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Comment

## ***Interactive comment on “Anaerobic ammonium oxidation, denitrification and dissimilatory nitrate reduction to ammonium in the East China Sea sediment” by G. D. Song et al.***

### **Anonymous Referee #1**

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The present study by Song et al. addresses multiple anaerobic processes of the nitrogen cycle in sea sediments. The authors did a good job in analyzing denitrification, DNRA and AnAmmOx by the  $^{15}\text{N}$ -isotope pairing technique and correcting process rates for simultaneous occurring processes impairing the isotope pairing technique. Thus, the conclusion that AnAmmOx significantly contributes to N-losses in the ECS sediments is supported by the data. The manuscript is basically well written with some shortcomings outlined below. However, two major points need to be addressed to improve the manuscript: 1. Experimental design. AnAmmOx utilizes nitrite rather than nitrate to oxidize ammonium. Why was nitrate supplemented as a tracer in the E\_AmmOx treatment designed to address AnAmmOx? In the current experimental setup, AnAm-

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mOx would depend on denitrification to provide nitrite first. Please discuss. 2. Choice of data presented. Data presented in figures is inconsistent (Fig. 3 a and b, and Fig. 4 are from different samples, although Fig. 4 is related to the data in Fig. 3), a rationale for the selection of data is not given. In case the authors would like to highlight some data, a rationale should be given. In general, I would suggest to include the complete data (where a fraction is in Fig. 3 and 4) in a table. The authors might give rates and the Fas. 3. Redundancies in data presentation. Figure 5 and Table 3 describe similar data, as well as Figure 6 and Table 4. Please avoid double presentation of data. Minor points: P4673 L26-27 AnAmmOx is described as a nitrate reduction pathway here. This is not fully correct, since AnAmmOx utilizes nitrite rather than nitrite. Please clarify. P4674 L7 Typo; “is” needed. P4674 L28 Please clarify: NH<sub>4</sub><sup>+</sup> combines with NO<sub>2</sub><sup>-</sup> (nitrite) rather than nitrate (NO<sub>3</sub><sup>-</sup>) during AnAmmOx! P4675 L12 Please avoid first time claims. Only new data should be published anyway. P4676 L5 Please give final concentrations of Hg<sub>2</sub><sup>+</sup> in the samples utilized to preserve samples. P4676 L22 What was the volume of such subsamples? Please clarify. Please give incubation temperatures. P4677 L4 “detected limitation”. Do the authors refer to the “LOD (limit of detection)” or LOQ (limit of quantification)? Please clarify. P4677 L15 How can pure 15NH<sub>4</sub><sup>+</sup> be converted to 29N<sub>2</sub> via hypobromite? In theory, all N<sub>2</sub> should be 30N<sub>2</sub>. Please explain. P4680 A description of the statistical methods utilized is lacking in the materials and methods section. Was data normally distributed? What statistical tests/ analyses were applied? Please explain. P4681 L20 Please add values of nitrate concentrations after pre-incubation in table 2. P4681 L24 DH55 or DH15 as indicated in the legend to figure 3. Which is correct? P4681 L26 What test was applied (see comment above)? P4682 L5 Why were only 2 depths and sites shown? Please provide the data of all treatments in a table (see above). P4682 L9 How can nitrate be limiting in E-Amox when nitrate was supplemented and AnAmmOx requires nitrite rather than nitrate? Please clarify. P4682 L10-12 Why was Fa shown in Fig. 4 for only one site (and not the same displayed in Fig. 3)? Please show complete data set (see above). P4682 L20-22 Fn not documented in Table 3. Please show data. P4687 L20 Please avoid first time claims.

P4688 L 16-25 Were the added nitrate concentrations in the range of saturation for the system? Arguing with half saturation constants runs short here, since it might not be excluded that rates increase with increased nitrate concentrations, thus still suggesting an overestimation of N-loss by the authors. Please clarify. Table 1. Check header. Please report temperatures. Table 4. Header: Nitrate reduction is not really performed by AnAmmOx. Please clarify.

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**BGD**

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