EMS Annual Meeting Abstracts
Vol. 8, EMS2011-179, 2011
11th EMS / 10th ECAM

Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Application of Numerical Method for Estimating of Soil Thermal Diffusivity and Soil Temperature Prediction under Different Moisture Contents

Y. Khoshkhoo (1), A. Khalili (1), H. Rahimi (1), and P. Irannejad (2)

(1) College of Agriculture and Technology Engineering, Faculty of Agriculture and Natural Resources, University of Tehran, (2) Institute of Geophysics, University of Tehran

In the present paper, numerical solution of one-dimensional heat conduction equation was used to estimate the optimum value of thermal diffusivity of a silty clay texture for 5 different soil moisture contents. Then, the estimated optimum value of soil thermal diffusivity for each case was applied to soil temperature predictions at several depths and times and by RMSE criterion, the accuracy of numerical method was evaluated. A laboratory model was made and soil temperature of various depths was measured at one minute intervals. This procedure lasted 24 hours for each case. Half of the data were employed to calculate soil thermal diffusivity and the other half was used for soil temperature prediction. The results showed that by increasing moisture content from 0% to 15%, values of soil thermal diffusivity increased at the beginning and then decreased. The RMSE values for different moisture contents varied from 0.33 to 0.72˚C for 15% and 5%, respectively. In prediction of soil temperature, the highest difference between predicted and measured values was -1.9˚C. The results obtained from model showed both overestimated and underestimated without having a specific trend.