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## The potential of urban soils for carbon neutral cities

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Urban areas are notable sources of atmospheric CO<sub>2</sub> and cities are currently setting up climate programs with the aim of carbon neutrality in the near future. For example, two major cities in Southern Finland, Helsinki and Turku, have set their targets for 2035 and 2029, respectively. Carbon neutrality can be achieved by reducing carbon emissions, compensating them, and / or strengthening carbon sinks in urban vegetation and soils, the last of which is often deemed the most cost-efficient option. However, the current understanding of biogenic carbon cycling in urban environments is based on dynamics observed in more well-known ecosystems such as forests and agricultural lands. Urban ecosystems differ from non-urban areas in terms of temperature, precipitation and water cycling, pollution, and the level of human-induced disturbance. Thus, there is a need for observations on urban carbon to accurately model and estimate the carbon sinks and stocks in urban green space.

We aimed to monitor urban biogenic carbon cycle with an extensive field campaign carried out around the SMEAR III ICOS station in 2020–2022, accompanied by a few satellite sites around the capital region of Finland. In this presentation, we will show soil carbon pools and the dynamics of soil respiration at five different types of urban green space: a managed park lawn with and without trees, small urban forest, apple orchard, and street tree site. Soil respiration was measured with both regularly repeated manual chamber measurements and automatic chambers throughout two growing seasons. Soil carbon stock was estimated by soil samplings conducted in 2020 and 2021. We investigate the role of different drivers in soil CO<sub>2</sub> emission at the various urban green space types and compare those to corresponding metrics measured in non-urban areas. In addition, we test the applicability of Yasso model to simulate the soil carbon dynamics in urban areas.