

亜熱帯域沿岸生態系におけるCO₂フラックスのモデル解析

The estimation of CO₂ flux in subtropical coastal ecosystems using a numerical model

*茂木 博匡¹、相馬 明郎²、渋谷 尚³、豊田 健志³、アカンド アニルバン¹、渡辺 謙太¹、所 立樹^{1,4}、井上 智美⁵、山野 博哉⁵、伴野 雅之¹、中川 康之^{1,6}、松田 裕之⁷、桑江 朝比呂¹

*Hirotsada Moki¹, Akio Sohma², Takashi Shibuki³, Takeshi Toyoda³, Anirban Akhand¹, Kenta Watanabe¹, Tatsuki Tokoro^{1,4}, Tomomi Inoue⁵, Hiroya Yamano⁵, Masayuki Bannno¹, Yasuyuki Nakagawa^{1,6}, Hiroyuki Matsuda⁷, Tomohiro Kuwae¹

1. 港湾空港技術研究所、2. 大阪市立大学、3. みずほ情報総研、4. 瀬戸内海区水産研究所、5. 国立環境研究所、6. 九州大学、7. 横浜国立大学

1. Port and Airport Research Institute, 2. Osaka City University, 3. Mizuho Information and Research Institute, Inc., 4. National Research Institute of Fisheries and Environment in Inland Sea, 5. National Institute for Environmental Studies, 6. Kyushu University, 7. Yokohama National University

Coastal ecosystems can play a role in climate change mitigation. One of the appropriate way to accurately quantify and predict the role is the utilization of numerical models. The mitigation effects can be facilitated by CO₂ uptake by net primary producers such as mangroves, zooxanthella in coral reef and seagrasses.

In this study, we developed a new ecosystem model that incorporates the biogeochemical processes of mangroves, tidal flats, seagrass meadows, lagoons, and coral reefs. We estimated CO₂ fluxes between air and the ecosystems and carbon burial rates in Yaeyama islands, Japan, which is the model site. In the future prediction, we selected two scenarios of representative concentration pathways, low emission (RCP2.6) and high emission (RCP8.5), adopted in IPCC 5th Assessment Report and compared the model results in 2010 and 2100. The output of HadGEM2-ES from CMIP5 models were used as the boundary data.

Our model results showed that the mangrove absorbed CO₂ more than other ecosystems because of direct uptake of CO₂ from the air. The maximal carbon burial rate was found in the mangrove. Additionally, the inflowing of open waters affected the air-ecosystem CO₂ flux and carbon burial rate near the open boundary. We will also present the result of comparisons between the model results and observed data.

キーワード：生態系モデル、亜熱帯沿岸生態系、大気-生態系CO₂フラックス、炭素埋没速度、将来予測

Keywords: Ecosystem model, Subtropical coastal ecosystem, Air-ecosystem CO₂ flux, Carbon burial rate, Future prediction