables. Major results include large seasonal variations were observed with generally higher CO₂ and N₂O fluxes during the rainy season (from April to September) in both disposals. Higher CH₄ fluxes were observed from the bare soil and lower fluxes from the soil with litter during the dry season (from October to March). Compared with the bare soil, soil with litter had higher CO₂ and N₂O fluxes, and lower CH₄ flux in the rainy than in the dry season. Soils behaved as net sources of these greenhouse gases in the two disposals except the soil with litter which acted as a net sink of CH₄. CO₂ fluxes were strongly correlated with soil temperature in both disposals, and affected by soil moisture only in the disposal of soil with litter. The difference of CH₄ fluxes between these two disposals indicated that harvesting litter could result in net CH₄ emission in the old-growth evergreen broadleaved forest.