

Submarine groundwater discharge variation due to tidal change in the coastal zone

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Submarine groundwater discharge (SGD) is recently recognized as a potentially significant water and material pathway from the land to the ocean. However, quantitative evaluations have not been done because the measurement is difficult. Therefore, a lot of uncertain points exist about SGD processes.

It has been clarified by various studies that SGD rates depend on tidal change, and there are 3 patterns on the relationship between tidal change and change of SGD rates. One is negative correlation between tide and SGD, second is positive correlation, and third is the correlation which has time lag in the peaks. It has not been clarified that the factor with different pattern of change, and this study may contribute to understand the process of groundwater discharge in coastal zone. Therefore, the purposes of this study are to clarify the correlation between tide and SGD, and to consider the process of groundwater discharge into the ocean.

Study area is a coastal zone of Yatsushiro Sea in Kyushu island, Japan. The average of tidal change of Yatsushiro Sea ranges from 3 to 5m. Therefore, the study area is a region where it is expected the large tidal effect on SGD. Continuous measurements of SGD rates and conductivity of SGD by automated seepage meters and CT sensors have been done in this study area. Observation period is about one month because SGD rate vary depending on the change of neap-spring tide.

As the result, negative correlations between tide and SGD were found. However, it were also found that the correlation changes from negative to positive in further offshore.