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0.1 Nitrogen fixation in the North Atlantic: a new geochemical estimate

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Measurements of both the organic and inorganic nutrient inventories across the North Atlantic at 24ºN allowed an accurate determination of N:P stoichiometry and the development of a new geochemical tracer Total Nitrogen Excess (TNxs). TNxs, combines both the organic and inorganic N to P anomalies and estimates the excess nitrogen in the upper layers. The net total nitrogen excess in the upper 1000m and water mass age is then used to estimate the contribution of N_2fixation in the North Atlantic subtropical gyre. A flux of to 0.19 ± 0.08 mol $Nm^{-2}y^{-1}$ is estimated to be supplied by N_2 fixation. This input of new N is 2-3 times larger than previous geochemical estimates and would account for up to 40% of the nitrogen required to sustain export production. High N_2 fixation rate estimate by this method is not unexpected given the influence of the organic fraction of the N pool in the upper layers which, is not accounted for in previous geochemical measurements but results being a large part of the recently fixed nitrogen. The revaluation of the magnitude of N_2 fixation in the North Atlantic if extrapolated to the global ocean would decrease the gap between current estimates of denitrifcation and N_2 fixation and the present marine N cycle could possibly result balanced