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Soil Carbon Dioxide Emission in Extreme Environment of the Center of Moscow Megapolis

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Moscow is the largest megapolis in Europe. The area of sealed areas in the center of Moscow is more than 50% (without hydrological objects). Anti-icing mixtures, car traffic, aerosols, dust, trampling - all this leads to the maximum stress of ecosystems in an urban environment. Soil emission is the largest component of Gross Respiration in terrestrial ecosystems, including cities. Field measurements of emission allow estimating and comparing the state of both the underground tier and the entire ecosystem in different functional zones of a city with different types of vegetation. Soil emission is the easiest to measure, as compared to other fluxes of C-exchange. In 2019, field measurements of carbon dioxide emissions were carried out at 15 key sites (15 times, 1 per 2 weeks), which showed that in the historic center, not only the temperature at different depths of the soil, soil moisture, carbon content, particle size distribution, but also the diversity of factors combined into a group of "land use", namely: human tillage, irrigation, lawn mowing, garbage removal, sprinkling peat-compost mixture, trampling, bringing anti-icing reagents, etc., have a contrasting effect on carbon dioxide emissions from urban soils. In some cases, the emission is below the conditional background values (urban forest), in other cases, it is higher up to several times, which allows a new assessment of soils of unsealed (open) areas of the center of a megapolis as an important component of the (micro-) regional C-cycle. The data obtained allow comparing the current state of the upper part of the underground tier of urban ecosystems under the maximum anthropogenic load in the territory of a modern large city, where the share of open surfaces is minimal. The territories, where the ground layer is represented by cultivated lawn, are characterized by the maximum values of soil carbon dioxide emission.

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