

**Title:** Relation of pollutant concentrations to the Péczeley's large scale weather situations in Szeged, Southern Hungary

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**Introduction/Aim:** Some weather conditions, like moderate winds or calm air conditions with temperature inversion created by an anticyclone, can significantly influence the emergence of extreme concentration rates of pollutants in the air. The aim of the study is to detect the efficiency of the Péczeley's large scale weather situations in enrichment or dilution of the main air pollutants.

**Methods:** The database of the study consists of 30-minute averages of the main air pollutants (CO, NO, NO<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub>, O<sub>3</sub> and PM) for the three-year period between January 1, 1997 – December 31, 1999. The data come from the air quality monitoring station in Szeged downtown, at a busy crossing. Daily concentrations of the main air pollutants are analysed as functions of the large scale weather situations, introduced by Péczeley for the Carpathian Basin. Furthermore, the Kolmogorov-Smirnov test, the Central limit theorem and the Makra-test are applied.

**Results:** According to the Kolmogorov-Smirnov test, considering all of the Péczeley's macrotype pairs, the 0-hypothesis (the distribution function of a given macrotype does not differ significantly from that of the others) is rejected in 70-79 % for CO, NO and NO<sub>2</sub>, while this rate is 46-58 % for O<sub>3</sub>, SO<sub>2</sub> and PM. Namely, the Péczeley's large scale weather situations are more efficient to classify concentrations of CO, NO and NO<sub>2</sub>, than those of O<sub>3</sub>, SO<sub>2</sub> and PM. By applying the Central limit theorem, we calculated confidence intervals with 90 % probability level for the pollutants concentrations for each Péczeley-macrotype. The main conclusion of our calculations is that width of the interval depends on the case number of the given macrotype. If the latter is little, the standard deviation of the concentration is high; hence, the confidence interval is wide. The role of the macrotypes in enriching or diluting pollutants, calculated by the Makra-test, are summarized as follows: mCc, AB, CMw, An and AF weather types have positive role in enriching pollutants, while during Ae, As and A types as well as with mCw and CMw types dilution is significant.

**Discussion/Conclusion:** Meridional northerly and zonal easterly air currents are most effective in enriching pollutants; at the same time, meridional southerly currents and A type are the most significant ones in diluting pollutants. This result was not expected at all, since normally anticyclonic and near anticyclonic types are expected for enriching, while cyclonic types are expected for diluting pollutants. Understanding of this result needs further analysis. It is supposed, that the Péczeley-classification is not the best category-system for grouping concentrations of air pollutants.

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