

# COMPARISON OF CARBON MASS CONCENTRATIONS IN PM<sub>2.5</sub> AND PM<sub>1.0</sub>

Ranka Godec<sup>1,\*</sup>, Linda Kuzmanovski<sup>2</sup>, Iva Šimić<sup>1</sup>, Martina Šilović Hujčić<sup>1</sup>, Martin Mihaljević<sup>1</sup>

<sup>1</sup>Institute for medical research and occupational health, Ksaverska c. 2, 10000 Zagreb, Croatia

<sup>2</sup>Hospira Zagreb Ltd., Prudnička c. 60, 10291 Prudnice, Croatia



✓ Carbon is a major part of particle matter (PM) in the atmosphere, and the most common forms are elemental (EC) and organic (OC) carbon. Total carbon (TC) is defined as sum of EC and OC. OC is divided into primary (POC) and secondary (SOC) organic carbon depending on the source of pollution while EC originates only from primary sources of pollution.

✓ The aim of this investigation is to compare the ambient air concentrations of PM<sub>2.5</sub> and PM<sub>1.0</sub> particle fractions, as well as the particle-bound carbon mass concentrations and carbon content in each particle fraction and to establish the existence of a temporal distribution of the carbon mass concentration (EC, OC, POC, SOC, and TC) in PM<sub>1.0</sub> and PM<sub>2.5</sub> in the air of Zagreb, capital of Croatia.

✓ Measurements were conducted during three year period (2018-2020) at urban background measuring station located at Institute for medical research and occupational health where the main sources of PM and carbon species are mostly household appliances and moderate traffic.

✓ Annual mass concentrations of PM, OC, SOC, and TC (total carbon) in both particle fractions followed the sequence: 2018 > 2020 > 2019, while EC and POC in PM<sub>1.0</sub> and PM<sub>2.5</sub> followed the sequence: 2020 > 2018 > 2019. The average EC/OC mass ratio was higher in the PM<sub>1.0</sub> than in the PM<sub>2.5</sub> particle fraction. The annual average EC/OC mass ratio in both fractions was higher than 3, suggesting the presence of SOA (secondary organic aerosol) and were in the order: 2018 > 2019 > 2020.

✓ The study was conducted within the internal scientific project "Organic content of PM1 particle fraction" funded by the Institute for Medical Research and Occupational Health (PI: R. Godec).

