



Diurnal Variations of Greenhouse Gas Fluxes from Mixed Broad-leaved and Coniferous Forest Soil in Dinghushan

<http://www.fristlight.cn> 2007-07-10

[作者] ZHOU Cunyu

[单位] South China Botanical Garden, Chinese Academy of Sciences, Institute of Atmospheric Physics, Chinese Academy of Sciences

[摘要] The subtropical mixed broad-leaved and coniferous forest, a typical successional monsoon forest, is one of the major forests in the subtropics of China. Therefore, it is very important to estimate the fluxes of the greenhouse gases from the forest soil in order to evaluate the impact of subtropical forests on the greenhouse gas emissions or absorptions. This study investigated the diurnal variations of fluxes of three greenhouse gases (CO₂, CH₄, and N₂O) from a mixed broad-leaved and coniferous forest soil. A static chamber-gas chromatograph technique was used to measure the fluxes of three greenhouse gases. By using the improved gas chromatography sampling system, the fluxes were analyzed with a single injection. In order to find out the effects of litter and seedling on the emissions or absorptions of these greenhouse gases, three treatments were set in the field: (1) bare soil surface (litter was removed previously); (2) litter+soil; (3) seedling+litter+soil. The experimental results demonstrated that the forest soil was a source of CO₂, N₂O and a weak sink of CH₄. The daily fluxes of CO₂, CH₄, and N₂O from the soil surface were in the range of 488.99-700.57, 0.049-0.108 and -0.025--0.053 mg / (m²·h), respectively. CO₂ from the litter decomposition accounted for about 1/3 of the total CO₂ emission from the soil surface, while the litter and seedling had no significant effect on the fluxes of CH₄ and N₂O. The fluxes of CO₂ and N₂O measured at 9:00—11:00 a.m. were significantly different from their daily averages. Therefore, caution must be taken if the CO₂ and N₂O fluxes measured within 9:00-11:00 a.m. are used for extrapolation.

[关键词] greenhouse gas; emission; absorption; flux; diurnal variation; broad-leaved and coniferous forest; Dinghushan; Chinese Academy of Sciences

The subtropical mixed broad-leaved and coniferous forest, a typical successional monsoon forest, is one of the major forests in the subtropics of China. Therefore, it is very important to estimate the fluxes of the greenhouse gases from the forest soil in order to evaluate the impact of subtropical forests on the greenhouse gas emissions or absorptions. This study investigated the diurnal variations of fluxes of three greenhouse gases (CO₂, CH₄, and N₂O) from a mixed broad-leaved and coniferous forest soil. A static chamber-gas chromatograph technique was used to measure the fluxes of three greenhouse gases. By using the improved gas chromatography sampling system, the fluxes were analyzed with a single injection. In order to find out the effects of litter and seedling on the emissions or absorptions of these greenhouse gases, three treatments were set in the field: (1) bare soil surface (litter was removed previously); (2) litter+soil; (3) seedling+litter+soil. The experimental results demonstrated that the forest soil was a source of CO₂, N₂O and a weak sink of CH₄. The daily fluxes of CO₂, CH₄, and N₂O from the soil surface were in the range of 488.99-700.57, 0.049-0.108 and -0.025--0.053 mg / (m²·h), respectively. CO₂ from the litter decomposition accounted for about 1/3 of the total CO₂ emission from the soil surface, while the litter and seedling had no significant effect on the fluxes of CH₄ and N₂O. The fluxes of CO₂ and N₂O measured at 9:00—11:00 a.m. were significantly different from their daily averages. Therefore, caution must be taken if the CO₂ and N₂O fluxes measured within 9:00-11:00 a.m. are used for extrapolation.

[存档附件1](#)

