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The transfer of diazotrophically fixed nitrogen to higher trophic levels

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The biological fixation of dissolved N_2 in marine waters has proved to be one of the great enigmas of recent oceanographic research. During the mid to late 1990s several publications indicated that previously accepted estimates of nitrogen fixation were grossly underestimated. Basin scale estimates were extrapolated from the activity and distribution of the "relatively conspicuous" *Trichodesmium sp*., a filamentous, colony forming cyanobacteria, which was restricted to water temperatures of $>21^{\circ}$C. Since then a large volume of focussed research has revealed a broad array of diazotrophic organisms which include groups of bacteria, unicellular cyanobacteria and archea, each of which may be active over a range of hydrodynamical conditions and we now recognise a temperature active spectrum of at least 15 to 30 $^{\circ}$C.

During a recent cruise to the north-east sub tropical Atlantic we have measured nitrogen fixation rates of 0.1 – 2.0 nmol $L^{-1}d^{-1}$which are attributed to a mixed community of diazotrophs which included *Trichodesmium*, but was dominated by unicellular cyanobacteria. The fixation of atmospheric N_2 is often the dominant source of new nitrogen in oligotrophic waters which is made available to other trophic levels either through the release of DON and ammonium or more directly through zooplankton grazing. In parallel with our measurements of nitrogen fixation we performed grazing experiments on size fractionated components of the zooplankton community which were subsequently analysed for their δ^{15}N signature. It is apparent that there is a vertical transfer of fixed nitrogen into the smaller (<500 μm) grazers which were dominated by small copepods (e.g. *Oithona* spp., *Oncaea* spp. and *Corycaeus* spp.). We will present our analysis of the fate of fixed nitrogen, it's transfer to the larger zoo-

plankton size-fractions and the implications of this route of nitrogenous nutrition to the oligotrophic ecosystem.