Nutrient Flux in Submarine Groundwater Discharge in Rishiri Island, Japan: Implication for Ecological Balance

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Submarine groundwater discharge (SGD) in many areas represents a major source of dissolved chemical constituents to the coastal water. In the Rishiri coast, previous studies have shown that huge amount of freshwater discharge into the ocean. The purpose of this study is to investigate the relationship between SGD nutrients and concentration of phytoplankton (chlorophyll).
In the Rishiri island, SGD geochemistry is influenced by the dissolution of primary minerals from Volcanic rocks, which release high (15-30 mg/l) silicate nutrient and macro-nutrient (phosphate and iron) into the coastal water. Moreover, the SGD also showed high (4 mg/l) NO3 - content as a result of leaching from forested areas. The observed high concentrations of silicate and nitrate in the SGD may suggest an imbalance in Redfield ratio (such as N:P, Si:P and Si:N) of the coastal water, which may affect the growth of phytoplankton in the ecological system. Oxygen isotope data also reveals the relative contribution of fresh water and sea water in SGD component.

Keywords: SGD; Volcanic; Rishiri island; nutrient, phytoplankton, Redfield ratio