Alternative reference evapotranspiration model applied to hourly temporal scale in subtropical climate

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A new alternative model "Moretti-Jerszurki-Silva", based on atmospheric water potential ($ETo_{MJS(\psi air)}$) and solar radiation (ETo_{MJS}) data was developed to estimate daily reference evapotranspiration from subtropical to semi-arid regions, showing significant benefits with respect to accuracy and spatiotemporal scale of application relative to previous models. To expand its use in different time scales, we tested the performance of the new alternative method in hourly temporal scale. We adjusted and evaluated this physical *ETo* method for the subtropical climate type (*Cfa*) in Southern Brazil using air temperature and relative humidity collected by a homemade sensor (BMP180 and DTH11). We compared our results with hourly standard ETo_{PM} (Penman-Monteith) estimates performed between April and May of 2017, using air temperature, sunshine hours, relative humidity and wind speed collected in a meteorological station. Least square regression analysis of ETo_{PM} *vs* ψ_{air} (atmospheric water potential) and ETo_{PM} *vs Ee* (equivalent evaporation obtained by solar radiation and weighted by atmospheric water potential) were used to calibrate the $ETo_{MJS(\psi air)}$ and ETo_{MJS} methods, respectively. The performance of calibrated methods $ETo_{MJS(\psi air)}$ and ETo_{MJS} was evaluated by index of agreement "*d*" and performance "*c*", and mean absolute error (*MAE*). Preliminary results are promising and indicate a strong linear association between standard hourly ETo_{PM} with $ETo_{MJS(\psi air)}$ and ETo_{MJS}. The ETo_{MJS} was particularly robust in hourly estimates and we recommend its use for most humid climate types in the region, but simplified $ETo_{MJS(\psi air)}$ estimates are better suited to estimate water fluxes in arid and semi-arid regions.

Key-words: atmospheric water potential, solar radiation, hydrological methods, Penman-Monteith.