Isotopically evaluating the impact of industrial activities on the atmospheric Pb budget of Tarragona (Spain)

KARELLE TROTTIER[1], EDSON PLASENCIA SÁNCHEZ[2], MÒNICA ROSELL[2], ALBERT SOLER[2], FRANCISCO SÁNCHEZ-SOBERÓN[3], JOAQUIM ROVIRA[3], MARTA SCHUHMACHER[3], ANDRÉ POIRIER[1], DAVID WIDORY[1]

[1]GEOTOP, Université du Québec à Montréal, QC, Canada
[2]MAiMA, Universitat de Barcelona, Spain
[3]TecnATox, Universitat Rovira i Virgili, Spain

Lead (Pb) in atmospheric particles can derive from a variety of natural and anthropogenic sources, hampering the identification of its origin. In the framework of the UltraPAR project, using the PM_{10} fraction (aerodynamical diameter <10 μm) of aerosols collected outdoor of 14 schools in the city of Tarragona (Spain) and its vicinity during winter 2016 and summer 2017, we investigated the potential of an approach coupling Pb stable multi-isotope ratios and classical chemical parameters (including metals, SO_4, NO_3) to trace its origin(s), focusing in particular on the potential impact of local industries.

A characterization of the emissions from the different potential sources (i.e. a petrochemical plant, a harbour, two industrial complexes and a waste incinerator) using dual Pb isotope ratios shows these are discriminated.

PM_{10} concentrations in the air vary between the two sampling seasons and results show that while they sometimes exceed the 0.5 $\mu g/m^3$ WHO guidelines during winter, they all comply with them during summer. A classical $^{208}Pb/^{204}Pb$ *vs* 1/Pb Keeling plot indicates that Pb in the PM_{10} samples can be explained by a ternary mixing relationship, with a dominant endmember having an isotope ratio around 38. Contributions of the three major contamination sources vary between the two sampling seasons.