Geophysical Research Abstracts
Vol. 21, EGU2019-16730, 2019
EGU General Assembly 2019

14C-based source apportionment of the PM2.5 carbonaceous fractions in Naples, Italy during winter

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For the first time, a source apportionment study of the carbonaceous aerosol in the city centre of Naples (Italy) has been conducted. Fine particles with diameter < 2.5 μm (PM2.5) were collected on 24h filters on top of a building in the city centre, from the last week of November 2016 until the first week of January 2017.
For source apportionment the carbonaceous aerosol fraction has been separated in organic carbon (OC) and elemental carbon (EC) fractions, by thermal separation (Dusek et al. 2014). Subsequent radiocarbon analysis on OC and EC allowed for the first time to characterize the major carbon emitting patterns of the Naples area.
During this campaign, an average PM2.5 concentration of 29 $\pm$13 μg / m3 was recorded, with a maximum of 68.6 $\pm$0.7 μg / m3 on a day when air masses' origin appears to be very local. The carbonaceous component contributes roughly half of PM2.5, which is high compared to other European cities and shows that reducing carbonaceous aerosol concentrations could mitigate local pollution. Fossil sources produce 30% of the total carbon, but they cause the most dominant fraction of EC ($\sim$65%), while OC is dominated by non-fossil particles. However, contribution of biomass burning is also considerable for EC, accounting for 5% of PM2.5. On average we estimate that primary biomass burning contributes 30% to total carbon and around 15-20% to PM2.5.

During the same winter the stable carbon isotope 13C was analysed in OC from ambient aerosol samples and samples taken from major sources (local biomass burning, tunnel, city buses). These data can give additional insight into sources and formation processes of the organic aerosol fraction and will be presented along with the radiocarbon source apportionment data.