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Presenter: Heather Forrer (Florida State University)**Description:**

The western subtropical South Pacific (WSSP) has recently been found to support high rates of di-nitrogen (N₂) fixation in association with shallow hydrothermal iron fluxes. While previous ¹⁵N₂ uptake and short-term d¹⁵N budgets have found that high rates of N₂ fixation contribute significantly to export production, no longer-term evaluations of N₂ fixation's role in supporting the regional ecosystem were available. Here we present results of an annual d¹⁵N budget using the d¹⁵N of sinking particles captured in a moored sediment trap deployed at 1000 m from Nov 2019 - Nov 2020. We compare the d¹⁵N of the particles collected over this annual cycle with the d¹⁵N of subsurface nitrate to evaluate the seasonal and annual importance of N₂ fixation for supporting export production. The results indicate that N₂ fixation supported up to ~20% of annual export and that N₂ fixation was most important during the summer. Notably, the d¹⁵N of subsurface nitrate at the trap station was low, 2 to 3 per mil compared to stations further from the vents. We also present some of the region's first dissolved organic nitrogen (DON) d¹⁵N data. The DON samples collected in Nov 2019 and Nov 2020 show similar DON concentrations and d¹⁵N between years. However, while DON concentrations in the WSSP, 5 +/- 1 uM, were similar to the eastern tropical South Pacific (ETSP), the d¹⁵N of DON in the upper 100 m in the WSSP was between 2 to 4 per mil, which is lower than the ETSP, where DON d¹⁵N was between 4 to 6 per mil. Together, the results of the

annual d15N budget as well as the low-d15N DON provide a longer-term perspective on the significance of N₂ fixation in the WSSP. Additionally, the results suggest that N₂ fixation in the WSSP introduces significant low-d15N N to the ocean, offsetting the elevated d15N generated in the oxygen deficient zones of the eastern tropical Pacific.

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Geochemical signatures of nitrogen fixation in the western subtropical South Pacific: d15N budgets and low-d15N DON

Category

Scientific Session > CT - Chemical Tracers, Organic Matter and Trace Elements > CT05 The Marine Nitrogen Cycle

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