

Interactive comment on “Hadal water biogeochemistry over the Izu-Ogasawara Trench observed with a full-depth CTD-CMS” by Shinsuke Kawagucci et al.

Anonymous Referee #2

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The authors present data from the abyssal and hadal Izu-Ogasawara Trench and Mariana Trench using a new CTD-CMS developed for these depths. The data presented are thus novel as such detailed sampling was possible for the first time and their publication is of large interest to the oceanographic and biogeochemical community. In this paper the authors present dual isotope measurements of nitrate and nitrite, nitrous oxide, nitrification rates, TOC, CH₄ concentrations and delta¹³C of methane in addition to oxygen and nutrient concentrations. The paper concentrates on the data from the two trenches but also shows complete water column profiles.

The interpretation of the data set is, however, very sketchy and touches only methane

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and its possible sources. For publication the discussion needs to be expanded. The isotopic data of nitrate, nitrite and nitrous oxide require some discussion regarding their evidence for the nitrogen cycle. What do these data reveal about N or O sources and transformation processes? Are these data typical for the region? The methane data are discussed and some ideas about methane sources (and the evidence from C isotopes) are presented. Here my suggestion is to present vertical profiles of these variables at least along 31.30N and 29.3 N in order to substantiate the discussion. Specific comments:

Page 4 line 10: give reference for the modified Winkler method

Results: are there results of dual isotopes of nitrate only (vs. nitrate+nitrite) can these data provide information about processes of the N cycle?

Page 10 line 3ff: can you name the end member values of delta¹³C of methane?

Can you specify the transformation processes and isotopic effects on methane delta¹³C ?

Page 10. Line 16: can the currents be better discerned from vertical profiles/cross sections through the trenches?

Page 11 line 11: does this mean that methane is released from pore waters as sediments are resuspended from the bottom or side of the trenches? Or do these processes take place in the water column after resuspension?

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