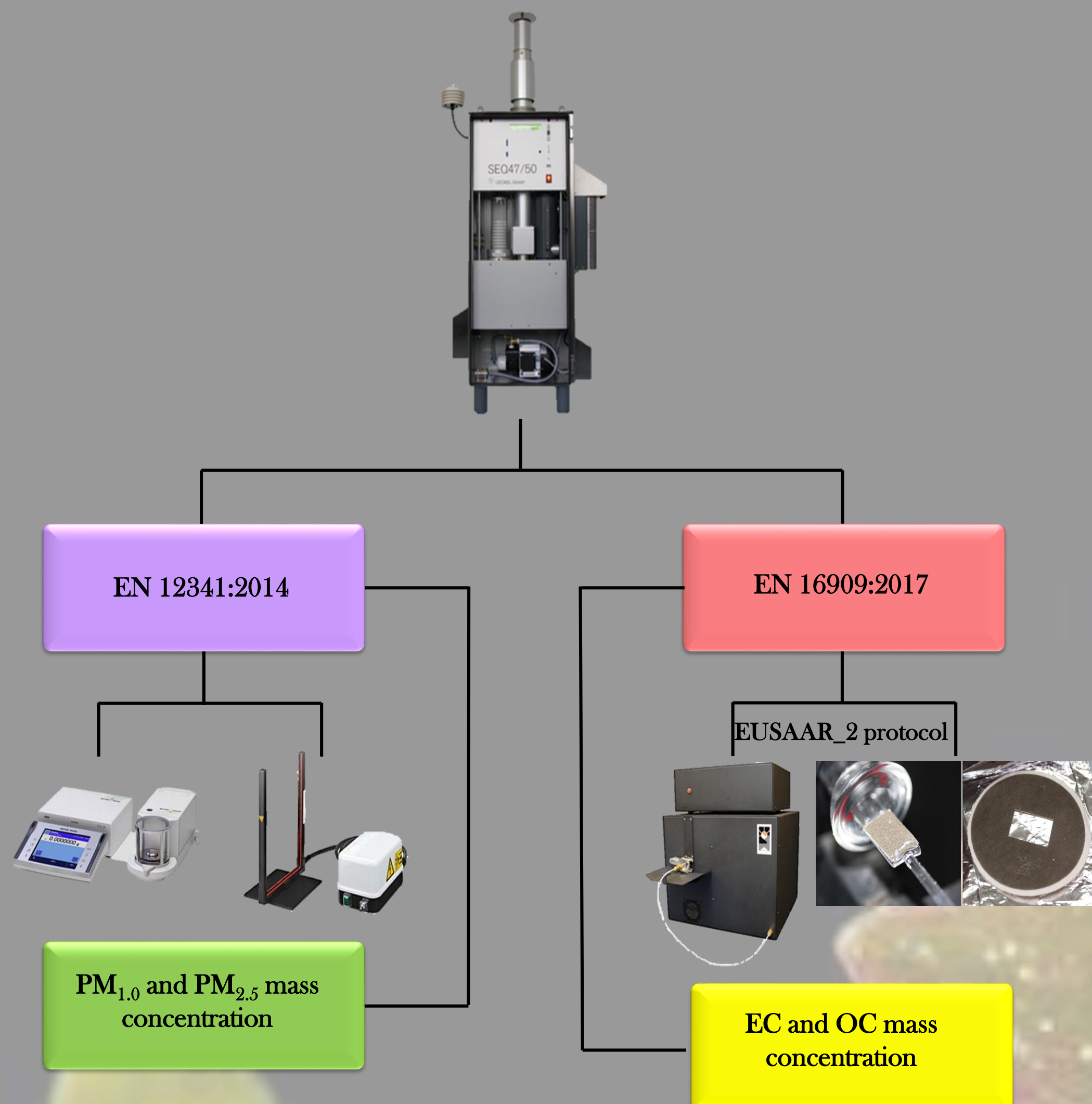


Fig. 1. Diagram of sample collection, preparation and analysis

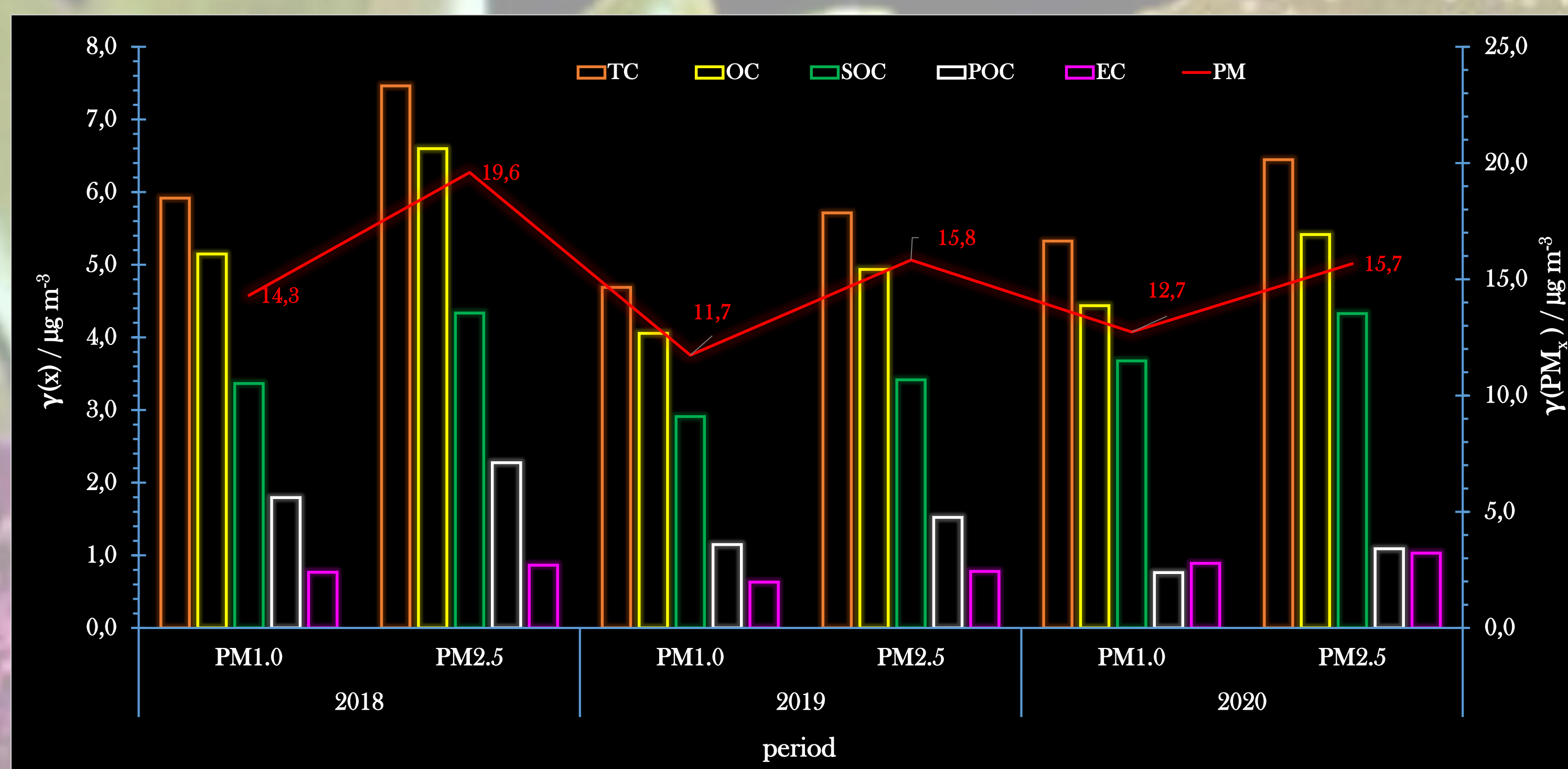


Fig. 2. Annual averages of PM<sub>1.0</sub> and PM<sub>2.5</sub> mass concentrations and carbon species (TC, OC, SOC, POC and EC) in them

