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Response to the Editor's Comments on Totterdill *et al.*, Atmospheric Lifetimes, Infrared Absorption Spectra, Radiative Forcings and Global Warming Potentials of NF_3 and CFC-115

Editor

Comment 1: The lifetimes and subsequent metrics for the title molecules calculated in this work have neglected to include their atmospheric loss due to UV photolysis in the 200 to 230 nm region as stated in the revised submission: "Note that in our modeling we neglected the photolysis caused by 200-230 photons and also the temperature dependence of the UV photolysis. This causes 20% error on the global lifetime values.". It is not sufficient to simply state that the UV photolysis in this region was neglected when the SPARC (2013) report, which is cited in this paper, clearly demonstrated its significance with regard to determining atmospheric lifetimes. Therefore, the lifetimes and dependent radiative parameters reported in this work are, most likely, over estimated and the comparison with previously reported lifetimes and loss processes in Section 5.2 Atmospheric Lifetimes not valid. Stating in the conclusions that the lifetimes are in error by 20% is not sufficient (also it is not clear whether a correction was applied to the reported values, or not). The authors have used a more "sophisticated" model than applied in previous studies, but the impact of these calculations is significantly diminished if the up to date recommendations for atmospheric loss processes are not included. Therefore, I recommend the authors revise the paper to include the neglected photolysis processes prior to consideration for publication.

Response: thank you for making this important point. In the case of CFC-115, the long wavelength (200-230 nm) absorption cross sections is already included, based on Papadimitriou *et al.* (2013). This means that the data on CFC-115 does not change. However, for NF_3 the cross sections above 200 nm were neglected. Therefore, the WACCM run was repeated with the extended cross sections. The revised atmospheric lifetime of NF_3 is (509 ± 21) years, which is a 15% reduction on the lifetime if the long wavelength photolysis is not included. Photolysis contributes 67.7% to the NF_3 removed lifetime, and reaction with $O(^1D)$ contributes 32.3%. The increased impact of photolysis also changes the atmospheric mixing ratios, so that Figures 3 and 4 have changed. All the latest changes, including the revised Radiative Forcing and Global Warming Potentials, are highlighted with green shaded text in the manuscript.