

Identification and quantification of metal origins in Belgium train stations by Pb-Zn isotopic ratios

GENEVIÈVE CLAIRE HUBLET, NADINE MATTIELLI
AND JULITA CURATOLO

Université Libre de Bruxelles (ULB)

Presenting Author: Genevieve.Hublet@ulb.be

For more than 20 years, air quality in the cities has become the focus of deep attention as a major health risk. Metal trace elements present in Particulate Matter (PM) are one of the major causes of degradation of air quality indoor and outdoor. Particulate Matter of $2.5\mu\text{m}$ (PM_{2.5}) may pass through the lungs to affect other organs and cause severe damages. In this context, the decision to reduce the number of cars and increase the use of public transport, in particular trains and trams, can significantly improve the quality of life in the cities.

While usually only particle and gas flux rates are monitored, origins of the aerosols and their composition are not identified or quantified. We present Pb isotopic compositions from PM_{2.5} fractions collected in two major train stations of Belgium. These two stations were selected for their intense traffic and the differences of configuration. Station 1 is an important train station where all international and mostly all national trains pass through. It is a modern and open-air building with a lot of open-air platforms. In contrast, Station 2 is an ancient building with few underground platforms. If Station 2 looks pretty small, traffic is as dense as Station 1 since all trains cross or stop at the Station 2. For each station, we sampled PM_{2.5} at two different locations: one in the main hall and one on the central platforms.

Lead isotope analyses of PM_{2.5} fractions in these two stations reveal contrasting major Pb sources. Lead isotopic data from Station 2 (hall and platforms) are in the range of European metal ore deposit signatures suggesting that Pb in Station 2 mainly originates from the usual train traffic. Contrastingly, the Pb isotopic signature of Station 1 (hall and platforms) are closer to the geochemical background values of city center, which is clearly indicative of Pb control by the road traffic. In opposition, preliminary results of Zn isotopic ratios from BC and BM show a constant ^{66}Zn for platforms and variable ^{66}Zn for the hall.

In close collaboration with the Société Nationale des Chemins de Fer Belges (SNCB/NMBS)