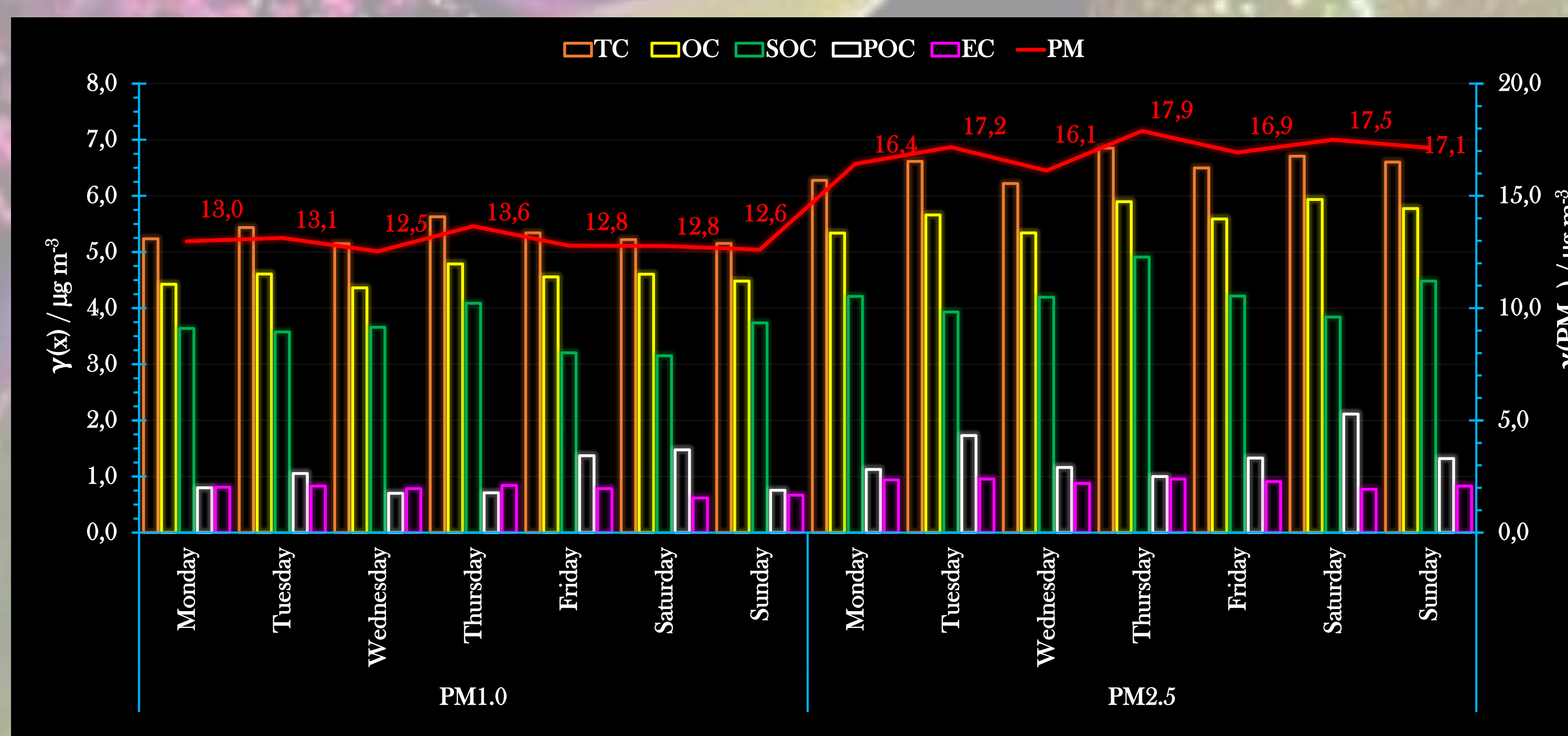


Fig. 3. Daily averages of PM<sub>1.0</sub> and PM<sub>2.5</sub> mass concentrations and carbon species (TC, OC, SOC, POC and EC) in them

