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The impact of park trees on microclimate in urban areas

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Abstract Trees in cities have an important positive effect on people's lives. One such positive effect is the amelioration of microclimate. The aim of this research is to assess the correlation between parameters that affect the microclimate of parks during the summer. We measured air temperature, relative humidity and solar radiation in the sun and shade of the trees in urban parks in Thessaloniki, Greece. The results indicate that: the air (A) temperature reduction percentage (dTair%), air relative humidity increase (dTRh%), discontent index reduction percentage (DI%) (cooling effect) and solar radiation (L) percentage that passes through the trees' foliage to their shade creates an exponential function of $dA\% = a \cdot e^{-bL}$. These functions are also applicable to the limiting variation values of the parameters. If we use $L = 0$ (meaning Lightsh = 0, which is the case for an extremely dense tree), then the values that we expect from this particular parameter are the maximum possible. These maximum values are a characteristic feature of the parameter variation for this particular research area. These maximum values for the trees in the parks of Thessaloniki are: $\max dTair\% \approx 24\%$, $\max dRh\% \approx 41\%$ and $\max dDI\% \approx 16\%$.

Keywords Air temperature · Relative humidity · Solar radiation · Thermal comfort · Shade trees