Estimation of DIC escape from a mangrove forest in Ishigaki Island inferred from using stable carbon isotopic analysise.

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It have been considered that mangroves forests have a largest carbon reservoir in terrestrial ecosystem and most carbon-rich tropical forests and substantial amount of carbon sink. However, the majority of the mangrove net primary production remains unaccounted for by current carbon budgets. Previous observation of mangrove carbon budgets has neglected the exchange of both ecosystem gross primary production and respiration. In addition, neglecting the escape of DIC derived from heterotrophic respiration leads to an overestimation of ecosystem net productivity estimates based on eddy covariance techniques. Here, we measured DIC concentrations and carbon isotopes over complete tidal and diel cycles in the mangrove tidal creek in Ishigaki island, SW Japan. The DIC escape calculated from the mangrove forest was computed using isotopic mass balance model. DIC concentrations and carbon isotopic values showed consistent tidal variation in August, with DIC ranging from 2017 to 3061 μmol/L, and 0.37 to 10.33 ‰, respectively. The carbon isotopic values were lower than expected for the mixing of the river water and seawater DIC during low tide, due to the ^{13}C-depleted DIC inputs from the mangroves. An isotopeic mass balance model was used to determine the DIC concentration derived from mangrove in the estuarine waters. The contribution to DIC escape from the mangrove in estuarine water was risen sharply in tandem with low tide ranging from 55 to 836 μmol C/L.

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