

EGU22-12270

<https://doi.org/10.5194/egusphere-egu22-12270>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



## Vertical profiles of CO<sub>2</sub> concentration in the urban area of Krakow, Poland – preliminary results of CoCO<sub>2</sub> measurement campaigns.

**Mirosław Zimnoch**<sup>1</sup>, Piotr Sekula<sup>1,2</sup>, Alicja Skiba<sup>1</sup>, Mikita Maslouski<sup>1</sup>, Alina Jasek-Kaminska<sup>1,2</sup>, Zbigniew Gorczyca<sup>1</sup>, Lukasz Chmura<sup>1,2</sup>, Jakub Bartyzel<sup>1</sup>, Jaroslaw Necki<sup>1</sup>, and Pawel Jagoda<sup>1</sup>

<sup>1</sup>AGH University of Science and Technology, Faculty of Physics and Applied Computer Science, Krakow, Poland

<sup>2</sup>Institute of Meteorology and Water Management – National Research Institute, Poland

Urban areas, which constitute 2% of the land surface, are responsible for around 70% of anthropogenic CO<sub>2</sub> emissions. Estimation of the anthropogenic contribution in total atmospheric CO<sub>2</sub> load observed in cities is crucial for better understanding of the human influence on the carbon cycle and can help improve and validate atmospheric models dedicated for such regions.

In 2021, diurnal measurement campaigns were performed with approximately monthly resolution aimed at characterization of vertical profiles of CO<sub>2</sub> over the urban area of Krakow, Southern Poland, using a tethered touristic balloon located in the city center. The measurements were conducted up to the altitude of 280 m a.g.l. Simultaneously, spot air samples were collected in order to determine the contribution of anthropogenic component based on radiocarbon analysis. Based on preliminary results presented in this work, the temporal evolution of the nocturnal (NBL) and convective (CBL) boundary layer over the city can be observed. Part of the profiles also shows CO<sub>2</sub> plums detected at the elevation of ca. 200 m a.g.l. originating potentially from nearby industrial emission sources. The model analysis performed using the HySplit model enabled to identify a potential emission source.

This project has been partially supported by the European Union's Horizon 2020 research and innovation programme under grant agreement No 958927, and the subsidy of the Ministry of Education and Science.