Abstract Details

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Title: Biogeochemical Fluxes of CH4 in Mangrove Ecosystems of India

Abstract:

Coastal environments are found to account for 75% of the oceanic tr
emissions to the atmosphere, which contribute to about 2% of the glo
atmospheric emission. There has been intense interest in understandi
methane and nitrogen cycles in wetland ecosystems because high inp
organic matter into wetland soils, along with oxic surface and anoxic
subsurface zones, potentially allow them to play a critical role in the
biogeochemistry of wetlands. Concerns about global climate change a
1% yr-1 increase in CH4 concentration in the troposphere have focus
much research on the emission, production, oxidation and transport o
from wetlands. Although most studies of methane's source strengths
wetlands have been focused on inland freshwater wetlands, where the
largest fluxes have been found to occur, methane fluxes from coastal
marshes have been scantly documented. Mangroves have been rated
long time as a minor methane source, but recent reports have shown
polluted mangroves may emit substantial amounts of methane (Purva
Ramesh, 2000). We have measured annual CH4 emission rates of 10
year-1 from the mangroves stands of Avicennia marina. Mangroves
growing under different salinity gradients (freshwater to saline water)
the same mangrove swamp showed distinct CH4 emission pattern, wi
higher emissions from the freshwater dominated area. The present st
provided the first insight into the quantification of CH4 flux from unpo
and polluted coastal wetland ecosystems of India. Our results show th
significant amount of CH4 and N2O are produced in coastal sediments
bears a strong inverse relationship with salinity and sulfate concentra
the unpolluted coastal wetlands. However, concurrent increase in CH4
emission even at high sulfate levels suggest that either the natural
environmental forcing factors such as high sulfate and salinity cease t
an effect on CH4 production and emission or other non-competitive
substrates exist in these wetlands promoting the coexistence of the
methanogens and the sulfate reducers. We have also established that
methane emission is mediated by the pneumatophores of Avicennia.
consistent with the methane concentration in the aerenchyma that de
on average from 350 ppmv in the cable roots to 10 ppmv in the emer
part of the pneumatophores. However, the number of pneumatophore
varied seasonally with the minimum number during the monsoon, red
methane emissions largely. Hence, CH4 emission was controlled via th
pneumatophores and by the water level. In addition, ebullition from b