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Forecast of water pollution sources using ANNs and hydrogeochemical analysis: Case study from Turkey

Tulay Ekemen Keskin[1], **Muharrem Dugenci**[1] and **Fikret Kacaroglu**[2]
[1]Karabuk University, Turkey
[2]Mugla Sıtkı Kocman University, Turkey

Investigations were performed on the water chemistry data from Sivas, Karabük and Bartın areas in order to contribute to studies aiming the forecast of water pollution sources and/or of water discharging from different rock types. There are different rock types (such as carbonate rocks, altered volcanic rocks, alternating (mixed) rocks and other type rocks), agricultural activities, the Pb-Zn-Cu deposits and coal mining activities in the study areas. In this study, a model based on artificial neural networks (ANNs) was developed for forecast the water pollution sources using some water chemistry parameters (Na, K, Ca, Mg, CO_3, HCO_3, Cl, SO_4, Fe, Mn, Al, pH, EC and NO_3). Back propagation (BP) and Bee Algorithm (BA) were used in artificial neural network training. The best ANN classification of water discharging from different type of rocks was accomplished with 80% accuracy using Bee Algorithm. Springs discharging from Tecer Mountain (Sivas) and its vicinity have generally Ca-HCO_3 facies while many springs issuing from gypsum are in Ca-SO_4 facies. The springs located in the Yıldız River Basin (Sivas) have generally Ca-HCO_3 facies, while geothermal waters have generally Ca-Na-HCO_3 facies. In the Eskipazar area, waters have mostly Ca-HCO_3 and Na-Ca-Mg-HCO_3 facies. NO_3 pollution was detected in groundwater discharging from clastic rocks and limestone where agricultural activities are carried out in Eskipazar (Karabük) area. Springs discharging from Upper Cretaceous volcanics in the Koyulhisar area are mostly in Ca-SO_4 facies. In the Bartın area, wells discharging from altered volcanic have generally Na-HCO_3 facies. Al, Fe and Mn element pollution was present in groundwater issuing from Pb-Zn-Cu mining area in Koyulhisar (Sivas) and altered volcanics and coal vein associated rocks in Bartın area

Biography

Tulay Ekemen Keskin received her M.Sc. and Ph.D. in hydrogeology field from Cumhuriyet University, Department of Geological Engineering. Currently, she is working as associated professor of Civil Engineering, Karabuk University. Her research interest includes hydrogeology, water contamination, isotope hydrogeology and geothermal water.

tulayekemen@karabuk.edu.tr
tekemen@gmail.com

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