

Groundwater as a hidden source of limiting nutrients in an estuarine zone: Results from the continuous monitoring of nutrients and ^{222}Rn

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We continuously monitored the concentrations of ^{222}Rn and nutrients in water at a fixed station of the Nakdong River estuary every two hours from October 2014 to May 2015. The upstream water of this estuary is obstructed by an artificial barrage which regulates seawater inundation through tidal fluctuations. The average water depth is approximately 5 m, and sampling intake point is positioned about 1 m below the surface. Assuming a steady-state condition, the monthly benthic flux was estimated using a simple model including the ^{222}Rn sinks for evasion and radioactive decay and the ^{222}Rn source for ingrowth from ^{226}Ra . Based on the correlation analyses, the concentration of dissolved inorganic nitrogen (DIN) is found to be dependent primarily on the river water inputs. However, the concentrations of dissolved inorganic phosphorus (DIP) and dissolved inorganic silicate (DSi) are controlled predominantly by the benthic advective fluxes, perhaps groundwater inputs, rather than the river water inputs. These results demonstrate that benthic advective fluxes could be the important source of DIP which limits biological production in this estuary (the daily average of DIN/DIP ratio: 26-330).