

**Mapping and evaluation of reference evapotranspiration methods under arid conditions.**

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**Abstract**

Reference evapotranspiration (ET<sub>o</sub>) is a vital factor in water resources managing and planning. Various estimation methods have been developed for different climatic regions and according to the available data. Therefore, the reliability of such methods depends upon climatic conditions. The present investigation evaluates four temperature-based methods: FAO Blaney-Criddle (BC), Turc, Jensen-Haise (JH) and Hargreaves (HG), and two radiation based methods: FAO-radiation (FAO-rad) and Priestley-Taylor (PT) in comparison with the FAO-PM method under arid conditions of Libya. In order to select the best ET<sub>o</sub> method, the percentage error of estimate (PE), the root mean square error (RMSE), and mean bias error (MBE) were calculated. The obtained ET<sub>o</sub> values (FAO-PM and the average of best-estimated monthly ET<sub>o</sub>) were utilized to generate spatial distribution maps of ET<sub>o</sub> with the aid of Kriging technique. Statistical analysis of the obtained results revealed that, Turc equation fitted well for the northern part of the study area. Which include Nalut, Zuara, Mosrata, Sirt, Shahat, Derna, Tubruk, Hon, Galo and Gagbub. While for southern zone, HG equation performed better for Opari and Tazirbu, BC equation for Kufra and Ghadames, FAO-Rad equation for Sebha; and JH equation for Ghat.