

Phenocam-based assessment of biogenic CO₂ fluxes in urban ecosystem

In the face of climate change, understanding how cities influence the carbon dioxide (CO₂) cycle – one of the main greenhouse gases – is becoming increasingly important. Most studies focus on human-related emissions such as transport, heating, or industry. However, cities also contain vegetation – trees, lawns, parks – which, just like in forests, absorbs CO₂ through photosynthesis. Separating these two sources and understanding how much CO₂ is taken up by urban greenery is currently one of the major challenges in urban climate science.

The aim of this project is to develop a simpler and more accurate method of distinguishing these two components of CO₂ flux in the urban environment. The research will be conducted in the centre of Łódź, where a specialist measurement tower has been monitoring gas exchange between the city surface and the atmosphere for years. A novel element of the project will be the use of digital images taken daily from this tower – a technique known as digital repeat photography. By analysing the greenness level in the images, it will be possible to track changes in vegetation activity over time and link them to the level of CO₂ uptake.

The project will contribute to a better understanding of when and under what conditions urban greenery helps reduce the amount of CO₂ in the air. This, in turn, can support urban planners in making decisions about the development of green infrastructure that most effectively improves residents' quality of life and contributes efficiently to achieving climate neutrality in cities.