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Interactive comment on "Projecting future HFC-23 emissions" *by* B. R. Miller and L. J. M. Kuijpers

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We thank Dr. Reimann for considered review of our manuscript and the resulting suggestions for improvement.

Dr. Reimann points out that our Best Practices scenario, in which HFC-23 incineration capacity is installed globally to cover all production facilities, results in an unrealistic expectation of virtually zero emissions. He cites a recent study of Keller et al. (2011) that used atmospheric observations of HFC-23 in Lagrangian transport simulations to estimate emissions for Western Europe during 2008-2010. In a region where HFC-23 incineration has been installed on every HCFC-22 production facility, these top-down emissions were 60-140% greater than those reported to the UNFCCC. The implications of these non-zero emissions are that full capacity for incineration does not entirely eliminate emissions. We acknowledge this conclusion. We would not expect that all

facilities equipped with incineration also have sufficient storage capacity to hold HFC-23 production during times that an incinerator is out of service. Nor would we expect that banks of HFC-23 in the existing limited refrigeration applications be reclaimed and destroyed before it escapes to the atmosphere. Estimation of the extent to which such mitigation could be realistically implemented to remedy these sources is outside of the intended purpose of this paper. Rather, our Best Practices scenario is intended to produce a projected emission history that we can then use in a simple atmospheric model to illustrate the lower limit for the future atmospheric abundance and radiative forcing from HFC-23. To address Dr. Reimann's first and last comments regarding the extent to which mitigation could be implemented, we reiterate our focus and put our Best Practices result into perspective with "real world" expectations with modifications to the text in section 2.7.

The conclusions are now shortened to make it more concise.

We have changed wording in the Abstract to ". . . to yield insights into how atmospheric composition and radiative forcing might change with and without additional efforts to constrain HFC-23 emissions" to denote our focus on these atmospheric properties. As suggested, we have augmented our Introduction to quantify of the long atmospheric lifetime of HFC-23.

GHG was already defined as "greenhouse gas" on page 23082, line 23.

We have amended our text to indicate that the CDMs were created under the Kyoto Protocol.

Regarding the future CDM incineration capacity, we have clarified our expectations by modifying text in the Introduction to read: "By the year 2009, eighteen out of the nineteen approved projects had commenced thermal decomposition of the HFC-23 produced at their facilities. As these facilities demonstrated success in destroying virtually all of their production (Miller et al., 2010), and as no additional developing country facilities currently meet requirements for project registration under current CDM policy

(UNFCCC, 2010), we anticipate that the amount of HFC-23 produced in the developing world that will be abated by these projects in the future will not increase significantly."

As suggested, we now add reference to Fig.1 when first discussing Developed Countries' emissions in section 2.1.

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