

Inorganic carbon cycle at the Fukido estuary in Ishigaki Island

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“ Blue Carbon ”, which is carbon captured by marine living organisms and about 55 % of biological captured carbon in the world, is an important carbon budget in the global carbon cycle. The Blue Carbon in coastal regions is recently focused as an effective option for the climate change initiatives because the part of the Blue Carbon is separated from the atmosphere for long periods as the sediment in the soil. The potential of the carbon sequestration in tropical-subtropical coastal regions is expected to be high due to the abundant vegetations such as seagrass meadows and mangroves. Meanwhile, there is the potential that the coastal regions release CO₂ to the atmosphere due to the high decomposition rate of organic matters in vegetations and from land.

The precise measurement of the carbon cycle including the air-sea CO₂ flux is necessary for the evaluation of tropical-subtropical coastal regions related to atmospheric CO₂. Because the temporal variation in tropical-subtropical regions is generally larger than that in other climate regions, the measurement should have a certain level of continuity for long periods. In this study, we analyzed the subtropical inorganic carbon flow base on the measurement of air-sea CO₂ flux by the eddy covariance method and the biomass of seagrass at an estuary in Ishigaki Island.

The measured air-sea CO₂ flux by the eddy covariance method ($-1.00 \pm 0.11 \mu\text{mol}/\text{m}^2/\text{s}$; 95 % confidential limit) indicates that the estuary was atmospheric CO₂ sink during the measurement period; the value is almost the same as the flux measured by other method such as the bulk formula method or the floating chamber method. In addition, the measured flux shows different tendency before and after a typhoon approach at the site. Because the seagrass was autotrophic during the measurement period, the linkage between the Blue Carbon production and the absorption of atmospheric CO₂ was confirmed at the measurement site. The presentation will discuss about the potential of the Blue Carbon fixation at subtropical coastal regions based on the comparison of the carbon flow measurement in other climate zone.

Keywords: Carbon cycle, Blue Carbon, Air-sea CO₂ flux, Seagrass, Eddy covariance method