

***Interactive comment on “UV and Infrared Absorption Spectra, Atmospheric Lifetimes, and Ozone Depletion and Global Warming Potentials for CCl<sub>2</sub>FCCl<sub>2</sub>F (CFC-112), CCl<sub>3</sub>CClF<sub>2</sub> (CFC-112a), CCl<sub>3</sub>CF<sub>3</sub> (CFC-113a), and CCl<sub>2</sub>FCF<sub>3</sub> (CFC-114a)” by Maxine E. Davis et al.***

**Anonymous Referee #1**

Received and published: 15 March 2016

The paper by Davis et al. combines measurements of UV and IR absorption cross sections of 4 chlorofluorocarbons (CFC) with 2D-modelling to derive atmospheric lifetimes, ozone depletion potentials and GWP values for these species. Three of the CFCs have recently been reported to be present in the atmosphere at low concentrations. The paper is well written, the methodology is sound, the assumptions and conclusions are well justified and the scope of the paper is clearly relevant for ACP. I only have one major and a few minor suggestions for the authors, which I suggest they

C1

should consider before publication.

Major point:

I find the uncertainty estimate unrealistic. The uncertainty which is reported here is purely the uncertainty due to kinetical and photochemical data. Not the uncertainty of the derived atmospheric lifetime. One important point in this respect is how fast tropospheric air is transported to the stratospheric loss region. The model lifetime will thus depend strongly on model transport. I therefore think it is unrealistic to assume that the model can really constrain the atmospheric lifetime this closely. For this, a thorough investigation of model transport would be necessary. I suggest that the authors discuss this point more closely and that they include a discussion on the uncertainty of the atmospheric lifetime due to transport. I further suggest that knowledge of actinic fluxes and the underlying uncertainties should be discussed in the uncertainty estimate.

Minor suggestions:

Introduction: I suggest stating more clearly that only three of the species investigated here have recently been observed and make a statement on whether there are indications of a presence of CFC114a in the atmosphere.

p.5.l 130: on what is this estimate based?

p.6.l. 140: how wide are the individual wavelength bands?

p.7.l. 193: please indicate if the error estimates are from the paper by Bassandorj.

p.8.l.219 ff.: to what extent does the uncertainty in actinic flux influence the lifetimes and their uncertainties? See also major point above.

Conclusion: I suggest adding a short statement on the concentrations in the atmosphere and the global importance of these species.