O71. INTERACTIONS BETWEEN BIOGEOCHEMICAL ENVIRONMENT AND SUSPENDED OYSTER FARMING IN SHIZUGAWA BAY, JAPAN

Yizhe Zheng¹, Kyohei Hayashi¹, Takumi Matsuno¹, Megumu Fujibayashi¹,², Munehiro Nomura¹, Osamu Nishimura¹, Takashi Sakamaki¹

¹Graduate School of Engineering, Tohoku University, Japan
²Faculty of Bioresource Sciences, Akita Prefectural University, Japan
yizhe.zheng.t6@dc.tohoku.ac.jp

The impacts of human-induced changes in coastal environments on shellfish farming need to be mitigated. Suspended farming species, such as oysters, greatly impact planktonic communities and benthic environments via filter feeding and bio-deposition. To more effectively manage coastal environments and achieve ecologically sustainable shellfish farming, interactions between coastal marine environments and aquaculture activities need to be properly assessed. We examined interactions between coastal biogeochemical environments and suspended oyster farming in Shizugawa Bay of northeastern Japan. We found that particulate organic matter (POM) produced at the oyster farm (e.g., exfoliated periphyton and/or oyster feces) locally increased the concentrations of chlorophyll $a$ and daytime dissolved oxygen in the bottom layer. Based on the estimated budget of POM at the bay scale, the oyster feeding rate was a couple of orders of magnitude lower than the net primary production and POM inputs at the bay boundaries (e.g., offshore and in rivers). The relatively high exposure of the bay and high seawater mixing rate may explain the lack of macroscale environmental impacts of oyster cultures at the bay scale. We also found that despite the oligotrophic environment, the oyster growth rate was higher in the bay, compared with previous estimates in other coastal areas. To understand the mechanisms sustaining the production of phytoplankton and oysters, further examinations from the perspective of nutrient cycling in the bay are required.