

Field observations and the path analysis of CO₂ fugacity in shallow coastal waters of Japan

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The Blue Carbon, which is carbon captured by marine living organism, is recently recognized as an important option for climate change mitigation initiatives. In particular, shallow coastal waters such as seagrass meadows, tidal flats and coral reefs have been recognized as significant carbon stocks due to the high burial rates and long term sequestration.

In this study, using the path analysis, we investigated the mechanisms by which environmental factors directly and indirectly affecting the fugacity of CO₂ in water. Field observations were performed to examine the fugacity of CO₂ in water and environmental factors (e.g., water temperature, salinity, total alkalinity (TA), dissolved inorganic carbon (DIC), the metabolism (Δ DIC) and calcification (Δ TA)) in shallow waters. In situ measurements were conducted at boreal (Furen and Komuke lagoon), temperate (Hashirimizu coast, Nojima waterway, Matsuwa, Banzu and Futtsu tidal flat), and subtropical (Fukido estuary, Shiraho coast and Nagura Bay) sites in 2010~2015. In addition, we implemented the path analysis to infer important environmental factors and interactions affecting the fugacity of CO₂ in water.

Keywords: blue carbon, the fugacity of CO₂ in water, seagrass meadow, tidal flat, coral reef, path analysis