Geophysical Research Abstracts
Vol. 21, EGU2019-16067, 2019
EGU General Assembly 2019

Organic carbon transfer across the river-sea interface: a case study of the Geum and Seomjin estuary systems, South Korea

Sujin Kang (1), Jung-Hyun Kim (2), Daun Kim (1), Hyeongseok Song (4), Jong-Sik Ryu (3,4), and Kyung-Hoon Shin (1)

(1) Department or Marine Sciences and Convergent Technology, Hanyang University, Ansan, Republic of Korea (su1423@hanyang.ac.kr), (2) Korea Polar Research Institut, Incheon, Republic of Korea, (3) Division of Earth and Environmental Sciences, Korea Basic Science Institue, Chungbuk, Republic of Korea, (4) Graduate School of Anaytical Science and Technology, Chungnam National University, Daejeon, Republic of Korea

The Geum River flowing into the Yellow Sea has a dam at the river mouth while the Seomjin River flowing into the South Sea of Korea has an open estuary. In this study, we investigated spatial variations in organic carbon (OC) concentration and its carbon isotope to understand estuary damming impact on the transport of riverine OC. The river and seawater samples were collected in two contrasting Korean estuary systems (Geum and Seomjin) across the river-sea interfaces with a salinity gradient in August 2016. The DOC concentrations in the Geum estuary were 2.0-3.8 mg/L, while the POC concentrations were in the range of 0.2-12.7 mg/L. In the Seomjin estuary, the DOC and POC concentrations were 1.9-2.4 mg/L and 0.8-1.0 mg/L, respectively. An abrupt decrease in the OC concentration occurred after the dam in the Geum estuary. In the Geum estuary, the $\delta^{13}C_{POC}$ values were -21.1±2.5 ‰ before the dam and -22.4±1.5 ‰ after the dam, while the $\delta^{13}C_{POC}$ values were -29.1 to -21.1 ‰ in the Seomjin estuary. We observed a heavy algal bloom before the dam during the sampling in the Geum River, which resulted in higher $\delta^{13}C_{POC}$ values than in other sampling sites. The $\Delta^{14}C_{POC}$ values in the Geum estuary were -51.1 ‰ before the dam and -98.2 ‰ after the dam. In the Seomjin estuary, the $\Delta^{14}C_{POC}$ values were much lower with the value of -186.7±2.2 ‰Ẇe calculated the contribution of biogenic OC in the closed Geum estuary system using the carbon isotope data, indicating 95% of the biogenic OC contribution. The calculated $\delta^{13}C_{POC}$ of the biogenic POC end-member was -19.2 ‰ indicating that biogenic POC was mainly derived from the phytoplankton in this system. Accordingly, our results showed that the two contrasting estuary systems are differently functioning due to an algal bloom occurred in the closed Geum estuary system, influencing OC concentrations and characteristics transferred from land to sea.