Dissolved nitrogen dynamics in groundwater in a riparian hyporheic zone during a small storm in a forested basin in northern Japan

Hideaki Shibata[1], Futoshi Nakamura[2], Osamu Sugawara[3]

[1] Facul. of Agric., Hokkaio Univ., [2] Graduate school, Agric., Hokkaido Univ., [3] Erosion Control,Hokkaido Univ

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Water and dissolved nitrogen flows in a hyporheic zone of 2nd-order mountain stream in Hokkaido, northern Japan were measured during a small storm in August 1997. A network of wells was established to measure the water head of groundwater and to collect groundwater to analyze dissolved nitrogen concentration. We applied the MODFLOW model for quantification of water flows in the ground. Dissolved inorganic nitrogen (DON) and ammonium derived as subsurface water from the hill slope were the dominant nitrogen inputs to the riparian zone. Ammonium is the dominant nitrogen species in groundwater and was net released during both base flow and storm event periods. Nitrate appeared to be immobilized by microorganisms and/or vegetation in the riparian zone.

Water and dissolved nitrogen flows in a hyporheic zone of 2nd-order mountain stream in Hokkaido, northern Japan were measured during a small storm in August 1997. A network of wells was established to measure the water head of groundwater and to collect groundwater to analyze dissolved nitrogen concentration. Field hydraulic conductivity and bedrock boundary were also surveyed in the hyporheic zone to apply the MODFLOW model (McDonald and Harbaugh 1988) for quantification of water flows in the ground. During a small storm, subsurface water inflow from the adjacent hill slope increased by 1.7 fold of that before the storm. Dissolved inorganic nitrogen (DON) and ammonium derived as subsurface water from the hill slope were the dominant nitrogen inputs to the riparian zone. DON was consumed via mineralization to ammonium in the hyporheic zone. Ammonium is the dominant nitrogen species in groundwater and was net released during both base flow and storm event periods. Nitrate appeared to be immobilized by microorganisms and/or vegetation in the riparian zone.