

DOWNSLOPE TRENDS IN NITROGEN ISOTOPES FROM SURFACE SEDIMENTS ON THE PERU MARGIN

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Nitrogen isotope trends of bulk sediments deposited under the oxygen minimum zone on the Peru Margin were studied in samples from deck-deployed box cores and push cores acquired by submersible on two transects at 12° and 13.5° from 75 to 1000m water depth. Previous work of Arthur et al., (1998) has shown that organic matter is more poorly preserved than would be expected despite the low-oxygen conditions (<5 µmol/kg). This is attributed to constant advection of low concentrations of dissolved oxygen, activity of organisms, and resuspension and downslope transport of organic matter by strong bottom currents up to 30 cm/s. These processes extend exposure time to oxidant (dissolved oxygen or nitrate) which progressively degrades surface and suspended organic matter. Bulk nitrogen isotope values average 7.5 permil and range from 4.0 to 10.9 permil. The average of 7.5 permil is typical for modern upwelling zones where denitrification is the dominant suboxic autotrophic metabolism within the oxygen minimum zone. The variability in nitrogen isotope values reflects the influence of resuspension and downslope movement of sediment. Nitrogen isotope and pyrolysis hydrogen index values decrease down-slope are positively correlated while atomic C/N ratios increase. This suggests that increasing exposure times to oxidant and removal of labile nitrogen results in decreasing nitrogen isotope values. This trend is contrary to normal isotope degradation kinetics which typically drive nitrogen isotope values higher but could be achieved through selective degradation of ¹⁵N-enriched proteins and amino acids which has been observed where denitrification is occurring (van Mooy et al., 2002).