DAILY MEAN VALUES OF AIR TEMPERATURE AND HUMIDITY MEASURED AND CALCULATED WITH THE STANDARD AND AUTOMATIC METHOD

Key words: air thermal and humidity parameters, automatic station, daily mean values, standard method, time series

Summary

The study presents the results of an analysis of mean daily values of air temperature, relative humidity and saturation deficit from three or four (depending on the parameter) measurements a day with standard devices and from 24 hourly records made with electronic sensors recording on the same days. Data were obtained from Wroclaw-Swojec Observatory during the period 2000–2009. Standard measurements were made using the station thermometer and August psychrometer, placed in a meteorological screen 2 m above the terrain surface. Saturation deficit was read from psychrometer tables. Daily mean values were calculated based on three fixed-term measurements (at 7, 13 and 19 CET) for air saturation deficit and on four measurements (1, 7, 13 and 19 CET) for temperature and relative humidity, the values for 1 a.m. were read from daily thermohygrographs.

Electronic temperature and humidity sensors were placed in the same meteorological screen and programmed to record hourly data. The sensors were components of a CR23X automatic meteorological station. Automatic mean daily values were calculated from 24 hours and from the same terms, when standard observations were conducted. Linear regression, frequency and significance of differences, time series analysis (i.e. autocorrelation analysis and seasonal decomposition using the additive model) were performed to determine whether a change in the method of calculating mean daily values might decrease the differences between the two methods.

Calculating the mean daily temperature and relative humidity recorded by automatic station during four measurements instead of using 24 hourly data did not decrease differences between the two methods of meteorological elements measurement. Only in the case of the deficit of air humidity, the daily means calculated from three automatic records were much more similar to those obtained with the standard method than those from all 24 hourly records. This was caused by neglecting night records when calculating the saturation deficit of air humidity according to the standard method. This in turn resulted in the overestimation of these data compared with those obtained from continuous automatic measurements.