

SCG010-04

会場:203

時間:5月25日 15:15-15:35

孔井間地中レーダデータと岩石物理学的関係に基づく不飽和帯溶質移動の定量的評価

Quantitative estimation for solute movement in vadose zone based on crosshole radar data and petrophysical relationship

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One of the best ways to solve problems with nitrate contamination of groundwater in agricultural areas is to improve fertilization and farming methods to reduce the leaching rate and impacts of nitrate to the groundwater. Recently, we can find some successful examples of the effort of farmers that maintain low input farming to overcome this problem. On the contrary, we can find cases in which the improvement of farming and the reduction of the amount of fertilizer applied have little effect for improving the quality of groundwater.

In order to maintain sustainable efforts in agriculture for environmental conservation, contamination and purification processes must be clarified. However, it is difficult to explain all the processes because they are subsurface phenomena and cannot be observed directly. This uncertainty and opacity are major obstacles to the improvement of water quality in watersheds contaminated by non-point sources. A technique to clarify the contamination process and to assess the effects of nitrate leaching rate, rain infiltration ratio and other principal factors affecting groundwater quality should be established.

Clarification and quantitative estimation of hydrological phenomena in the deep vadose zone are essential and necessary in environmental science and engineering. However, it is difficult to explain these phenomena because of a lack of proper measurement methods. We propose a method to monitor soil water and solute dynamics quantitatively in the vadose zone. This approach is based on time-lapse cross-borehole ground-penetrating radar (GPR) measurements in the vadose zone and petrophysical relationship between electromagnetic property of soil and soil solution.

The objective of this research is to develop a method to clarify the dynamics of soil water and solute quantitatively in the vadose zone, which is a zone of unsaturated soil from soil surface to groundwater. The proposed method was tested in Makinohara Plateau in Shizuoka Prefecture to evaluate the applicability.

キーワード: 地中レーダ, 孔井間物理探査, 繰り返し探査, 不飽和帯水文学, 土壌環境, 溶質移動

Keywords: Ground Penetrating Radar (GPR), Cross-hole geophysics, Time-lapse, Vadose zone hydro-geophysics, Soil environment, Solute movement