

RELATIONS BETWEEN CIRCULATION AND WINTER AIR  
POLLUTION IN POLISH URBAN AREAS  
JOLANTA GODŁOWSKA, ANNA MONIKA TOMASZEWSKA

**Abstract:** We determined the performance of different Circulation Type Classifications (CTCs) to stratify air pollutants concentrations in Polish cities in winter. Our analysis is based on 15 CTCs calculated by COST 733 as well as on 5 manual universally used manual weather type classifications. For this purpose we compared and tested the explained variation (EV) and within-type standard deviation (WSD) methods. Finally, EV method has been chosen for evaluating classifications for daily values of SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>10</sub> and CO as well as vertical dispersion conditions obtained from SODAR data. We also presented the methodology of choosing smog episode days based on 90-percentile values. For the winter smog episodes data from Krakow different classifications have been compared using Gini coefficient method. The best results for separate air pollution data series as well as for smog episode days were obtained for Hess-Brezowski Großwetterlagen classification (HBGWL). Moreover, good results were obtained for the based on principal component analysis PCACA classification, Polish Niedzwiedz TCN21, modified Polish Litynski LITTC, modified Lamb LWT2, and three modified HBGWL (GWTC26, OGWL, OGWLSLP) classifications. The same classifications except for HBGWL are good for SODAR data. For the best CTCs, the differences between various classes are visible, however a big scattering is still observed. Main urban air pollution problems arise in situations when flow with Southerly component is observed. Correlations between air pollution data and SODAR data (calculated for marginal means obtained for different classes) confirm a negative role of both low height of the ground-based inversion and long duration of the low-level elevated inversion in urban areas.