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TIME SERIES ANALYSIS OF AIR POLLUTANTS RECORDED FROM ROMANIAN EMEP STATIONS AT MOUNTAIN SITES

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Abstract

The present study analyzes the background pollution in Romania using official data reported for recorded air pollutants from the automated regional stations located at three mountain sites. A series of key figures regarding the trend of background pollution at Romanian mountain sites was extracted based on annual average concentrations recorded between 2010 and 2013 i.e. $8.8 \pm 5.2 \mu\text{g NO}_2/\text{m}^3$, $5.3 \pm 1.6 \mu\text{g SO}_2/\text{m}^3$, $0.075 \pm 0.035 \mu\text{g CO}/\text{m}^3$, $3.2 \pm 0.9 \mu\text{g C}_6\text{H}_6/\text{m}^3$ and $11.4 \pm 6.9 \mu\text{g PM}_{10}/\text{m}^3$. A case study is presented for EM-3 EMEP Station (RO0008R, Poiana Stampei) located in the north of Romania. Multivariate techniques provided the trends and patterns of collected data structure. Meteorological input data were long time series (1961-2012) of air pressure, air temperature, precipitations, sunshine hours, cloud cover, and relative humidity in the area. Strong correlations were observed between air pollutants, and between air pollutants and meteorological factors. The latent factors resulted from the Principal Component Analysis have explained the total variance in the data structure of Poiana Stampei as follows: factor 1 – meteorology; factor 2 – aerosols; and factor 3 – heavy metals. NOAA HYSPLIT backward trajectory model was applied to overview the most probable source region of two pollution episodes (NO_2 and SO_2) at EM-3 location. The results confirmed that meteorological processes, local topography and air mass trajectory controlled significantly the amount of air pollution in the studied area.

Key words: air pollution, air mass backward trajectory model, EMEP station, heavy metals, meteorological parameters, particulate matter, Romania, ozone

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