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Human Effects and Soil Surface CO_2 fluxes in Tropical Urban Green Areas, Singapore

Bernard Ng (1,2), Laure Gandois (2), Fuu Ming Kai (2), Amy Chua (2), Alex Cobb (2), Charles Harvey (3), and Lucy Hutyra (4)

(1) National University of Singapore, NUS, (2) Singapore-MIT Alliance for Research and Technology, CENSAM, (3) Massachusetts Institute of Technology, MIT, (4) Boston University, BU

Urban green spaces are appreciated for their amenity value, with increasing interest in the ecosystem services they could provide (e.g. climate amelioration and increasingly as possible sites for carbon sequestration). In Singapore, turfgrass occupies approximately 20% of the total land area and is readily found on both planned and residual spaces. This project aims at understanding carbon fluxes in tropical urban green areas, including controls of soil environmental factors and the effect of urban management techniques. Given the large pool of potentially labile carbon, management regimes are recognised to have an influence on soil environmental factors (temperature and moisture), this would affect soil respiration and feedbacks to the greenhouse effect.

A modified closed dynamic chamber method was employed to measure total soil respiration fluxes. In addition to soil respiration rates, environmental factors such as soil moisture and temperature, and ambient air temperature were monitored for the site in an attempt to evaluate their control on the observed fluxes. Measurements of soil-atmosphere CO_2 exchanges are reported for four experimental plots within the Singtel-Kranji Radio Transmission Station (103^{o}43'49E, 1^{o}25'53N), an area dominated by *Axonopus compressus*. Different treatments such as the removal of turf, and application of clippings were effected as a means to determine the fluxes from the various components (respiration of soil and turf, and decomposition of clippings), and to explore the effects of human intervention on observed effluxes.

The soil surface CO_2 fluxes observed during the daylight hours ranges from 2.835 $\pm$ 0.772 umol m-2 s-1 for the bare plot as compared to 6.654 $\pm$ 1.134 umol m-2 s-1 for the turfed plot; this could be attributed to both autotrophic and heterotrophic respiration. Strong controls of both soil temperature and soil moisture are observed on measured soil fluxes. On the base soils, fluxes were positively correlated to soil temperature and negatively to soil moisture. Above the grass, fluxes are negatively correlated soil temperature and positively to soil moisture.

The measured values will be combined to carbon stock evaluation in the different compartments to assess carbon budget for green area under different grass management in Singapore.