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Use and misuse of Hargreaves reference evapotranspiration

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Reference evapotranspiration (ETo) is commonly used when the water balance requires to be analyzed, both at the regional and global scale. Due to the low availability of some of the required variables to calculate Penman-Monteith, it is common to use temperature based methods, such as Hargreaves and Samani.
Obviously, as only temperature data is used, the variability or the trends of the rest of the variables that contributes to ETo are not considered when Hargreaves and Samani is used, leading to a situation in which the performance of this method is time variant in two ways: i) the presence of a trend in the non-observed variables conducts to a trend in the performance of the method and ii) meteorological conditions that deviate from the mean climatic conditions can imply the apparition of errors in the ETo estimation.
Even when calibrated, the use of HS is not free of these effects, as time invariant coefficients are used.
Another source of errors in the obtained estimations of HS is the assumption of a stationary relationship between solar radiation and temperature. Nevertheless, the positive trend affecting the temperature during the last decades can only be partially explained by an increase in solar radiation. In other words, the relationship is not actually stationary.
A comparison of HS estimations against Penman-Monteith values is developed to test the impacts of these problems in an actual dataset, pointing out the risks of using HS.