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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Abiotic and biogeochemical signals derived from the seasonal cycles of tropospheric nitrous oxide" *by* C. D. Nevison et al.

Anonymous Referee #1

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This paper describes an analysis of N2O surface concentration data at sites around the world. The main message I took away from this paper was that at most sites the competing atmosphere/land/ocean sources/sinks of N2O makes it difficult to attribute observed variability to individual surface sources and sinks via inverse modeling. To help address this challenge, the authors suggest using N2O isotopes and/or a stratospheric tracer. The paper represents a straightforward analysis with important implications. I have only a few minor points.

1) The title of the paper appears inconsistent with its content. The paper does not manage to derive (convincingly, perhaps) abiotic or biogeochemical signals from the

data. This is an important point.

2) The difference between colocated data from different networks is alarming to say the least. The authors provide some discussion about why this might be so. However, the authors are in an excellent position to make a statement about which data they suggest modelers use and/or what efforts should be made to reconcile these data.

3) [related to the point above] There is a lot of discussions about statistical correlations coefficients but most (not all) equate to a value that suggests that one dataset reproduces less than 50% of the other dataset. This will no doubt lead to substantially different values of flux estimates unless measurement errors are revised upward.

4) The authors appear to hit a limit to their simple analysis. I appreciate that adding a coupled ocean-atmosphere transport model into the mix can bring its own problems but I cannot see how they can move forward without it.

5) So what now? What is the minimum measurement frequency that would help detect subtle interannual signals and filter out noise? Do the authors think that using CFC-12 and N2O isotopes will radically improve our chance of reducing uncertainty of N2O flux estimates?

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 25803, 2010.