

Interactive comment on “Trends in N₂O and SF₆ mole fraction in archived air samples from Cape Meares, Oregon (USA) 1978–1996” by Terry C. Rolfe and Andrew L. Rice

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This paper describes new measurements of SF₆ and N₂O from archived air samples taken over two decades ago from a site in Oregon. Measurements of these trace gases from before the mid 1990s are relatively rare so this addition is valuable, especially for SF₆, of which there are very few measurements going back to the 1970s. The description of the measurement and calibration techniques are thorough and well done. The features of the measurement time series and seasonal cycles are interesting and described well. My main comment is that it would be helpful to see a plot of the comparison with other measurements of these trace gases rather than in the text only. The

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subject is appropriate for ACP and I recommend publication with consideration of the minor comments below.

Specific comments:

Pg. 1, line 25: I think you mean 0.04 ppt rather than ppb.

Pg. 3, line 19-20: There are two more recent studies on the lifetime of SF₆ that should be included here since they both significantly reduce the estimated lifetime, Ray et al., JGR, 2016 and Kovacs et al., ACP, 2017.

Pg. 6, line 12: Change 'provides' to 'provide'

Pg. 7, line 21: Even though it's apparent from the values of the concentration you should add 'N₂O of' before '301.5' since the figure includes both N₂O and SF₆.

Section 3.1: You mention comparable measurements and their locations in the text of this section but it would be easier to see this information in a figure. What would be useful is a plot of concentration vs. latitude at two different times, one at the beginning of your measurement time series and one at the end. By including all available surface measurements it will be easy to see how many other measurements exist for each time and how it changed. Since the concentrations changed enough over the period of your measurements you could just color the two different times differently and they will fit on the same plot. The lack of measurements in the 1970s should be readily apparent from a plot of this type.

Pg. 10, lines 23-25: Also, seasonal transport from the stratosphere can influence SF₆ due to the high growth rates, especially in these early years. Growth rates of ~10%/yr means that stratospheric air with a mean age of 2 years will have ~20% lower concentrations compared to tropospheric values. For example, the seasonal cycle of CFCs have a minimum in the summer of each hemisphere due to the transport of relatively low concentrations due to photochemical destruction (e.g. Liang et al., JGR, 2008).

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