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Title: A simple temperature method for the estimation of evapotranspiration [electronic resource].

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Abstract: Accurate estimation of evapotranspiration (ET) is essential in water resources management and hydrological practices. Estimation of ET in areas, where adequate meteorological data are not available, is one of the challenges faced by water resource managers. Hence, a simplified approach, which is less data intensive, is crucial. The FAO-56 Penman–Monteith (FAO-56 PM) is a sole global standard method, but it requires numerous weather data for the estimation of reference ET. A new simple temperature method is developed, which uses only maximum temperature data to estimate ET. Ten class I weather stations data were collected from the National Meteorological Agency of Ethiopia. This method was compared with the global standard PM method, the observed Piche evaporimeter data, and the well-known Hargreaves (HAR) temperature method. The coefficient of determination (R^2) of the new method was as high as 0.74, 0.75, and 0.91, when compared with that of PM reference evapotranspiration (ET_o), Piche evaporimeter data, and HAR methods, respectively. The annual average R^2 over the ten stations when compared with PM, Piche, and HAR methods were 0.65, 0.67, and 0.84, respectively. The Nash–Sutcliff efficiency of the new method compared with that of PM was as high as 0.67. The method was able to estimate daily ET with an average root mean square error and an average absolute mean error of 0.59 and 0.47 mm, respectively, from the PM ET_o method. The method was also tested in dry and wet seasons and found to perform well in both seasons. The average R^2 of the new method with the HAR method was 0.82 and 0.84 in dry and wet seasons, respectively. During validation, the average R^2 and Nash–Sutcliff values when compared with Piche evaporation were 0.67 and 0.51, respectively. The method could be used for the estimation of daily ET_o where there are insufficient data. Copyright © 2013 John Wiley & Sons, Ltd.

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