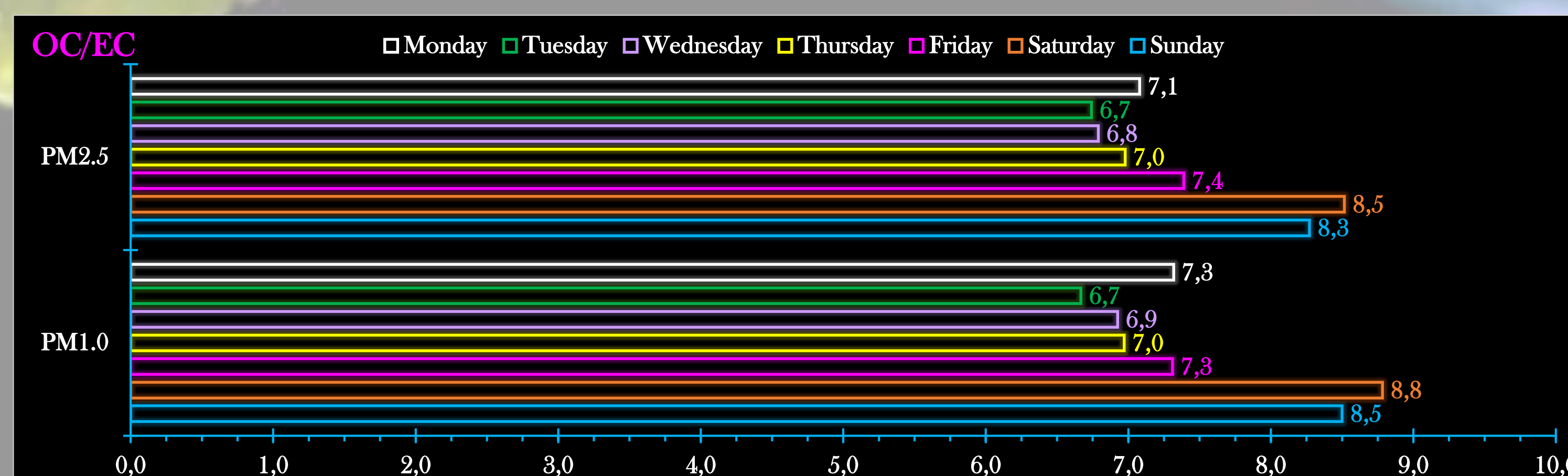


Fig. 4. Daily averages of OC/EC ratios in PM<sub>1.0</sub> and PM<sub>2.5</sub>

