

I found two comments of referee #2 that are not addressed in the manuscript. I also found parts of the text that need some reformulations/clarifications. Please, address all these points in your manuscript.

Comments of referee #2:

In its review, referee #2 made two comments for which I have not seen any feedback in the last version of the paper (although you replied in your responses to the referee). I think that the comments of the referee and your responses must appear at some point in the manuscript. Please, update accordingly:

- P31622,L2-5: "In Figure 2, the modeled O3 loss appears consistently smaller than the Match rates between days 20 and 40, whereas ClOx seems in line the observations. This must be explained or commented.

In Figure 3, the "observed" ClOx is substantially larger than the model ClOx for most of the 2006 winter. On the other hand, SWIFT and Match O3 loss rates are fairly consistent at the beginning and at the end of the winter, but tend to disagree just at the time when the SWIFT and "observed" ClOx agree best (days 200-230). Comments on those two issues?"

- P31623,L5-6: "SWIFT will still give a good representation ... in a changing climate". I agree, but this is also the case of existing linearized O3 scheme that include the temperature in their Taylor expansion of the O3 continuity equation.

My specific comments:

L29-43: I found this part not very clear. Would it be possible to clarify the role of the GCM and role of the stratospheric chemistry module? As far as I know, GCMs also have a stratospheric chemistry model but, indeed much more simple than those of CCMs. See also my comment about L170-172.

L48: Can you provide the definition of CMIP5?

L49: Idem for IPCC

L160-162: The formulation of this sentence needs to be revised. A model do not influence (as stated in the first part of the sentence), it rather do calculations (as stated in the second part of the sentence). I would write something like this: "SWIFT calculates the rates of change of ozone due to polar chemistry occurring in the lower stratosphere". I mentioned lower stratosphere to make the distinction with processes occurring in the higher stratosphere related to energetic particle precipitations that also affect the ozone field at the Poles.

L164: I do not understand the meaning of this sentence. Can you reformulate, please?

L166-169: Idem.

L170-172: It is mentioned that advection of ozone is done by the GCM. However, it is mention on L32 that the GCM provides the dynamical fields to the stratospheric module. In fact, both GCM and CCM have a stratospheric chemical module but the first one is based on a parameterization (or let say a

linearized chemistry) while the second one resolved the chemistry explicitly. Please, clarify (as well in the introduction).

L199-200: "At every level" while it is mentioned on L197 a "small number of vertical levels". Please, reformulate.

L203: Remove "as HCl".

L208-211: This sentence needs clarifications. Remove "now" (L208). "every level" (L210-211): same comment as for L199-200. By "SWIFT will be run with FAP, FAS and ..." do you mean "SWIFT is run by given on input FAP, FAS and ..." I am a bit lost.

L215-217: Is ozone chemistry could also be calculated by linearized chemical scheme in addition to a climatology or the future module for middle and low latitudes (to not say extra polar). Please, clarify.

L533: I would write "... or Match data are available..." instead of "... is available ..."

L550: I would replace "is striking" by "is very good".

Fig 4: The lines on the plots are poorly visible (gray and dotted lines in particular). Please, make them larger.