SOURCE APPORTIONMENT OF AMBIENT PM10 NEAR A MAJOR HIGHWAY IN A SWISS ALPINE VALLEY

Regina E. Ducret-Stich, *Swiss Tropical and Public Health Institute, Basel, Switzerland, University of Basel, Switzerland*
Harish C. Phuleria, *Swiss Tropical and Public Health Institute, Basel, Switzerland, University of Basel, Switzerland*
L.-J. Sally Liu, *Swiss Tropical and Public Health Institute, Basel, Switzerland, University of Basel, Switzerland, University of Washington, Seattle, USA*

Background and Aims: Although trans-Alpine highway traffic exhaust is the major source of air pollution along the Alpine highway valleys, little is known about its contribution to residential exposure and impact on respiratory health. This pediatric asthma panel study aims at (1) developing spatial land-use regression models for residential outdoor exposures, (2) estimating the contribution of different sources of PM_{10} using receptor modelling methods, and (3) examining the relationship between spatially refined exposure estimates and respiratory heath. This paper focuses on source apportionment and the source-specific spatiotemporal distribution of PM_{10} in a Swiss Alpine valley.

Methods: From November 2007 to June 2009 two fixed (background and highway) and four mobile sites were monitored for daily PM_{10}, continuous particle number concentrations and NO_x in an alpine community in Switzerland. At the mobile locations measurements were taken for one month in each of the four seasons. PM filters were analyzed for elemental (EC) and organic carbon (OC) and 48 trace elements. Positive Matrix Factorization (PMF) was used to quantify contributions of different local and regional sources.

Results: In a preliminary PMF analysis with 7, 8 or 9 factors about 29% of PM_{10} were explained by secondary pollutants, 23% by biomass burning, 13% by traffic exhaust, 8% by railway and 2% by road salt. The contribution of these factors stayed about constant over all approaches with different factor numbers. The remaining 25% of PM_{10} were split into soil, road dust, break wear and an unknown factor depending on the predefined number of factors. Further analysis will be done using fractionated EC, OC data and an attempt will be made to split the traffic exhaust factor into diesel and gasoline exhaust factors.

Conclusions: These first results indicate significant contribution of highway traffic and local biomass burning on the PM exposure in the community.