

Comparing Different Processes for Mapping Annual and Monthly Reference Evapotranspiration in Iran

Abstract

Accurate estimation of reference evapotranspiration-(ET_0) is essential to determine water requirements of crops and achieve a high irrigation efficiency. This study presents a comparison of two different processes namely "first interpolate then calculate (IC)" and "first calculate then interpolate (CI)" for estimating and mapping annual and monthly ET_0 over Iran. In the first process, an interpolation of meteorological parameters required to calculate ET_0 were performed and then ET_0 were calculated on a network defined on the study area using the FAO - Penman-Monteith equation. In the second approach which is more common, first ET_0 was calculated for the selected station given meteorological parameters and then interpolated over the study area. These techniques used were include ordinary kriging (OK) with and without auxiliary variable, radial basis functions (RBF), local polynomial (LPI) and inverse distance weighting (IDW). The results showed that ET_0 has a moderate to strong spatial correlation with a spherical structure. Overall, ignoring the interpolation method used, IC performed better than CI for majority of months and annual scale.

The best interpolation method (according to RMSE and MAE) in IC procedure was IDW for September and October and for annual case, OK for January and March and COK for February, April, November and December. IDW with CI procedure was the best method for estimating ET_0 for May, June, July and August. Further, the comparison of interpolation methods indicated that for both IC and CI, OK, COK and IDW, which incorporate the separation distance in estimation procedure, performed well. Based on the ET_0 generated maps, the highest reference ET_0 occurs in southern, southwestern and eastern parts of the study area.

Key words: Evapotranspiration, Penman-Monteith, Spatial variation, Interpolation, Kriging.



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