Atmos. Chem. Phys. Discuss., 1, S8–S9, 2001
www.atmos-chem-phys.org/acpd/1/S8/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Nitrous oxide emissions from the Arabian Sea: A synthesis" *by* "H. W. Bange et al."

Anonymous Referee #1

Received and Published: 14 September 2001

General comments

This paper attempts to provide a more constrained estimate of N_2O from the Arabian Sea, providing data of use to atmospheric modellers. The authors' have collated data from a period of over 2 decades in order to estimate smoothed N_2O fields and fluxes from this region. Due to incomplete data coverage, the errors associated with the final analyses are large. Nevertheless these estimates appear to be the best available at present for this region. The authors should estimate the errors associated with assuming a mean N_2O atmospheric concentration (see below).

Specific comments

Abstract: The authors should state how their emissions differ from previous estimates and also state their error estimates.

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Interactive Discussion

Original Paper

Pg 169. Ln 26. More detail should be given on the algorithm developed by Schlussel, since the reference appears to be a German thesis.

Pg 170. Ln 9 and pg 171 Ln 4. Similarly, the procedures developed by Conkright et al., referenced as a report, should be described in more detail.

Pg 172. Atmospheric N_2O data. This is my main concern in this paper. How much error does the increase in the mean N_2O mixing ratio from 300 to 315 ppb over the period of study introduce? A quick calculation suggests that the typical C_a (assuming an SST of 15 °C, and using a dimensionless Henry's Law coefficient, calculated from Lide Frederiske, 1995, of 1.2) is 10 nmol L^{-1} at 300 ppb N_2O. This is close, if not higher, than the C_w values reported in Figure 3. So small differences in C_a are likely to be important.

Pg 173, first para. It is implied that the difference in N_2O concentration fields reported in this study and that by Naqvi et al. (2000) could be due to the temporal differences in sampling, reflecting an increasing accumulation of N_2O. Is there any evidence of a trend apparent in the data synthesised by these authors? Or is the trend so recent that it will not have been picked up in data collected in 1997?

Pg 173. Lns 16-18. A brief explanation is required for choosing Rhee (2000) over Broecker and Peng (1974) as the best estimate of D_{N_2O}.

Pg 173. Lns 23-24. The revised estimate for the annual N_2O flux is not "much more tightly constrained than the previous consensus" if the errors of the fluxes are taken into account (up to +442%, Table 6). The errors should be stated more clearly in the results/conclusions. With such large errors as reported, the value of this study does come under question somewhat.

Interactive comment on Atmos. Chem. Phys. Discuss., 1, 167, 2001.