

Nitrous oxide emissions from European Agriculture; an analysis of variability and drivers of emissions from field experiments by Rees et al

### **General comments**

The paper reports the multi-year nitrous oxide emissions from western European and Zimbabwe soils used for cropping and pasture production. Besides soil variables (organic C, total N, pH, texture and bulk density), N inputs (both inorganic and organic), water inputs (irrigation and / or rainfall) and temperature were considered to evaluate the main drivers of nitrous oxide emissions. The aim of this study was to identify the management practices, which can be manipulated to reduce nitrous oxide emissions from soil. As expected, nitrogen input, including fertiliser N, was the main driver of nitrous oxide emissions, and hence N management is critical in reducing nitrous oxide emissions from soil.

In general, it is difficult to interpret the nitrous oxide emissions from such as wide range in soils, management and climate, and inherent nature of large variability in nitrous oxide emissions. The authors have summarised the nitrous oxide emissions data satisfactorily. Since nitrous oxide measurements were sporadic and sparse, and nitrous oxide emissions data required log-normal transformation, authors should have done interpolation of the data on the log-transformed nitrous oxide emissions rather than linear interpolation between two measurement events.

Authors should add a table listing the stepwise multiple regression output and significant level of the regression coefficients of the drivers associated with nitrous oxide emissions.

It is hoped that the dataset will be useful for validation of nitrous oxide models and hence extend the applicability of this study both in space and time.

### **Specific comments**

Page 9262, line 18: Add reference to the IPCC default value of 1%, that is, IPCC, 2006

Page 9264, lines 18-19: What procedure was used to transform back the log-transformed data, especially the mean nitrous oxide emission values since the data are usually skewed?

Page 9265, lines 25-29, and Page 9266, lines 1-13: Please add a table listing the stepwise multiple regression output and significant level of the regression coefficients of the drivers associated with nitrous oxide emissions

Page 9266, line 20: 1.4-3.9kg? or g? It is not clear from Fig. 5b

Page 9268, lines 4-6: From the 3-year data, Wang et al. (Greenhouse gas fluxes from an Australian subtropical cropland under long-term contrasting management regimes. *Global Change Biology* 17, 3089-3101, 2011) showed that nitrous oxide emissions from soil under no-till system was lower than that from the conventional till system

Page 9269, lines 22-25: nitrous oxide emissions from organic amendments could be delayed rather than reduced unless mineral nitrogen is immobilised

Page 9269, lines 26-29, Page 9270, lines 1-3: Since nitrous oxide uptake was not reported in the Results section, this paragraph should be deleted from the Discussion section. What was the magnitude of nitrous oxide uptake?

Page 9286, Fig. 5b. The unit on the Y-axis is not clear, e.g. (Total N input)<sup>-1</sup>

Page 9287, Fig. 6b. The unit on the Y-axis is not clear, e.g. (Total N input)<sup>-1</sup>