Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

MIS24-P10 Room:Convention Hall Time:May 23 18:15-19:30

Relationship between the coastal Blue Carbon and atmospheric CO_2

Tatsuki Tokoro[1*], KUWAE, Tomohiro[1]

[1]Port and Airport Research Institute

The mitigation of atmospheric CO_2 is an urgent task for future climate change, and has been required to be applied to several initiatives. UNEP reported that the Blue Carbon, which is the carbon captured by marine living organisms, could be a new initiative for future climate change. Especially, coastal regions are expected to be long-term atmospheric CO_2 storage because the persistent Blue Carbon such as seagrasses is estimated to sequestrates in the sediment for millennia.

However, the contribution of the Blue Carbon to atmospheric CO_2 has not been clarified quantitatively. Rather, the coastal vegetation has been basically recognized as an atmospheric CO_2 source in according to the former measurements in Mangroves or Salt marshes. But, the comprehensive measurement and analysis of the complex coastal carbon flow, which is necessary in order to evaluate the relationship between the Blue Carbon and atmospheric CO_2, has been few. Besides, there were few measurements in Seagrasses where the vegetation uses the dissolved inorganic carbon (DIC) in water.

In this study, the relationship between the Blue Carbon and atmospheric CO_2 was analyzed by the measurement in two seagrasses. The measurement sites were the Furen lagoon and the Fukido reef, which locate in boreal and subtropical regions, respectively. These sites were selected in order to expose the latitudinal difference. The measured carbon flows were 1): the air-water CO_2 flux, 2): the net ecosystem production (NEP), 3): carbon discharge from land. The air-water CO_2 flux was measured by three methods; the eddy covariance method, the bulk formula method and the floating chamber method. The NEP and the carbon discharge from land were determined from the DIC of the water samples. However, the NEP at the Fukido reef was determined from the grow rate of the seagrass due to the problem of the precision. At the Furen lagoon, the measurements were mainly performed in summer (August) and winter (November). Additionally, the measurement of the bulk formula method and the NEP were performed from June to November in 2011. At the Fukido reef, the measurements were performed in summer (August) in 2011.

The results of the measurement are summarized below. The air-water CO_2 flux at the Furen lagoon indicated atmospheric CO_2 influx and efflux in summer and winter, respectively. The annual average indicated atmospheric CO_2 influx both in 2010 and 2011. The air-water CO_2 flux at the Fukido reef indicated atmospheric CO_2 influx but the flux shifted to efflux during the latter half of the measurement period. The NEP at the Furen lagoon showed clear diurnal change and indicated the autotrophic condition in summer. Contrary, the NEP in winter showed small fluctuations, and the average indicated the heterotrophic condition. In 2011, the autotrophic and heterotrophic conditions were indicated from June to September and from October to November, respectively. At the Fukido reef, the grow rate of the seagrass indicated the autotrophic condition. The carbon discharge from land was confirmed both at the measurement sites.

Atmospheric CO_2 influx and efflux were seemed to occur under the autotrophic and heterotrophic conditions at the measurement sites, respectively. The analysis of the carbon equilibrium system revealed that the site changed from an atmospheric CO_2 source to a sink due to the decrease of CO_2 partial pressure by the NEP. Because the NEP determined in this study was smaller than that in the former references, other seagrasses might have larger atmospheric CO_2 influx than our measurement site.

This study indicated that the Blue Carbon in Seagrasses could contribute to the mitigation of atmospheric CO_2 directly. Therefore, the funds for recovery and reservation of seagrass vegetations by carbon credits such as REDD+ is expected by the further study of the coastal Blue Carbon.

Keywords: Recovery and Reservation of coastal vegetations, Initiative for climate change, Carbon flow in coastal regions, Seagrasses, Eddy covariance