

Spatial and Temporal Distribution of Methane in an Extensive Shallow Estuary, South India

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The increase in the concentrations of atmospheric methane has received recent interest because of it role in Global Climate Change. Concern about this has stimulated research to quantify the uncertainties in the individual sources and sinks of methane in natural ecosystems. Estuaries have shown to be significant sources of atmospheric methane however emission studies in estuaries require revision in order to constrain this flux. Sediment methane fluxes and oxidation rates were determined over the wet and dry seasons (four measurements) at Pulicat Lake, an extensive shallow lake, South India. Dissolved methane concentrations were measured at 52 locations in Pulicat Lake, South India. The annual mean net methane flux from Pulicat Lake sediments based on static chamber measurements was 3.68 * 10 9 g per year. A further 1.66 * 10 9 g per year was estimated to be oxidized at the sediment-water interface. The mean dissolved concentration of methane was 242 nmol per litre with a range of 94.14 and 500.62 nmol per litre and the spatial distribution could be explained by tidal dynamics and freshwater input. Sea-air exchange estimates using models only appeared to account for $\sim 13\%$ (0.48 * 10 9 g per year) of the total methane produced by sediments, whereas ebullition was considered to be the major route for loss to the atmosphere (\sim 62.80% of the net sediment flux). The total atmospheric source of methane from Pulicat Lake was estimated to be 0.48 to 4.06 * 10 9 g per year.