Geophysical Research Abstracts
Vol. 19, EGU2017-2465, 2017
EGU General Assembly 2017

Effects of land cover change on litter decomposition and soil greenhouse gas fluxes in subtropical Hong Kong

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Nowadays, over 50% of the world's population live in urbanized areas and the level of urbanization varies substantially across countries. Intense human activities and management associated with urbanization can alter the microclimate and biogeochemical processes in urban areas, which subsequently affect the provision of ecosystem services and functions. Litter decomposition and soil greenhouse gas (GHG) exchange play an important role in governing nutrient cycling and future climate change, respectively. Yet, the effects of urbanization on these two biogeochemical processes remain uncertain and not well understood, especially in subtropical and high-density cities. This study aims to examine the effects of urbanization on decomposition and GHG fluxes among four land covers– natural forest, urban forest, farmland and roadside planter, in Hong Kong based on litterbag experiment and closed chamber measurements for one full year. Litter decomposition rate was significantly lower in farmland than in other land cover types. Significant differences in CO_2 emission were detected among the four land cover types ($p<0.05$), with the highest and lowest CO_2 emissions being recorded in farmland and roadside planter, respectively. CH4 emission varied significantly among the land covers as well ($p<0.05$), with the highest and lowest CH4 emissions being recorded in farmland and urban forest, respectively. Farmland and urban forest showed the highest and lowest mean N2O fluxes, respectively. The emission of CO_2 was positively correlated with soil potassium content, while CH4 and N2O flux increased markedly with soil temperature and nitrate nitrogen content, respectively. The results obtained in this study will enhance our understanding on urban ecosystem and be useful for recommending sustainable management strategies for conservation of ecosystem services in urban areas.