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Interactive comment on "Constraints on N_2O budget changes since pre-industrial time from new firn air and ice core isotope measurements" *by* S. Bernard et al.

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Could you please clarify what diffusion coefficients you used for the isotopes in your firn model calculations? You have said that you used D(N2O)/D(CO2)=1.004, but what did you use for d15N2O and d18O in N2O? If you used the same relative diffusion coefficient for all isotopes of N2O, you may want to consider rerunning the calculations taking into account the effect of mass on the diffusion coefficient. You could use the formula from Perry and Chilton (1973) (see also Trudinger et al., 1997) to calculate the diffusion coefficients. We found that this can have a significant impact on isotopic

ratios of CO2 and CH4 inferred from firn air (Trudinger et al., 1997; Trudinger, 2000, page 82).

References:

Perry, R.H. and C.H. Chilton (eds), Chemical Engineers Handbook, 5th ed, Sect. 3, pp. 230-234, McGraw-Hill, New York, 1973.

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Trudinger C.M., Enting I.G., Etheridge D.M., Francey R.J., Levchenko V.A., Steele L.P., Raynaud D., Arnaud L., Modeling air movement and bubble trapping in firn, J. Geophy. Res. Atm., 102 (D6), pp. 6747-6763, 1997.

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