

Is denitrification in the eastern tropical North Pacific increasing?

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The Oceans fixed nitrogen inventory limits the productivity of large marine areas and is determined by the balance between denitrification (Biological N₂ production) and nitrogen fixation. Denitrification occurs in oxygen minimum zones (OMZs) of the tropical Pacific and Arabian Sea and in marine sediments. Strong evidence suggests OMZs are expanding, so one can hypothesize that denitrification might likewise be expanding or intensifying. The largest OMZ is found in the eastern tropical North Pacific (ETNP).

Here we analyse data from 6 repeats of a 1000 km transect along 110° West in the heart of the ETNP ODZ between 1971-2018. We use N*, a stoichiometric parameter calculated from nitrate and phosphate, as our indicator of denitrification. The more Negative N* the more denitrification has occurred. After secondary QC [1] the values of O₂ and N* were integrated along the section and over the depth interval of the OMZ (Figure 1).

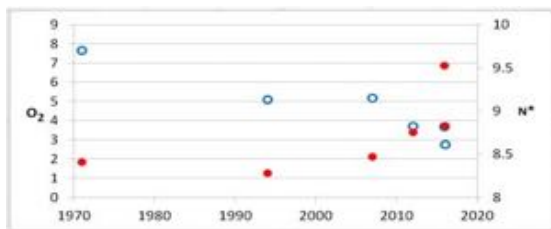


Figure 1: Trends versus time; O₂ (open symbols) N* (closed). Units: 10⁶ mmol km m⁻²

The results show a clear decrease in oxygen inventory along with an increase in N*, suggesting an intensification of denitrification over during the 50 year period. We discuss potential mechanisms for denitrification signal increase including ENSO, Pacific Decadal Oscillation, tropical hurricane intensity, and variations in thermocline depth.

[1] Tanhua, *et al.* (2010) *Earth Sys. Sci. Data* **2**, 35-49.