

## **Carbon dioxide, heat, and water fluxes on a Manhattan green roof**

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Green roofs address several important problems, but there has been limited quantification of their benefits exist. The methods used for this research allow for more complete quantification of known green roof benefits, and investigation of more speculative benefits such as the use of green roofs for short-term carbon sequestration.

Measurements of atmospheric CO<sub>2</sub> and H<sub>2</sub>O concentration and meteorological variables were taken between 19 June 2008 and 6 July 2008 on a green roof in the Morningside Heights area of Manhattan. CO<sub>2</sub> and H<sub>2</sub>O concentrations were sampled at five different heights for five minutes each over the course of thirty minute intervals to construct a vertical profile, as well as a being sampled constantly at the median height to quantify time variability; temperature and relative humidity were sampled at the highest, lowest, and median heights. Wind speed and direction were recorded from two heights. Canopy temperature and moisture, and solar radiation were also measured. The gradient flux technique was used to calculate the carbon dioxide, sensible and latent heat, and water fluxes between the green roof and the atmosphere.

The plant canopy was a net sink of carbon dioxide during the day and a net source of carbon dioxide during the night, as expected. Average carbon dioxide flux was approximately 98.8168 g C/m<sup>2</sup>/year from the atmosphere into the plant canopy.