

Topographic effect on nitrate load in coastal shallow groundwater of Seto Inland Sea

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Eutrophication in Seto Inland Sea is one of important problems in Japan. So, it is important to estimate nitrate load of groundwater flow to sea as well as river flow. For the estimation of nitrate load of groundwater flow, we need to monitor the fluctuation in groundwater flow and nitrate concentration with considering the reaction in hyporheic zone. The objective of this study is to confirm the groundwater flow and solute transport in coastal aquifers at the urban and rural area, and to estimate the nitrate load. We observed groundwater levels and collected water samples in coastal groundwater. Urban area is at Takehara city, and rural areas are at Shimo-Kamagari Island and Ikuchi Island, Hiroshima prefecture, western Honshu Island, Japan. In case of Takehara city, groundwater flow had usually the direction from the land to the estuarine with 2mm/h of Darcy flux. Mixing ratio of seawater in groundwater at the 50m, 100m and 200m far from the estuarine was 5%, 0.5%, and 0.08%, using the chloride tracer. This result determines that groundwater at the 50m of estuarine side is hyporheic zone, because mixing with seawater occurred. Nitrate concentration in groundwater at 200m, 100m and 50m from the river was 3.2mg/L, 1.1mg/L, and 0mg/L, respectively. It indicates that no nitrate load is from shallow groundwater to sea. In case of rural areas, nitrate source were too much, fertilizer at the orange plantation and wastewater. Therefore, nitrate concentration were more than 10 mg/L in groundwater at the pre-hyporheic zone. However, nitrate was emitted at the every sites of the hyporheic zone with the high chloride concentration. These nitrate emission processes would be denitrification, based on the mass balance estimation. This study suggests the hyporheic zone with the purification process distributes in shallow groundwater around a sea with larger tidal fluctuation.