

## Frame and Casciotti Supplementary Material

### Supplementary Figure legends

Supplementary figure 1 (S1). Growth of C113-a on 50  $\mu\text{M}$   $\text{NH}_4^+$ .  $\text{N}_2\text{O}$  accumulates steadily as  $\text{NH}_3$  is oxidized and  $\text{NO}_2^-$  accumulates.  $\text{N}_2\text{O}$  production drops off when  $\text{NH}_3$  is completely oxidized.

Supplementary figures 2a and 2b (S2a, S2b). Sensitivity analysis of SPND to  $^{18}\epsilon\text{NH}_2\text{OH}$  and  $\text{SPNH}_2\text{OH}$ . In 2a, representative values of  $\delta^{18}\text{O}-\text{NO}_2^-$  and  $\text{N}_2\text{O}_{\text{total}}$  were taken from experiments in unlabeled water while in 2b, they were taken from experiments in labeled water. In both cases, SPND and  $\text{SPNH}_2\text{OH}$  were very sensitive to changes in  $^{18}\epsilon\text{NH}_2\text{OH}$ , although this sensitivity is not as strong in labeled water.

Supplementary figures 2c and 2d (S2c, S2d). Sensitivity analysis of SPND to  $^{18}\epsilon\text{NH}_2\text{OH}$  and  $^{18}\epsilon\text{ND}$ . In 2c, representative values of  $\delta^{18}\text{O}-\text{NO}_2^-$  and  $\text{N}_2\text{O}_{\text{total}}$  were taken from experiments in unlabeled water while in 2d they were taken from experiments in labeled water. In both cases, SPND is very sensitive to changes in  $^{18}\epsilon\text{NH}_2\text{OH}$ , although this sensitivity is not as strong in labeled water.  $^{18}\epsilon\text{ND}$  and  $^{18}\epsilon\text{NH}_2\text{OH}$  vary inversely and labeling the water has little impact on their sensitivity to each other.