Fate of macroalgal organic matter and its effects on in and outside of algal bed

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Macroalgal bed is known as one of the most productive biome on the earth’ s surface. Their habitat is limited to shallow coastal region, but the coastal environments are linked with the open oceans. A part of organic matter derived from macroalgae would be exported, and it contributes to ecosystem outside of algal bed. Dislodgement of algal body from their base provide drifting algae which would be partly utilized by organisms in offshore. Another fate of organic matter which is exported would be dissolved organic matter (DOM). DOM is exuded to body surface of macroalgae, and transported with mixing of water mass. Based on quantitative estimates of these fate of macroalgal products, we have tried to evaluate the ecological roles of macroalgae in large special scale.

Dislodgement of macroalgae

Dislodgement of macroalgal body would often happen due to wave action. In order to quantitatively estimate the amount of dislodgement, we labeled the body of *Ecklonia cava* which is dominant species in kelp forest around Shimoda, Izu Peninsula, Shizuoka, Japan. A part of labels was disappeared due to dislodgement, and it accounted for about 20-30% of fixed carbon by *E. cava*. In addition, we collected benthic organisms in offshore region with/without drifting algae, showing settlement of drifting algae increases species diversity of fauna on the seafloor.

Macroalgal DOM

Release rate of DOM is estimated by covering bag on blades of *E. cava*, and approximately 40% of fixed carbon is released as DOM. Horizontal distribution of DOM across algal bed to offshore showed a gradient of macroalgal DOM, being consistent with the fact that *E. cava* releases large amount of DOM in coastal region. We additionally examined the microbial and photochemical decomposition processes of the macroalgal DOM. Macroalgal DOM has a resistance for bacterial mineralization, while it was degraded by exposure to sunlight. Therefore, macroalgal DOM would be exported with mixing of water mass, and it is partly decomposed in surface layer. On the other hand, the fraction transported to deeper layer has resistance for bacterial decomposition, and contributes to carbon sequestration.

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