SPATIAL INTERPOLATION OF REFERENCE EVAPOTRANSPIRATION AND PRECIPITATION IN GREECE

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ABSTRACT

Climate data interpolation has lately gained great importance since it constitutes a meaningful tool for a great variety of applications. Especially for hydrological and ecological research, reliable surface meteorological data are required, at any spatial scale, and is of high importance component to study climate functioning.

The accurate estimation of the spatial distribution of climate variables requires a very dense network of meteorological stations but it is rarely the case since it entails large installation and operational costs. Consequently, in order to generate reliable surface climatic data, point data must be interpolated across a wide spatial domain and estimations of a climatic variable at unrecorded locations from records at surrounding sites can be obtained. Spatial interpolation can generate continuous surfaces from point data so that can be used for creating climatic maps.

This study aims to evaluate the suitability of four spatial interpolation methods for interpolating two climate variables in entire Greece. The data were provided by a network of 93 weather stations and the mean values refer to the long term period 1931-1998. The two studied variables were mean monthly precipitation and mean daily reference evapotranspiration rate calculated according to modified FAO Penman-Monteith method. The four geostatistical interpolation methods were: Ordinary Kriging (OK), Residual Kriging (RK), Inverse Distance Squared (IDS), and Gradient-plus-Inverse Distance Squared (GIDS). The assessment criteria were Mean Error (ME), Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE) of residuals. Also in the frame of this work monthly and yearly thematic maps of each studied variable were generated.

In general all methods exhibited quite satisfied performance resulting in reliable results. The results revealed that the performance of each interpolation method varied considerably among months as well as between the two climatic variables. Also, none geostatistical interpolation method had evident superiority against to others indicating that their performance was primarily affected by data set.

Keywords: spatial interpolation, reference evapotranspiration, precipitation, gis.