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河川への地下水流出にともなう栄養塩供給 - 西日本と韓国南部の比較 -

Comparative study on nutrient supply by groundwater to rivers in Southern Korea and Western Japan, using 222Rn

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Nutrient condition in water environment controls the ecosystem. Groundwater discharge to the oceans is significant as nutrient supply (Slomp et al, 2004 etc). This situation is similar to the nutrient condition in rivers. Most of river line generally is discharge area of groundwater, but a part of river line is recharge area of groundwater. In addition, nutrient concentration changes by the trap in dammed lake in the way of flowing to downstream. On the other hand, recent human activity has caused the intensive and excessive supply of nutrient. To clarify the nutrient condition in river environment, it is necessary to confirm the groundwater discharge to river as well as estimate the nutrient load by human activity. However, these types of researches have not been conducted enough.
In this research, we aimed to confirm effects of groundwater on nutrient supply to rivers of various properties. Our research areas are around Hiroshima of western Japan and around Busan of southern Korea. We collected river water samples from upstream to downstream. In addition we collected continuously water samples at one station of the river mouth area in Asahi River on Okayama near Hiroshima and Nakdong River on Busan. The 222Rn concentrations were also continuously measured by Rad 7 in situ at the interval from 15minites to 2hours during one tidal variation. All water samples were analyzed in the laboratory for the 222Rn, nutrient and inorganic element concentration, respectively. In addition, water samples of groundwater around there, bottom sea water, and river water at some points around the station were collected.
Spatial variations from upstream to downstream in 222Rn and nutrient concentrations indicated decreasing trends. These suggest that head water is source area of nutrient. But some areas in midstream had high values, and it indicated heterogeneous groundwater supply. The hourly changes in 222Rn and nutrient concentrations at the river mouth station of Asahi River are shown in Figure 1. The low tides were at 9 a.m. and 9 p.m. on July 13 in 2009 of a low flow period. The 2 22Rn concentration was lower at the high tide, and this value was same as the concentration at the point of 4km upstream. On the other hand, the 222Rn concentration was highest at the low tide and was twice of that at the high tide. The 222Rn of groundwater was one order higher than that of the river. These results suggested the groundwater discharge at the low tide and the stop of that at the high tide, respectively. In addition, comparative variations of dissolved nitrate and phosphorus were indicated, the nitrate was almost constant but the phosphorus changed as 222Rn. This would mean that nitrate source was the river of the upstream are, on the other hand phosphorus source was the groundwater. In the high flow period, the river discharge was one order larger than that in the low flow period. Therefore, 222Rn and phosphorus signals became small in the compared at low flow period. On the other hand, the results in the tidal area of

Nakdong river indicated the low concentration at the low tide and high concentration at the late low tide and late high tide.

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