

8.2. SEDIMENT DENITRIFICATION IN THE MIRA ESTUARY SALT MARSHES

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Sediment denitrification is a microbial process that converts dissolved inorganic nitrogen present in sediment porewaters to nitrogen gas, which is lost to the atmosphere. Sediment denitrification was determined as a flux of nitrogen gas from intact sediments incubated in gas-tight chambers. The present technique allows for the direct measurement of denitrification in undisturbed sediment cores under ambient conditions of oxygen, dissolved nutrients and temperature.

Nitrogen gas flux was measured from *Spartina maritima* sediments taken from the Mira estuary salt marshes in southern Portugal, over a six month period. Denitrification rates ranged from 0.42 to 20.86 mmol N₂ . m⁻² . dia⁻¹. Lowest rates were obtained during spring months, when the salt marshes presented a peak export of dissolved inorganic nitrogen to the Mira estuary. The lowest rate obtained in April seems to be related with the dissolved inorganic nitrogen export period that characterized the spring months in the Mira salt marshes.

The highest rate was measured in July. During summer months the

8.3. NITRATE RIT... IMPORTANCE OF ASSIMILATION

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Removal of forest...
concentrations of nitrate...
increased N-loss from...
vegetation as a result...
measurements in a...
microbial assimilation...
loss. The role of plant...
and thereby promoting...
much attention. Our...
forest vegetation as...
diameter by 30-cm...
hemlock-sitka spruce...
hemlock (*Tsuga*...
western juniper (*Juniperus*...
half the root...

nitrate out of sediments reached the higher values (12.3 mmols $N_2 \cdot m^{-2} \cdot dia^{-1}$ in June and 5.14 mmols $N_2 \cdot m^{-2} \cdot dia^{-1}$ in July). This result suggests that nitrate produced by nitrification in the sediments during this time of the year appears to be an important substrate for denitrification in the Mira salt marshes.

In summer there was also a substantial import of NH_4^+ and NO_3^- into the marsh. Although water column nitrate concentrations were not high (1.5 mmols $NO_3^- \cdot l^{-1}$), this fact does not eliminate the possibility that some nitrate from the water column enters the sediment and is denitrified.

Key words: Denitrification; salt marshes; nitrogen cycle.

than the root-exclusion
(i.e. both plant C and
remaining root-exclusion
a mixture of C sources
plant root-C addition
quantity of C injected
each site. Leaching
ion-exchange resin
and 3 yr, accumulated
root-exclusion cylinders
beneath unconfined
plant N uptake) was
showed that leaching
were very low in all
ammonium were
increased during the
from 49% to 8% of
These results indicate
communities is more
plants as a sink for