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H11B-1295: Modeling an Alternative Reference Evapotranspiration Method under Different Climate Regimes in Brazil

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The development and validation of new reference evapotranspiration (*ETo*) methods hold significant promise for an improved quantitative understanding of terrestrial water fluxes to the atmosphere. To address a critical gap in knowledge, concerning the general absence of adequate alternative *ETo* estimations for tropical and subtropical regions, generated a new reference method "Moretti-Jerszurki", based on atmospheric water potential (ψ_{air}) and solar radiation (*Ra*) data. We adjusted and evaluated this physical *ETo* method for the most representative climate types of Brazil. We compared our results with standard ETo_{PM} (Penman-Monteith) estimates performed between 2004 and 2014, using air temperature (*T*), sunshine hours (*n*), relative humidity (*RH*) and wind speed (U_2). The new method was proposed and analyzed in two different scenarios, based: (*i*) only on ψair ($ETo_{MJ(\psi air)}$); and, (*ii*) ψ_{air} and *Ra* (ETo_{MJ} and ETo_{MJc}). Least square regression analysis of ψ_{air} *vs* ETo_{PM} and ETo_{MJ} *vs* ETo_{PM} were used to calibrate the $ETo_{MJ(\psi air)}$ and ETo_{MJc} methods, respectively. The performance of calibrated methods $ETo_{MJ(\psi air)}$ and ETo_{MJc} was evaluated by index of agreement "*d*" and performance "*c*", root mean square error (*RMSE*), mean absolute error (*MAE*) and mean reason *(MR*). Preliminary results across a wide range of tropical and subtropical climates are promising and indicate a strong linear association with standard ETo_{PM}. The $ETo_{MJ(\psi air)}$ was particularly robust in tropical and semi-arid climates, outlining the importance of continuous measurements of *T* and *RH* used in the ψ_{air} modeling effort. We recommend the use of ETo_{MJc} for most humid climate types in the region, but simplified $ETo_{MJ(\psi air)}$ estimates are better suited to estimate water fluxes in arid and semi-arid regions.

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