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Submarine groundwater discharge in the Suruga Bay

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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. The objectives of this study are to evaluate the reasons of the SGD variations and to compare the SGD with river discharge. Two automated seepage meters are installed to observe continuous SGD rates in Mochimune, the Suruga Bay, Japan. The depths of the seawater at the locations of the seepage meters are (A) 0.5m and (B) 1m. The averages of SGD at A and B are 2.33 x 10-6 m/s and 1.84 x 10-5m/s, respectively. Variations of SGD were analyzed by PSD to evaluate the dominant periods of the SGD variations. The dominant periods of the SGD at A are 4.9 and 2.4 hours which are corresponded to the dominant periods of groundwater level in the coast of Mochimune. On the other hand, the dominant periods of the SGD at B are 11.4, 8.5 and 6.2 hours, and the half day of the periods of SGD is corresponded to the sea level change due to tidal effect. The overall changes of SGD without the tidal effect shows the strong negative correlation with the change in barometric pressure. The separation of SGD into fresh terrestrial groundwater discharge and recirculated seawater discharge were also done by using the electric conductivities of the water of two end members, groundwater in the coast and seawater. SGD were also calculated to be 1.5 x 10-7 - 1.7 x 10-6 m/s using estimated hydraulic conductivity and observed hydrological gradients between land and sea. According to calculations of the water balance in the basin, river discharge and SGD were estimated to be 5.8 x 108 m3 and 9.9 x 107 m3, respectively. Therefore the ratio of SGD to river discharge was estimated to be 0.15.