Geophysical Research Abstracts
Vol. 19, EGU2017-4750, 2017
EGU General Assembly 2017

Benzene patterns in different urban environments and a prediction model for benzene rates based on NO_x values

Shlomit Paz (1), Pavel Goldstein (2), Levana Kordova-Biezuner (3), and Lea Adler (1)

(1) Department of Geography and Environmental Studies, University of Haifa, Haifa, Israel, (2) Department of Statistics, University of Haifa, Haifa, Israel, (3) Israel Ministry of Environmental Protection

Exposure to benzene has been associated with multiple severe impacts on health. This notwithstanding, at most monitoring stations, benzene is not monitored on a regular basis. The aims of the study were to compare benzene rates in different urban environments (region with heavy traffic and industrial region), to analyse the relationship between benzene and meteorological parameters in a Mediterranean climate type, to estimate the linkages between benzene and NO_x and to suggest a prediction model for benzene rates based on NO_x levels in order contribute to a better estimation of benzene.

Data were used from two different monitoring stations, located on the eastern Mediterranean coast: 1) a traffic monitoring station in Tel Aviv, Israel (TLV) located in an urban region with heavy traffic; 2) a general air quality monitoring station in Haifa Bay (HIB), located in Israel's main industrial region. At each station, hourly, daily, monthly, seasonal, and annual data of benzene, NO_x, mean temperature, relative humidity, inversion level, and temperature gradient were analysed over three years: 2008, 2009, and 2010. A prediction model for benzene rates based on NO_x levels (which are monitored regularly) was developed to contribute to a better estimation of benzene. The severity of benzene pollution was found to be considerably higher at the traffic monitoring station (TLV) than at the general air quality station (HIB), despite the location of the latter in an industrial area. Hourly, daily, monthly, seasonal, and annual patterns have been shown to coincide with anthropogenic activities (traffic), the day of the week, and atmospheric conditions. A strong correlation between NO_x and benzene allowed the development of a prediction model for benzene rates, based on NO_x, the day of the week, and the month. The model succeeded in predicting the benzene values throughout the year (except for September).

The severity of benzene pollution was found to be considerably higher at the traffic station (TLV) than at the general air quality station (HIB), despite being located in an industrial area. Hourly, daily, seasonal, and annual patterns of benzene rates have been shown to coincide with anthropogenic activities (traffic), day of the week, and atmospheric conditions. A prediction model for benzene rates was developed, based on NO_x, the day of the week, and the month. The model suggested in this study might be useful for identifying potential risk of benzene in other urban environments.