Geophysical Research Abstracts
Vol. 17, EGU2015-3032, 2015
EGU General Assembly 2015

Variability in soil CO_2 efflux across distinct urban land cover types

Lena F Weissert, Jennifer A Salmond, and Luitgard Schwendenmann
The University of Auckland, School of Environment, New Zealand (l.schwendenmann@auckland.ac.nz)

As a main source of greenhouse gases urban areas play an important role in the global carbon cycle. To assess the potential role of urban vegetation in mitigating carbon emissions we need information on the magnitude of biogenic CO_2 emissions and its driving factors. We examined how urban land use types (urban forest, parklands, sportsfields) vary in their soil CO_2 efflux. We measured soil CO_2 efflux and its isotopic signature, soil temperature and soil moisture over a complete growing season in Auckland, New Zealand. Soil physical and chemical properties and vegetation characteristics were also measured. Mean soil CO_2 efflux ranged from 4.15 to 12 μmol m^{-2} s^{-1}. We did not find significant differences in soil CO_2 efflux among land cover types due to high spatial variability in soil CO_2 efflux among plots. Soil (soil carbon and nitrogen density, texture, soil carbon:nitrogen ratio) and vegetation characteristics (basal area, litter carbon density, grass biomass) were not significantly correlated with soil CO_2 efflux. We found a distinct seasonal pattern with significantly higher soil CO_2 efflux in autumn (Apr/May) and spring (Oct). In urban forests and sportsfields over 80% of the temporal variation was explained by soil temperature and soil water content. The $\delta^{13}C$ signature of CO_2 respired from parklands and sportsfields (-20 permil - -25 permil) were more positive compared to forest plots (-29 permil) indicating that parkland and sportsfields had a considerable proportion of C4 grasses. Despite the large intra-urban variability, our results compare to values reported from other, often climatically different cities, supporting the hypothesis of homogenization across urban areas as a result of human management practices.