VIEW ABSTRACT

N$_2$ FIXATION AND N-BUDGET IN THE PHOTIC LAYER OF THREE STATIONS REPRESENTATIVE OF THE SW PACIFIC OCEAN (OUTPACE CRUISE, 2015)

We measured N$_2$ fixation and performed a first order N budget in the photic layer of three stations in the SW Pacific Ocean during the OUTPACE (Oligotrophy to Ultra-oligotrophy PACific Experiment - February-March 2015) cruise. Thanks to a Lagrangian strategy, we sampled the same water mass for the entire duration of each station (6 days), allowing to consider only vertical exchanges. The three stations LDA, LDB and LDC were characteristic of different trophic regimes, with a chlorophyll maximum (Chl a max) located close to the surface (60 m) at LDB, at 80 m at LDA (Melanesian archipelagoes), and deeper (140 m) at LDC, representative of the ultraoligotrophic waters from the South Pacific gyre. N$_2$ fixation rates were extremely high at both LDA (593±51 µmol N.m$^{-2}$.d$^{-1}$) and LDB (706±302 µmol N.m$^{-2}$.d$^{-1}$) and dominated by the diazotroph _Trichodesmium_. N$_2$ fixation rates were lower (59±16 µmol N.m$^{-2}$.d$^{-1}$) and diazotroph populations were dominated by UCYN at LDC in the South Pacific gyre. In the nitrate-depleted photic layer of the South Western Pacific, N$_2$ fixation appears to be the major source of new N for primary production before aeolian deposition and upward nitrate fluxes induced by turbulence. The efficiency of particulate organic N export across this trophic and N$_2$ fixation gradients will be discussed. OUTPACE cruise DOI: http://dx.doi.org/10.17600/15000900

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DETAILS

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