Abstract
In this study a new optical method for highly time and size resolved atmospheric elemental carbon has been described. For this purpose has been used image analysis of 3 DRUM strips with three size fractions deposited (2,5-1,15 μm; 1,15-0,34 μm; 0,34-0,1 μm). Strips were scanned by Fotoscanner HP ScanJet 8200 with optical resolution of 600 dpi. For the analysis of images Matlab program was used, in which the images are transformed to a matrix of grayscale values. The output of this program are time series of grayscale values for each transformed image. Because the time series consist of data in 5 minute intervals, for comparing with hourly PM2,5 EC data obtained from the Sunset EC/OC analyzer, it was necessary to have hourly time series.
The precise method of this new approach to determine concentration of atmospheric BC is described in this thesis. In addition, it contains description of the procedures connected with calibrations and controls of sectional outputs. Using linear regression, the daily averages for black carbon are compared with daily EC data. Similarly, hour averages are compared by linear regression also. The analysis performed proved very good relation between daily EC and daily BC described by formula (EC ~ 1.0399 + 0,0117*BC). In respect to hourly averages, a very different autocorrelation in EC than in BC is observed. This is due to the different procedure of evaluation of deposited aerosol in both methods. Hence a regresion model is not suitable in this case, nevertheless a good correlation between the hourly averages of BC and EC was estimated (R2=0,7043).
It can be concluded that the new method of analysis of digital image proved its applicability to measuring of daily averages. To assess the applicability of the new method in the case of hourly averages further analysis from more locations and samples would be needed.