



The importance of seasonal snow cover chemistry for estimation of air pollutants deposition in the area near Cracow (South Poland)

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This work was focused on the role of snow cover in the evaluation of atmospheric pollutants deposition. It was based on the analysis of the spatial and temporal variability of snow cover chemical composition, and on the study of factors controlling spatial and temporal variation of snow cover chemistry. Fieldwork took place in the winter seasons 2006/07-2008/09 in the area between Cracow and Upper Silesian Industry Area (Southern Poland). In the field measurements of snow cover thickness, density and water equivalent were made and snow samples were collected. In the laboratory the snow samples were melted. In each sample pH and specific conductivity were measured (ELMETRON CX-721). The following ions were determined using chromatographic method (Dionex, ICS-2000 type): Ca, Mg, Na, K, NH₄, HCO₃, SO₄, Cl, NO₃ and NO₂. The analysis of empirical data were performed using different methods: statistical (cluster analysis, factor analysis, regression and correlation analysis), geostatistical (semivariogram analysis, ordinary and indicator kriging interpolation) and spatial (analysis of random fields). The obtained results revealed that in seasonal snow condition of Poland it was possible to assess the spatial distribution and changes of pollutants deposition based on the spatial distribution of snow cover chemical content, but reliable results were obtained only in the vicinity of large emitters (e.g. steel mill). Due to a large number of factors and processes shaping chemical composition of snow cover, snow chemistry may not be a good source of information about emitters' location and directions of advection of contamination. The chemical composition of snow chemistry reflects primarily the chemical composition of snowfalls, and is stable until the beginning of melting and loss of water from the snow cover.