

“Fat Thursday” (Tsiknopempti) as an important source of Organic Aerosol in the urban environment of Athens

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Introduction

“Fat Thursday” (Tsiknopempti), an annual rite in Greece, marks the last Thursday before Lent and fasting for Easter and is associated with the celebration of Carnival. The word Tsiknopempti comes from the Greek words “tsikna” (the smell of grilled meat) and “Pempti” (Thursday), celebrated 11 days before Clean Monday (1st day of Lent). Traditionally, everyone cooks meat so that the smoke fills the air and everybody knows it's a feast-day.

Previous studies have reported that meat-cooking operations contribute significantly to urban organic aerosol (OA) concentrations (Mohr et al., 2012; Crippa et al., 2013), while for winter-time Athens, contribution has been found to be 10% on average (Stavroulas et al., 2019). Even though the cooking contribution is not easily resolved due to similarities with other primary OA emission sources, such as hydrocarbon-like OA (HOA), advances in source apportionment using positive matrix factorization (PMF) combined with the possibility of using constraints, provide a valuable tool for the deconvolution and identification of this source.

Methods

Non-refractory PM₁ chemical composition, during 2014, and 2017–2019 “Fat Thursday”, was measured at the urban background site of the National Observatory of Athens at Thissio, using an Aerosol Chemical Speciation Monitor (ACSM; Ng et al., 2011). PMF was performed on the obtained OA mass spectra using the graphic interface SoFi (Canonaco et al., 2013). Three days prior and after “Fat Thursday” were considered as a reference period.

Conclusions

It is derived that cooking OA (COA) contribution to total OA, during “Fat Thursday” evenings, clearly doubles, compared to the reference period, reaching 35% on average, directly linked to the almost 3-fold higher OA concentrations observed, denoting the importance of this specific source in the urban environment of Athens. While COA contributions peak around 20:00–22:00 LT throughout the year, consistent with typical dinner times of Athenians, during “Fat Thursday” festivities,

elevated COA contribution extends throughout the evening, from 18:00 to 24:00 LT.

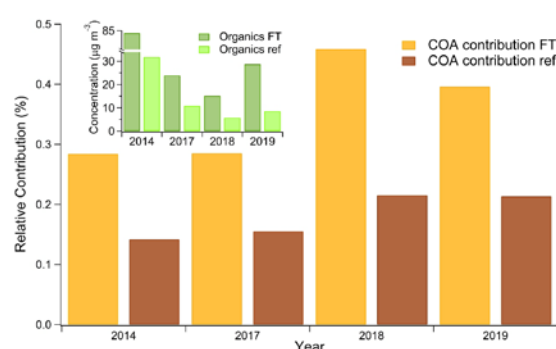


Figure 1. Relative contribution of COA during “Fat Thursday” (FT) festivities versus the reference period evening hours as well as total organics loadings.

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