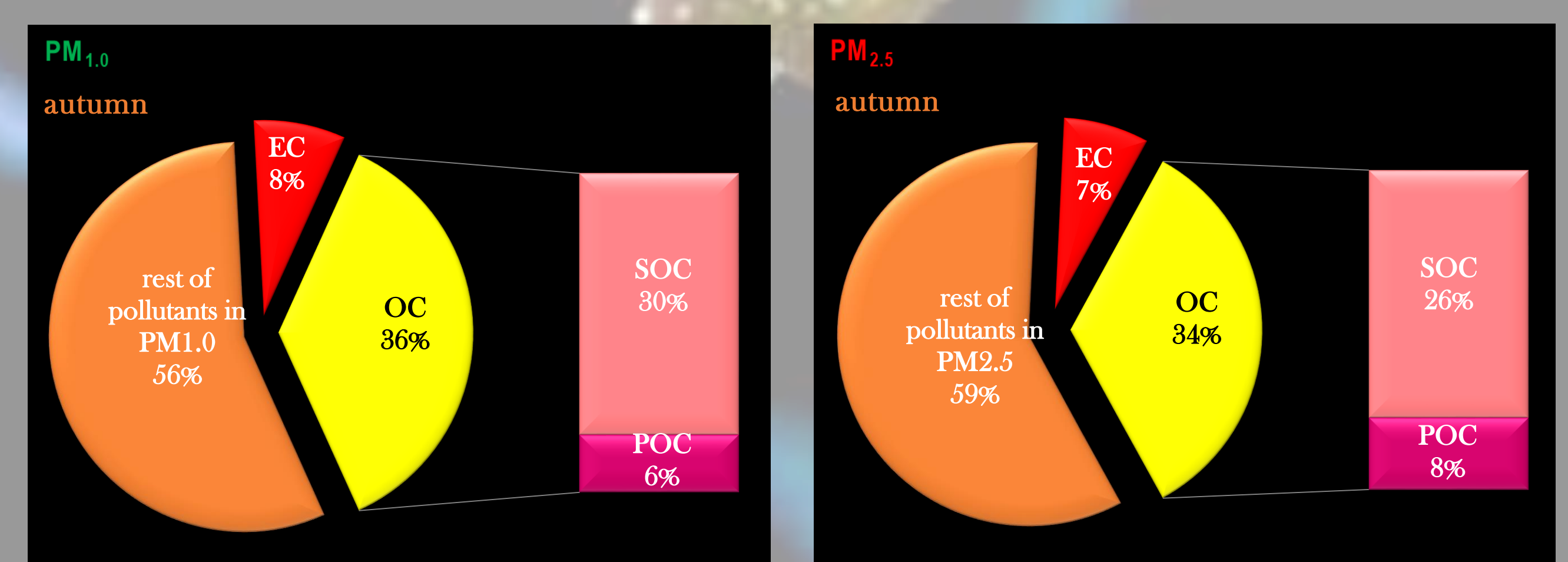
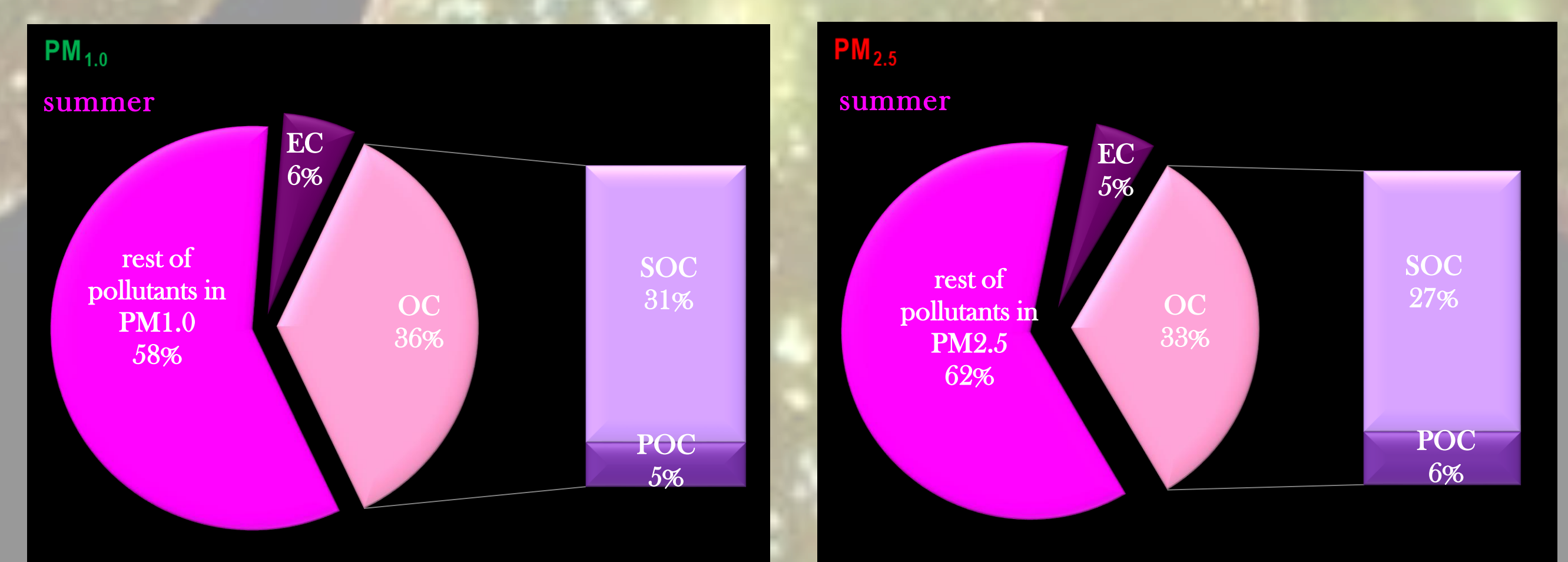
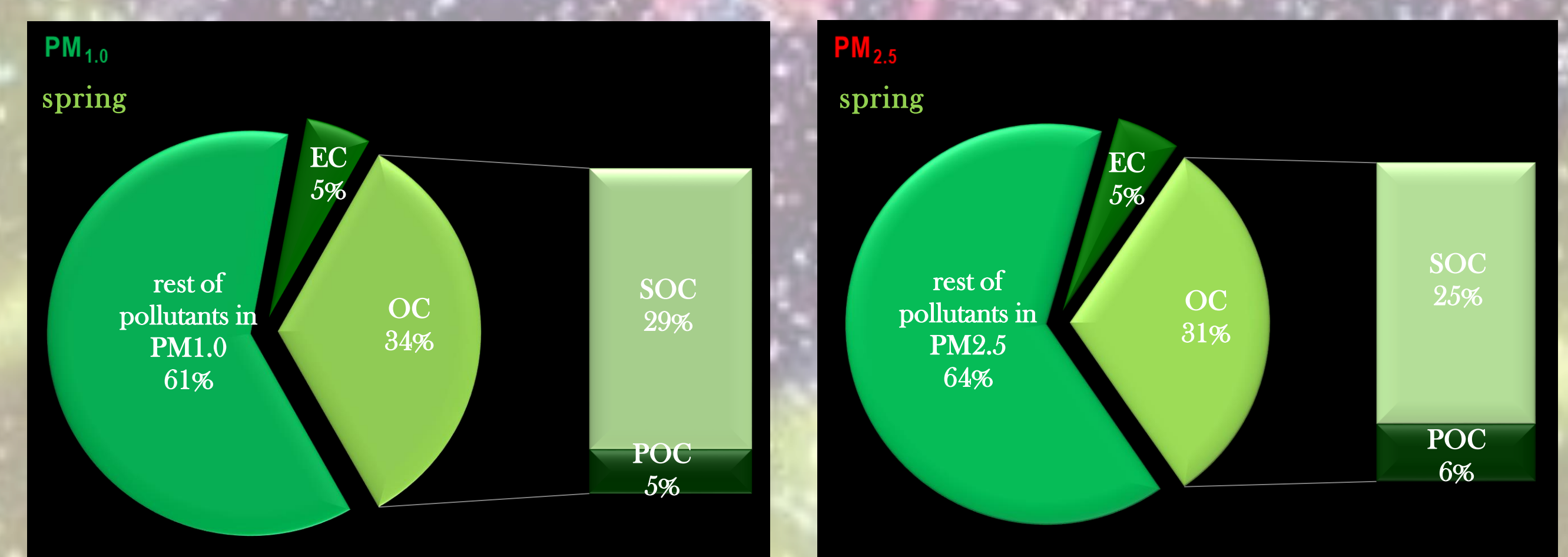
