

Groundwater flow and nitrate fate around a hillslope-wetland zone in Tsukuba, Japan

Norio Tase[1]

[1] Life and Enviro. Sci., Univ. Tsukuba

Transitional zones from upland to lowland have been focused as an important attenuation zone of nitrate in groundwater. We have been studying relationships among geology, landform, vegetation, groundwater flow and nitrate concentration, in order to clarify nitrate fate in a typical small hillslope-wetland zone in Tsukuba, through intensive observation network of wells and piezometers.

The results are summarized as follows:

1)Groundwater flow system in this zone is controlled basically by landform, that is, water table is consistent with landform.

2)High nitrate(-100mg/L) in groundwater is attenuated near or below the black clay layer distributed in the small valley bottom. The attenuation zone or front is distributed like horseshoe-shaped along the valley bottom.

3)The attenuation process is attributed to denitrification by organic carbon as an electron donor under anaerobic condition. The black clay layer with high organic contents supplies dissolved organic carbon and reduced groundwater.

4)The attenuation front moves forward or backward with low or high hydraulic gradients in the black clay layer. That is, when downward flow is dominant in the black clay layer to the sand layer, attenuation occurs actively and the front moves backward or upstream.

5)A tree plays an important role in water and nitrate intake and also in providing anaerobic conditions for denitrification around root zone by induced upward flow and root respiration.

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