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# ***Interactive comment on “Technical Note: Simultaneous measurement of sedimentary N<sub>2</sub> and N<sub>2</sub>O production and new <sup>15</sup>N isotope pairing technique” by T.-C. Hsu and S.-J. Kao***

**Anonymous Referee #1**

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## GENERAL

This manuscript presents a revised version of the IPT calculations that uses the production of both N<sub>2</sub> and N<sub>2</sub>O, validates this new ITP method and gives a modified analytical method for the simultaneous measurement of N<sub>2</sub> and N<sub>2</sub>O from the one sample.

The analytical method is a nice addition and publishable. The new IPT calculations are also a nice addition and publishable, but only after further validation. The manuscript also presents an excellent review and discussion of the assumptions of the ITP technique.

Only one validation experiment in the dark was done. Most of the environments where  
C1991

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this technique will be applied, including the site where the authors did their validation, would contain benthic microalgae (BMA). As such, I would like to have seen a light and dark validation to make the technique more broadly applicable (see also comment on assumptions re: BMA below). More importantly, a N<sub>2</sub>O yield of 66% is exceptionally high, and the estimate N<sub>2</sub>O production rates didn't match the directly measured N<sub>2</sub>O flux. Although the authors did discuss both these issues, they highlight that the technique requires more validation. It would also have been nice to have done a validation on subtidal sediment and compared to directly measured N<sub>2</sub> fluxes across the sediment water interface. The authors would then have validation of both the N<sub>2</sub>O and N<sub>2</sub> fluxes. Due to the inclusion of N<sub>2</sub>O perhaps the two techniques would compare better than previous comparisons between IPT and N<sub>2</sub>:Ar that found IPT underestimated denitrification (e.g. Ferguson 2007. MEPS 350, 19; Gihring 2010. L&O 55, 740).

## SPECIFIC

The whole manuscript needs to be edited for expression and grammar. I haven't made these corrections.

p. 6863. L. 19. See Dong 2006. L&O. 51, 545. Who did duel measurements of N<sub>2</sub> and N<sub>2</sub>O.

p. 6864. L. 5. Need to make it clear that the did not take N<sub>2</sub>O into account for denitrification, as some did measurement N<sub>2</sub>O.

p. 6874. Its not clear how many times the time series was sampled- start and end point only?

p. 6876. L. 25 . see Dong 2006. L&O. 51, 545.

p. 6880. Section 4.4. Should also consider production of N<sub>2</sub>O from co-denitrification see Spott 2011. Soil Biology and Biogeochemistry 43, 1995.

p. 6881. L.3. Welsh 2001. Marine Biology 139, 1029. found N<sub>2</sub>O production from DNRA in the field.

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p. 6885. Assumption 6. You need to consider the effect of the  $^{15}\text{NO}_3$  addition on the stimulation of BMA production, which may reduce nitrification, due to completion for  $^{14}\text{NO}_3$ , particularly if this technique is to be used in the light, although BMA can still consume  $\text{NO}_3$  in the dark.

Assumptions. What is the effect on N-fixation on this technique? What if the added  $^{15}\text{NO}$  stimulated heterotrophs, sulphate reducers which can fix N?

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Interactive comment on Biogeosciences Discuss., 10, 6861, 2013.

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10, C1991–C1993, 2013

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