AOGS 2005

Fluxes of dissolved CH4 across the air-sea interface at Pulicat Lagoon, South India

RAMESH RAMACHAN[1], SHALINI AKELLA[1], PURVAJA RAMACHANDRAN[1] and PETER FRENZEL[2]

[1]*Anna University*
[2]*Max-Planck Institute for Terrestrial Microbiology*

Estuaries and lagoons have recently been shown to be significant potential sources of atmospheric CH_4 however emission studies in estuaries and more particularly; coastal lagoons require revision in order to constrain this flux. Most contemporary estuarine/lagoon CH_4 data are only available for temperate latitudes, however models have predicted greater CH_4 emission from sub-tropical latitudes, particularly where population pressure is greater. We examine CH_4 fluxes in an extensive sub tropical shallow water estuarine ecosystem, Pulicat Lagoon in South India.

Sediment CH_4 fluxes and oxidation rates were determined over the wet and dry seasons (four measurements) at Pulicat Lagoon, an extensive shallow Lagoon, South India. Dissolved CH_4 concentrations were measured at 52 locations in December 2000. The annual mean net CH_4 flux from Pulicat Lagoon sediments was $3.7 \bullet 10^9$ g yr^{-1} based on static chamber measurements. A further $1.7 \bullet 10^9$ g yr^{-1} was estimated to be oxidized at the sediment-water interface. The mean dissolved concentration of CH_4 was 242 nmol l^{-1} (between 94 and 501 nmol l^{-1}) and the spatial distribution could be explained by tidal dynamics and freshwater input. Sea-air exchange estimates using models only appeared to account for ~13% ($0.48 \bullet 10^9$ g yr^{-1}) of the total CH_4 produced by sediments, whereas ebullition was considered to be the major route for loss to the atmosphere (~62.80% of the net sediment flux). We estimated the total atmospheric source of CH_4 from Pulicat Lagoon to be $0.48 - 4.1 \bullet 10_9$ g yr^{-1}.