Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.19021

Spatio-temporal variation of anthropogenic origin organic matter and nutrients in the Korean estuary

SEUNG-HEE KIM[1], DONG-HUN LEE[2], MIN-SEOB KIM[3], SUJEONG PARK[1] AND KYUNG-HOON SHIN[1]

[1]Hanyang University
[2]Pukyong National University
[3]National Institute of Environmental Research
Presenting Author: bearpig4528@gmail.com

Increased anthropogenic activities near the coastal areas may enhance the discharge of organic matter and nutrients to the marine environment. In this study, we investigated the spatial and temporal variation of dissolved organic matter (DOM) and nutrients in the three largest Korean estuaries of Han, Nakdong, and Yeongsan rivers using stable isotope analysis approach. Seasonal variations of DOC and DTN concentration ranged from 11.9 to 1.2 mg/L and 5.9 to 0.04 mg/L for Han River, from 3.5 to 0.8 mg/L and 3.0 to 0.04 mg/L for Nakdong River and from 5.2 to 0.9 mg/L and 4.4 to 0.1 mg/L for Yeongsan River, respectively. For $\delta^{13}C_{DOC,}$ three estuaries ranged from -22.4 to -32.8 ‰, -19.7 to -30.0 ‰ and -19.3 to -31.6 ‰ respectively. Except for the Han River, which represented relatively constant DOC concentration and $\delta^{13}C_{DOC}$, the other two estuary show decreasing pattern of DOC concentration and increasing patterns of $\delta^{13}C_{DOC}$ from river to coastal sites. This indicates that DOC sources in the Nakdong and Yeongsan should be changed from land to marine origins with the spatial distance of estuary dam. In contrast, all three estuaries show decreasing patterns of DTN concentration with the distance from upper river site. Also, the Han river represented relatively higher and wider ranges of DTN and nitrate concentration (from 364.4 to 19.6 μM) compared to other two estuaries (from 187.5 to 2.9 μM for Nakdong and 135.7 to 5.1 μM for Yeongsan River). These patterns indicate that massive human activities in the Seoul metropolitan city may discharge large N nutrients (NO_3^- and NH_4^+) loading, which cause a relatively higher DTN concentration in the Han River. Further investigation of dual isotopic composition ($\delta^{15}N_{NO3}$ and $\delta^{18}O_{NO3}$) of nitrate in the three estuaries may provide the information of specific sources of nitrate.