Submarine Groundwater Discharge

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Submarine groundwater discharge (SGD) is now recognized as a significant water and dissolved material pathways from land to the ocean. International research organizations such as SCOR/LOICZ, IOC/IHP, IAEA, START and APN funded the researches on SGD recently. Intensive measurements through intercomaprisons on SGD with different methodologies have been carried out in Florida, Sicily, Perth, New York, Brazil, Thailand, and Philippines. Regarding the results from intercomparisons, SGD consists of SFGD (Submarine Fresh Groundwater Discharge) and RSGD (Recirculated Saline Groundwater Discharge). SGD rate changes with time by tidal effects (high-low tide and spring-neap tide), precipitation, and barometric pressure. SGD rate also changes with space by distance from the coast, location within the bay (curvature of the coastline), the distance from the adjacent river, and heterogeneity of the geology. Relationships between SGD and saltwater-freshwater interface, SFGD and RSGD, and phase lag of SGD and tidal changes, have also been evaluated by continuous measurements of conductivity of SGD and resistivity of the aquifer across the coast.

Relationships between SGD and the freshwater-saltwater interface are evaluated by continuous measurements of SGD rates, conductivity and temperature of SGD, and resistivity measurements across the coastal aquifer, Shiranui bay, Japan. Our measurements show that the processes of SGD differ between the offshore and near shore environments. SGD in the near shore can be explained mainly by connections of terrestrial groundwater, while offshore SGD rate is controlled mostly by oceanic process such as recirculated saline groundwater discharge. In this study, we compare the results of SGD in Shiranui and the results in other intercomparisons on SGD.