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The threshold hybrid regressive model and its application to prediction of water table in Jinan city

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Abstract Prediction of the dynamic variation of water table in Jinan city is very difficult as it is influenced by many factors such as global climate changes, human activities, etc. The threshold regressive model and threshold auto-regressive model are both excellent for describing complex nonlinear processes with limiting points, limiting cycles, fluctuation, interdependence, and harmonics. But they both have localization to some degree. In this paper, a threshold hybrid regressive model is established for predicting water table fluctuations in Jinan city, taking water table as the auto-regressive factor and precipitation and exploitation as regressive factors, and a self-contained modelling scheme based on genetic algorithms is given. In addition, it is indicated that the threshold auto-regressive model and the threshold regressive model are special cases of a threshold hybrid regressive model. The results of predicting water table in Jinan city using the threshold hybrid regressive model show that prediction precision can be improved further owing to all the information that is extracted from the regressive and auto-regressive factors and the prediction capability is much steadier owing to the thresholds controller.

Key words genetic algorithm; Jinan city; nonlinear forecast; threshold auto-regressive model; threshold regressive model; threshold hybrid regressive