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琉球石灰岩帯水層における硝化と脱窒
Nitrification and Denitrification of Groundwater in Ryukyu Limestone Aquifer

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In recent years, drinking water due to excessive fertilization and domestic waste water, nitrate nitrogen pollution of groundwater has occurred in many places, it has become one of the most pressing challenges for conservation water environment. on the other hand, Ryukyu limestone the distribution areas, from surface geology characteristic is a high permeability of porous, groundwater pollution such as nitrate nitrogen is also easy to progress, water pollution by nitrate nitrogen concentration has been reported. The study area is located in the southern part of Okinawa Main Island, Japan, where Ryukyu limestone is extensively distributed.In this study, from the point of view that contribute to the proper use of groundwater, including the future of water quality management, using the water quality data, the elucidation of understanding and water quality formation mechanism of nitrification-denitrification dynamics of limestone aquifer groundwater areas are carried out. It is suggested that nitrogen load from agricultural land in this area influences the long-term fluctuation of NO_3^--N concentrations in groundwater. It is recognized that groundwater level participates annual fluctuation of NO_3^--N concentrations in groundwater. It is considered that NO_3^--N concentrations are influenced by nitrogen load accompanied with groundwater flow from the upstream to the downstream of the study area. It is also found that NO_3^--N concentration formation is assumed to depend on two factors, that, mixing-inflow actions and denitrification-dilution actions under conditions of groundwater flow caused by completion of the subsurface dam. Through advection action and diffusion effects associated with the event changes in groundwater flow triggered by the precipitation, after the equilibrium state of the dissolved substance is lost, nitrogen component to keep the equilibrium state by adsorption, creation, annihilation action and dilution and concentration effect. The hydrological condition and groundwater flows may cause the redox diagram of nitrogen so that patterns of electron donors and acceptors also play important role on nitrification and denitrification processes. It is considered that transport of nitrate sources tends to determine the nitrification and denitrification of potential as extend nitrate is transported as conservative substance through the aquifer. Nitrification reaction rate constant in the Ryukyu limestone aquifer is 0.031 ˜0.089h-1, denitrification reaction rate constant is 0.008 ˜0.145h-1, both nitrification reaction rate constant is higher than the literature value of field soil oxidation state a value, denitrification rate constant has been shown to be not less than paddy soil of reduced state, has revealed that it has a high nitrification-denitrification potential.

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