Sequestration of Carbon by Foraminiferal Carbonate Pump Affecting Benthic CO2 Flux in the Sundarban Mangrove Environment

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Sequestration of carbon in the Sundarban mangrove sediment by foraminiferal carbonate pump was found marginal during 2007-08 considering the net rate of 487.36 µg $CaCO_3$ m^{-2} d^{-1} in the Sundarbans (4264 km^2). Annual estimate of sequestration of carbon by foraminiferal carbonate pump was found to be 91.02×10^3 MgC. A close relationship between benthic foraminiferal dissolution and recruitment-production rate with benthic carbon dioxide flux was observed in Sundarban mangrove sediment. The benthic fluxes of CO_2 varied seasonally with a minimum of 45.56 ± 10.2 mM CO_2 m^{-2} d^{-1} in monsoon and maximum of 66.94 ± 8.17 in premonsoon (Fig. 1) which was quite higher relative to that of water-air exchange flux of CO_2 i.e 314.6 µM m^{-2} d^{-1} (Biswas et al. 2004). Degradation of labile organic matter available from mangrove litter by the process of aerial roots mediated oxygen enrichment in the sediment resulted acidification of pore water leading to the dissolution of foraminiferal $CaCO_3$. Benthic flux of CO_2 showed 34 % increase in post-monsoon compared to that of monsoon, and 3.5 % decrease in pre-monsoon and 52.1 % in monsoon relative to post-monsoon.

Keywords: Foraminiferal carbonate pump, benthic flux of CO_2, carbon sequestration, Sundarban mangrove ecosystem.

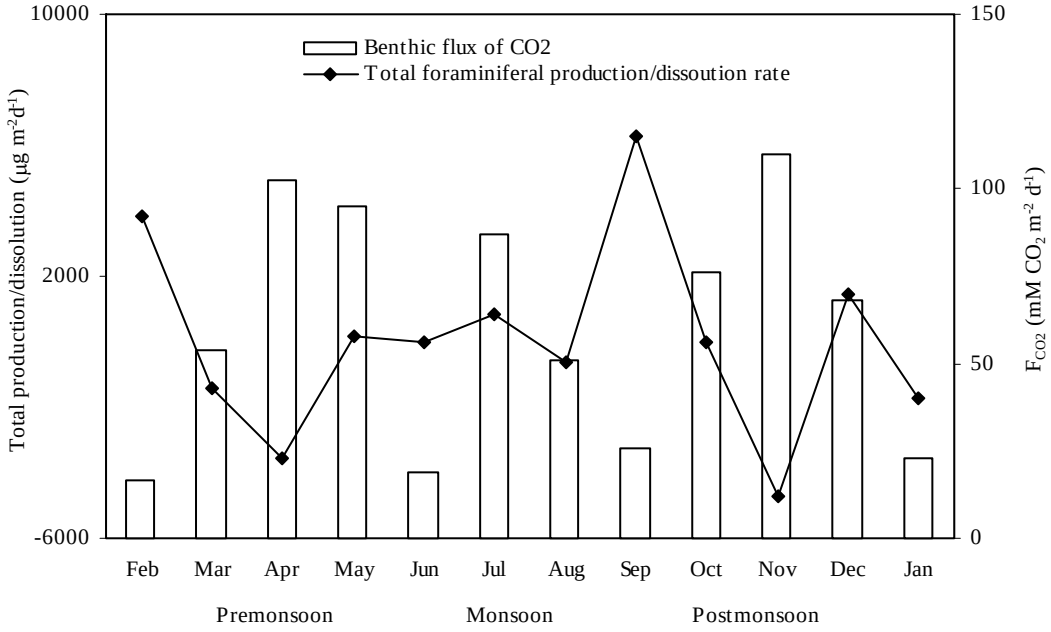

Fig. 1: Monthly fluctuation of benthic CO_2 flux (FCO_2) with foraminiferal dissolution rate (R(t))

References:

[1] H. Biswas, S. K., Mukhopadhyay, T. K., De, S., Sen, and T. K. Jana, *Limnol. Oceanogr.***49,** 95–101 (2004).