

Interactive comment on “Investigating the effect of El Niño on nitrous oxide distribution in the Eastern Tropical South Pacific” by Qixing Ji et al.

Anonymous Referee #3

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This manuscript presents the distribution and fluxes of N₂O in the Eastern Tropical South Pacific region during Oct. 2015, when a strong El Niño event occurred. Measurements of N₂O and other related parameters along with its isotopomers were made in the water samples collected from six stations. These measurements have been used to study the variability and biogeochemistry of N₂O in the ocean water as well as the effect of this event on the distribution and fluxes of N₂O in this region. The manuscript presents important results during this major El Niño event and it is very well written. However, I have the following clarifications/suggestions for its further improvement.

Specific points:

1. The main focus of this manuscript is on the effect of El Niño on the distribution and fluxes of N₂O. The three offshore stations show buildup of N₂O in the water down to

C1

1000m depth (Fig. 8). However, the comparison for these 3 stations is limited with previous one neutral year only (2012). Also there is large variability in the 0-200m depth. Please show error bars for each point. Measurements for the three coastal stations are compared with the measurements from three different years (2011, 2009 and 1985). All these three stations show very different comparisons. Hence, it is difficult to conclude for the coastal region.

2. Fig. 9 shows depth integrated N₂O concentrations and comparison with earlier measurements. However, the depth taken for each station is limited by earlier measurements and it is different for different stations except for stations B and C. This, in my view, is not correct and gives a wrong comparison. The X axis scale and even the depth for the coastal stations could have been same for all the three stations for a better visualization.

3. Are these earlier measurements for the same respective stations? If not, please give their locations also.

4. How the observed decrease in the N₂O fluxes compare with earlier studies mentioned in the introduction (P2, L17)?

5. P1, L25 : ‘The depth-integrated N₂O. ...were nearly twice ...’ is not correct except may be for the E and F stations. Please modify this sentence suitably and also give depth information related to integration.

6. How long this El Niño event has been there? The ONI shown in Fig. 1 for 2015 was >0.5 in January itself.

Minor corrections:

P1, L16: ‘...was developing ..’ or developed? P2, L17: Please change to – ‘...related to changes in...’