CO_2, CH_4, N_2O flux measurements from a constructed wetland

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Implication

It is recently reported that microbial activity in freshwater wetland soils transforms considerable amounts of CO_2 into CH_4, which is then released into the atmosphere [1]. Consequently, this is likely to enhance greenhouse effect as CH_4 has a global warming potential greater than CO_2. The current study was focused on quantifying the source strenths of these greenhouse gases (GHG) from a wetland water surface and elucidating relationship between GHG emissions and physicochemical parameters.

Sampling and Experimental Methods

A closed chamber system was utilized to measure GHG emissions from water surface in a constructed wetland at Kunsan, Korea for six-month period (August~December, 2010 and March 2011). The measurements were made on 20 days during a day time (1400~1600LST) for experimental period only when weather was clear, and 50 ml of three consecutive gas samples for one GHG flux calculation were taken at each 10 min interval from a half spherical plastic chamber floating on the wetland water surface with plastic syringes. GHG fluxes were calculated based on the rate of change of GHG concentration [2]. Chemical characteristics in water (NO_3^--N, NH_3^+-N and pH) and water temperature also were monitored on measurement days. Concentrations of CO_2, CH_4 and N_2O were analyzed by using a Gas Chromatography (equipped with ECD/FID) at laboratory.

Results and Discussion

In order to examine the role of temperature on the gas flux, the changes of GHGs' emissions were investigated in terms of water temperature measured during sampling period (warm season: 18~31 ºC, cool season: 8~12 ºC). Results from current wetland experiment shows that water surface of the wetland absorbs CO_2 (sink) and emits CH_4 and N_2O (source) in average over the experimental period. Those levels were greater in warm season than in cool season. Futher results in correlations between physicochemical controlling parameters and those GHG emissions will be discussed in the conference.

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[1] Williams (2009) CCAR Tidal Wetland Issue Paper 02/04/09. [2] Kim *et al*. (2002) *J. Air & Waste Manage. Assoc*. **52**, 416–422.

The elemental and stable isotope geochemistry of Korean bottled waters: Characterization and identifying their origins

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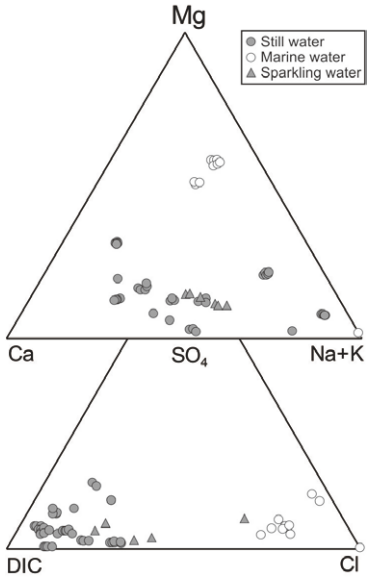
We investigated 54 Korean bottled waters to characterize their water types and to examine a good tool for identifying their origins using the elemental and isotopic geochemistry. The elemental and isotopic compositions of the bottled waters varied substantially in different types of bottled waters. Major ion chemistry and oxygen and hydrogen isotopes clearly discriminate marine waters from the other types of water. Fractionation of oxygen and hydrogen isotopes likely explains the altitude and latitude effects. Variations in dissolved inorganic carbon isotope values reflect artificial CO_2 addition in sparkling waters, and reveal fractionation during the desalination process of marine waters. Strontium isotope ratios ($^{87}Sr/^{86}Sr$) of bottled waters are clearly associated with those of basement rocks in which bottled waters were collected. The results suggest that combined elemental and stable isotope variations in bottled waters are useful for characterizing the bottled waters and identifying the origins. Furthermore, combined elemental and isotope geochemistry could be a powerful tool in the related research fields and forensic sciences.



Figue 1: Ternary diagram showing chemical characteristics of bottled water.