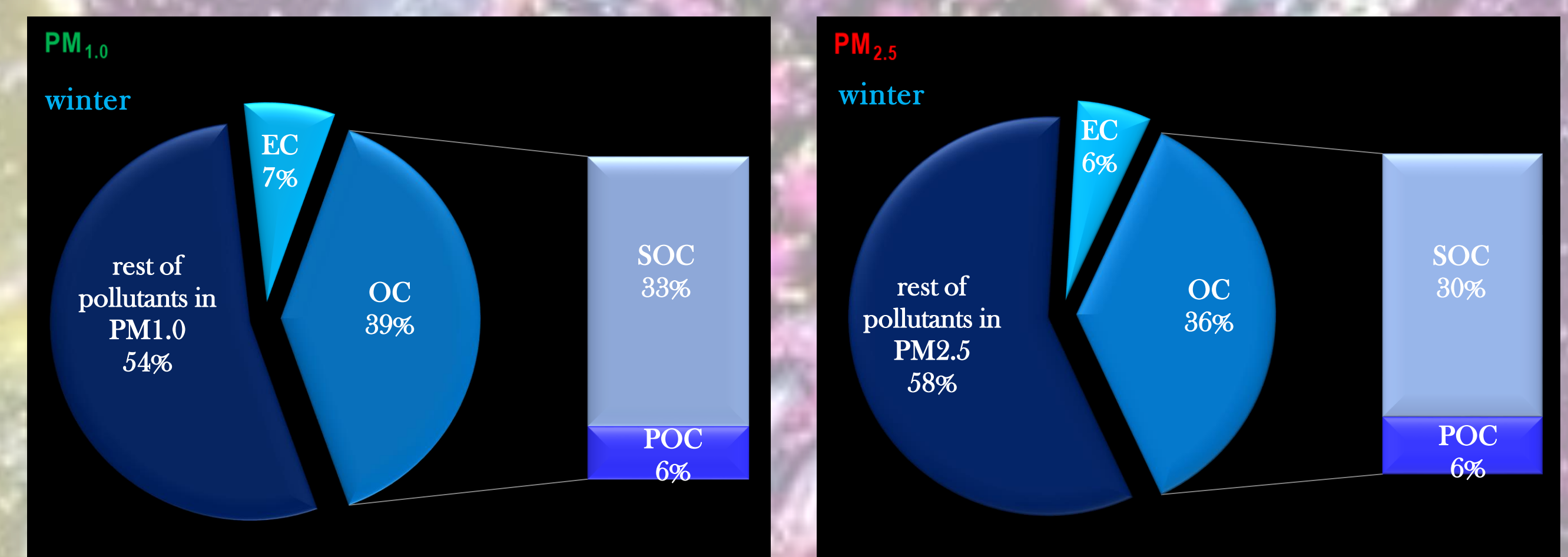


Fig. 5. Seasonal mass contribution of carbon pollutants to the total PM mass