

## ***Interactive comment on “Perfluorocarbons in the global atmosphere: tetrafluoromethane, hexafluoroethane, and octafluoropropane” by J. Mühle et al.***

**Anonymous Referee #1**

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This manuscript presents measurements of three perfluorocarbons, CF<sub>4</sub>, C<sub>2</sub>F<sub>6</sub>, and C<sub>3</sub>F<sub>8</sub>, from a combination of sources that include the global AGAGE network, archived air samples, and firn air. The measurements are based on improved analytical techniques and a well-defined calibration scale. The high frequency data from the in-situ network span only 3 – 7 years, but when combined with the other data sources an atmospheric time history extending back to the early 1970's is presented. Pre-industrial estimates come from the firn air. The data are of great interest, and the manuscript should be published with some revision. The strength of the manuscript is in the basic data record. The data appear to be of very high quality, and are suitable for evaluation of emissions. The calibration procedures used by the AGAGE project have proven to

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be very reliable, and there is no reason to question this aspect of the manuscript. The high precision that is demonstrated is very impressive, and lends confidence to the subsequent calculations of emissions. Previous data actually compare reasonably well to that reported here, with perhaps some calibration scale differences or offsets.

The data are evaluated with the AGAGE 12-box 2D inversion model to arrive at emission estimates, and a time history of these emissions. If the measurements are accurate, this top-down emission estimate provides a benchmark for evaluating other estimates of emission rates. The authors then discuss the differences between their estimates and other estimates based on source emission reporting. They find differences between their calculated emissions and those emissions based on other methods.

I would suggest that it is sufficient for this manuscript to present the data and the resulting emission calculations, and note that they are different from emissions based on source emission reporting or hybrid methods. The authors' discussion of the possible reasons for existing differences in reports from other organizations is often speculative and not particularly useful in this context. Perhaps a separate paper from scientists and engineers who are directly involved in producing the emissions estimates would be more appropriate and constructive.

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