Geophysical Research Abstracts
Vol. 21, EGU2019-1606, 2019
EGU General Assembly 2019

The numerical relationship between widths and cooling effects of riverside greenways

Huiwen Zhang

Urban riverside greenway plays an important role in mitigating the urban heat island (UHI) effect and the heat-waves. Especially in high-dense cities, an efficient width of riverside greenway can expand the cooling effect of waterbody and green space as far as possible in the limited area. Previous studies claimed that there was probably an optimal width of greenway and a corresponding threshold of the cooling effects of greenways. However, as the numerical relationship between the width and cooling effects of riverside greenways is still not clear, the existing of the optimal width and the threshold of cooling effect has not been proved yet.

The purpose of this study is to figure out the numerical relationship between the width and the cooling effect of the river greenways. Through the ENVI-met model, 152 scenarios were simulated to acquire the different widths of riverside greenways (from 10-200m, with 10m intervals) under different vegetation densities (*Grasses, Bushes, Sparse Trees, Dense Trees and Dense Trees with Bushes*), and their corresponding cooling effects(the maximum cooled-down air temperature). The numerical relations between widths and cooling effects were derived through the nonlinear regression by the least square method. The regressions were made separately under the five different vegetation types. A field measurement was conducted in a riverside greenway containing different widths of green spaces to test the creditability of the numerical relationship.

The results show that the relationship between the width and the cooling effect of riverside greenways is very close to an inverse proportional function with R2=0.98. There is an asymptotic line of this kind of function, which can be seen as the threshold of the cooling effect and differs between different vegetation types (0.2K for *Grasses*, 0.7K for *Bushes*, 1.1K for *Sparse Trees*, 1.5K for *Dense Trees* and 2.1k for *Dense Trees with Bushes*). However, there is no critical point of this function during the domain of definition. This indicates that there is no significant optimal solution for the width of the riverside greenway. The cooling effect of the riverside greenway always increases with the expanding of the width. However, the speed of the increase of the cooling effect keeps slowing down with the increase of the width.

This study explored the numerical relationship between the biomass and the ecological functions through the way of simulation. This methodology can enable abundant ideal scenarios which are not possible in the real environment. However, the creditability of the results should be confirmed repeatedly in the coming studies. More field measurements will be conducted in the future to test and amend the results of this study.