Stochastic approach to assess a nitrate process-factor in soil water

ALAA EL-SADEK

Associate Professor, National Water Research Center, Delta Barrage, P.O.Box 13621/5, Cairo, Egypt (alaa_elsadek@yahoo.com)

In this research, a nitrate process-factor was driven for the Wijlegem catchment, Belgium. The simulated concentration of the water draining from the soil profile (at a depth of 90 cm), instead of the NO_3^--N concentration in the drainage water, was used to calculate Cg. The NO_3^--N concentration at the outlet of the catchment was used as Cs. The model was run in a stochastic way on each individual field within the catchment for four consecutive winter periods. A Monte Carlo approach was used (i.e. the simulations are repeated 1500 times with new picks). The process-factor (the ratio of the simulated NO_3^--N concentration in the soil water at 90 cm and the measured NO_3^--N concentration in the surface water) for the catchment of the Wijlegem was calculated to be 2.35. The NO_3^--N concentration in the soil water was simulated with the Burns α model.

The research concluded that, the average process-factor for the four leaching periods is 2.35. This implies that the average simulated NO3--N concentration in the soil water at 90 cm under the field surface is twice the average measured NO3--N concentration in the surface water, or that 50% of the NO3--N will be denitrified in the subsoil. It is thus recommended that, the modelling combined with monitoring in small agricultural catchments is a useful tool for assessing state, trends and effects of counter-measures for water quality management planning aimed at reducing the impact of nitrogen leaching on the aquatic environment.

Impact of mineralogy on groundwater chemistry along the southeastern part of the UAE

A.K. EL SAIY, A.A. MURAD* AND A. ALDAHAN

Department of Geology, UAE Univ., P.O.Box: 17551, Al-Ain, United Arab Emirates (*correspondence: ahmed.murad@uaeu.ac.ae)

Quaternary clastics sequences represent an important aquifer system in the southeastern part of United Arab Emirates (UAE). During last decade, extensive utilization of groundwater has caused deterioration of the water. Therefore, understanding the water-rock interaction in this aquifer seems indispensable for future sustainable management. In order to achieve this goal, petrological characterization of the aquifer sediments and chemical analyses of the groundwater were carried out. The results indicate that within the determined four facies, serpentine and calcite are the dominant minerals followed by dolomite and plagioclase. Results of the groundwater analyses show relative increase of the Ca^{+2} concentrations within the calclithite and lithic carbonate facies whereas an opposite trend was observed for the elevated Mg^{+2} concentrations. The latter feature may relate to accompanied effect of serpentinization of olivine in the ophiolite zone recharge area and *in situ* dolomitization of serpentine. The high calcium concentrations reflect disequilibrium in the water system that has been brought about by less recent amount of recharge water to the aquifers. A feature that supports this conclusion is occurrence of extensive calcite coating on ophiolite clasts at zones reflecting fluctuation in the water table.