Denitrification in Galveston Bay

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EDUCATION

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POSITION HELD

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RESEARCH INTEREEST

Coastal Environments
Benthic Food Web Modeling
Marine Nitrogen Cycle
Trace Gas Biogeochemistry

NITROGEN CYCLING AND DENITRIFICATION IN GALVESTON BAY

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Benthic fluxes of O_2, N_2, NH_4^+, NO_3^- and dissolved inorganic carbon (DIC) were measured to estimate total remineralization and denitrification rates in Galveston Bay (TX, USA) sediments. The denitrification rate was directly estimated from the N_2 accumulation rate in the overlying water trapped *in situ* incubation chambers. The change of N_2 concentration over time was estimated by gas chromatography using argon as an internal standard. The denitrification rates (0.6 to 4.6, average = 1.8 mmole $m^{-2}d^{-1}$), sediment oxygen demand (1.8 to 19.0, average = 7 mmole $m^{-2}d^{-1}$) and DIC flux (1.2 to 40.5, average = 19 mmole $m^{-2}d^{-1}$) followed the water temperature fluctuation on a 1.5 year period. The high denitrification activity in summer appears to be the result of increased NO_3^- supply from nitrification when remineralization is high and oxygen is not limited. Most of the NO_3^- needed for denitrification (93%) was supplied from in situ nitrification. Oxygen consumption during nitrification exceeded observed sediment oxygen demand (average = 135% of sediment oxygen demand). Oxygen production by benthic primary production seems to satisfy the O_2 demand of nitrification as well as aerobic respiration and reoxidation of reduced chemicals. Denitrification removed 52% of the nitrogen loading in Galveston bay. The removal rate is about 4 times larger than the previous estimation that used *in vitro* method of denitrification measurement.