



Influence of atmospheric pollution on spectral composition of incident solar radiation

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Atmospheric pollutants influence the intensity and spectral composition of incident solar radiation and thus can substantially affect plant growth and photosynthesis. This topic is very important in the region with strong air pollution caused by industrial activity. Three different measuring stations in the Ostrava region were used in this study. Two of them were located in the area with higher air pollution as compared to third station located in the less polluted area. The spectral bands in UVB, UVA, global, photosynthetically active radiation (PAR, 400–700 nm) and its regions (blue, 400–510 nm; green, 510–600 nm; red, 600–700 nm) together with 660 nm and 730 nm were measured in all stations and subsequently compared. Only 15 sunny days with different air pollution categories for both studied areas were available for analysis. Further, we focused on the comparison of UVA/UVB, blue/red, 660/730 nm, UVA/PAR and UVB/PAR ratios at individual stations. We expected different spectral composition at stations located in the more polluted area because of the interaction of solar radiation with pollutants causing its absorption and scattering. Significantly different values for the station with lower air pollution were measured for global, PAR and blue together with 660/730 nm and UVB/PAR ratios during the solar elevation angle higher than 30 degrees. The UVB/PAR ratio measured at that station was lower during most of the studied days and also significantly differed from the other two stations. In certain solar elevation angles, behaviour of the green spectral band and the blue/red ratio did not correspond to our expectations. The rest of incident solar radiation components and their ratios differed only slightly or have irregular course if we compared individual stations. It means that atmospheric pollutants are only one of the aspects that influence the spectral quality of incident solar radiation.