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Carbon isotope based aerosol source apportionment in Eastern European city Vilnius

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We present carbonaceous aerosol source apportionment results in Eastern European city Vilnius (capital of Lithuania) using stable carbon isotope ratio (δ13C) and radiocarbon (14C) methods. The aerosol sampling campaigns were performed in 2014-2016 winter seasons in Vilnius. PM1 particles were collected on quartz fiber filters using high volume sampler, while PM10 and size segregated aerosol particles were collected using low volume and MOUDI 128 cascade impactor respectively. δ13C values were measured with EA-IRMS system while radiocarbon analysis was performed using Single Stage Accelerator Mass Spectrometer (SSAMS). For the AMS analysis, filters (or aluminium foils from cascade impactor) were graphitized using Automated Graphitization Equipment.

It was estimated that dominant carbonaceous aerosol source in Vilnius was of biogenic/biomass origin (60-90 %). Fossil fuel sources accounted for up to 23 % of total carbon fraction. Combining stable carbon and radiocarbon isotope analysis we were able to quantify the amount of coal derived aerosol particles. The contribution of coal burning emissions were up to 14 %.

We will present the applicability of dual carbon (13C and 14C) isotope ratio method for the aerosol source apportionment in different regions of Europe, also the perspectives of using MOUDI cascade impactors to make source apportionment in size segregated aerosol particles.