オンラインでは要旨のみ公開しています。

Nitrate Attenuation Processes in Groundwater at an Upland Slope-Wetland Plot

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Abstract

In the upland slope-wetland plot of about 300m^2 in area, detailed study was conducted to clarify relationship among groundwater flow paths, distribution of NO_3^- concentrations, and NO_3^- attenuation processes. The results are summarized as follows.

(1) Nitrate concentrations in groundwater were attenuated in the upland slope. There are two NO_3^- attenuation zones. One is NO_3^- attenuation zone in the deeper silt and clay layer of unweathered sediments. The other is NO_3^- attenuation zone in the interface between the loam layer and the sand and gravel layer. Furtherer, NO_3^- attenuation zone in the interface between the loam layer and the sand and gravel layer locates the place where gradient of water table is below 0.2 and the height from boundary between the loam layer and the sand and gravel layer is within 10cm. However, nitrate was not attenuated in the shallowest part of loam layer.

(2) Nitrate is attenuated in the deeper silt and clay layer of unweathered sediments in N3 as groundwater flow from the sand and gravel layer is directed downward. On the other hand, NO_3^- attenuation zone in the interface between the loam layer and the sand and gravel layer will be formed by more anaerobic groundwater from the deeper layer.

(3) Considered groundwater geochemistry, NO_3^- attenuation process in the deeper silt and clay layer is denitrification. The denitrification will occur in anoxic micro sites because the bulk groundwater may not be well anoxic condition. On the other hand, NO_3^- attenuation processes in interface between the loam layer and the sand and gravel layer at N1-N2 are dilution, denitrification, dissimilatory nitrate reduction to ammonium, and microbial assimilation into biomass.

Key words: upland slope-wetland plot, nitrate attenuation zone, water table gradient, groundwater flow path, unweathered sediments

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