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Nitrous oxide production in the eastern tropical South Pacific oxygen minimum zone

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Nitrous oxide (N2O) is an important climate active trace gas that contributes to both atmospheric warming and ozone destruction, and the ocean is an important source of N2O to the atmosphere. Dissolved oxygen concentrations play an important role in regulating N2O production in the ocean, such that under low oxygen conditions major shifts in the predominant production pathways (i.e. nitrification vs. denitrification) can occur and the magnitude of production may increase substantially. To this end, major oceanic oxygen minimum zones (OMZs) are responsible for a disproportionately high amount of marine N2O production. During the October 2015 ASTRA-OMZ cruise to the eastern tropical South Pacific (ETSP), one of the three major oceanic OMZs, we measured a suite of N2O parameters which included N2O concentrations, N2O production, and natural abundance N2O isotope (i.e. del 15N and del 18O) and isotopomer (i.e. 15N site-preference) signatures. Based on the results from these measurements, our presentation will demonstrate how N2O production and the different production pathways change along the oxygen concentration gradients from the oxygenated surface waters through the oxygen minimum layer. Our data could better constrain the importance of the ETSP-OMZ as source of marine N2O. Results from this work will provide insights into how N2O cycling responds to ocean deoxygenation as a result of climate change.