



Supplement of

Confirming the minimal role of in-atmosphere production on the global HFC-23 budget using a 3D chemical and transport model

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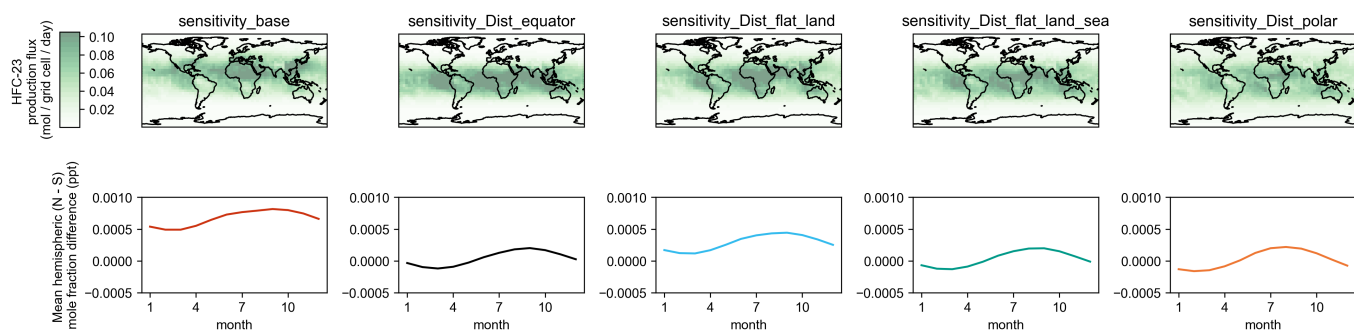


Figure S1. Plot of the spatial distribution of HFC-23 production flux across the five sensitivity tests varying the HFO emissions distribution (upper panel), and the corresponding mean hemispheric difference in HFC-23 mole fraction in the model across the twelve month analysis period (lower panel). These mole fraction hemispheric differences are on the order 0.001 ppt, orders of magnitude lower than the limit of detection on modern instrumentation. This suggests that even in the absence of direct emissions of HFC-23, measurements of the HFC-23 mole fraction would not be able to differentiate between different emissions scenarios. In all cases, the bulk of HFC-23 is produced in the equatorial region, even if the HFO emissions were to occur outside this region.

S2 Supplementary Tables

Table S1. Direct and indirect global warming potentials for each of the eight source gases considered in the model, across the twenty-, one-hundred- and five-hundred-year time horizons (GWP₂₀, GWP₁₀₀ and GWP₅₀₀). Values of the direct GWP₁₀₀ are taken from Burkholder et al. (2022), while the mean and standard deviation of the indirect GWP₁₀₀ values calculated across the twenty model runs are presented here.

species	Direct GWP ₂₀	Indirect GWP ₂₀	Direct GWP ₁₀₀	Indirect GWP ₁₀₀	Direct GWP ₅₀₀	Indirect GWP ₅₀₀
HFC-143a	7900	1.13 ± 0.08	5900	4.3 ± 0.3	1980	1.2 ± 0.1
HFC-236fa	7820	0.15 ± 0.01	9120	0.81 ± 0.06	6340	0.23 ± 0.02
HFC-245fa	3190	1.4 ± 0.1	966	2.3 ± 0.2	276	0.65 ± 0.05
HFC-365mfc	3100	1.65 ± 0.11	969	2.8 ± 0.2	276	0.79 ± 0.06
HFO-1234ze(E)	4	7.3 ± 0.3	1	8.5 ± 0.4	< 1	2.4 ± 0.1
HFO-1336mzz(Z)	9	6.1 ± 0.4	2	7.1 ± 0.5	< 1	2.0 ± 0.1
HCFO-1233zd(E)	14	6.2 ± 0.3	4	7.2 ± 0.3	1	2.1 ± 0.1

References

- 5 Burkholder, J., Hodnebrog, Ø., McDonald, B., Orkin, V., Papadimitriou, V., and Van Hoomissen, T.: Annex : Summary of Abundances, life-times, ODPs, REs, GWPs, and GTPs, in: Scientific Assessment of Ozone Depletion 2022, no. 278 in Global Ozone Research and Monitoring Project, pp. 435–492, World Meteorological Organization, Geneva, Switzerland, <https://ozone.unep.org/system/files/documents/Scientific-Assessment-of-Ozone-Depletion-2022.pdf>, 2022.