We thank the reviewer for their encouraging assessment of the manuscript. The reviewer's comments are given below in black *with our responses in blue italics.*

This paper describes the results of an update to the BASCOE model to include detailed SF6 chemistry in the mesosphere. The lifetime of SF6 as well as of five other trace gases are calculated from the model output and they all generally agree well with previous lifetime estimates. This suggests that the SF6 chemistry implemented in BASCOE is at least sufficient to represent the main loss processes of SF6 and that it is then primarily the model transport that will determine the SF6 lifetime. The SF6 lifetime is shown to vary considerably with different reanalysis data sets driving the model but the lifetimes still agree within uncertainties. The accurate representation of SF6 chemistry in BASCOE is an important advancement in assessing model transport compared to observations.

The paper is well written and the results are described clearly. The topic is appropriate for ACP and so I suggest publication with consideration of the minor comments listed below.

Minor comments:

Line 24: I would suggest replacing 'General' with 'Chemistry-'.

We replaced "General climate models" by "Climate models" as not only chemistry-climate models predict this increase.

Table 1: The entries in this table are somewhat confusing and repetitive. It doesn't seem like you need the fifth column with the Data Versions since they're all the same. Maybe just state the versions in the table header. Also, the 'Agreement' and 'Notes and References' columns sometimes overlap in their content and frequently include the subjective term 'Good' that isn't necessarily helpful. The 'Compared instruments' and Data versions' columns seem to have conflicting versions. For instance, for SF6 the ACE V2.2 and V5.3 are listed. I would suggest trimming this table down to the basic information and make sure it isn't repetitive or conflicting.

We use the validation studies that are available as a reference for our own results. To our knowledge, there are no validation studies for SF6 with a more recent version of ACE-FTS. The subjective statements have been removed, and the table has been simplified.

Line 131 'parameterized' is misspelled

We use Oxford spelling throughout the article. Parametrized is an accepted British English spelling. We have changed "sulfur hexafluoride" to "sulphur hexafluoride" to be more consistent with Oxford spelling.

Fig. 7: The y-axis scales here seem much too large, it's difficult to see any features. Maybe that's the point but it seems like you could at least go to +/-30%. It also might be helpful to indicate the instrument differences for each species by dashed lines for instance.

Done.