The manuscript by Francisco Perez-Invernon and colleagues reports the global chemical impact of streamer discharges in the upper atmosphere, known as sprites, which are caused by particularly intense lightning discharges with continuing current. The results are obtained by using meteorological parameterisations of lightning continuing current in a chemistry-climate model, the subsequent estimation of sprite occurrences and an injection of the associated chemical perturbations based on previous chemical simulations. It is found that some constituents, such as NO_2, HNO_3, and HNO_4 in the middle atmosphere exhibit sizeable concentration changes on regional scales following sprite occurrences and that the number of sprite occurrences would follow a temperature increase caused by climate change. The paper is very well written, logically constructed and easy to follow. The figures and tables are informative and support the text well. However, the authors should consider some clarifications as outlined in the comments and suggestions below.

(1)l18: VLF electromagnetic radiation from lightning discharges is attributed to the return stroke, not to lightning continuing current at ELF/ULF frequencies.
(2)l81: State how many HO_2 molecules are 'considerably larger' for comparison.
(3)l86: State which meteorological parameters are used to parametrise sprite activity.
(4)l103: truncation - It might be better to give the high level information first before being more specific, as most readers are unlikely to be familiar with the designation 'T42L90MA'.
(5)l121: 'sprite density' seems more appropriate, as they are streamers rather than flashes.
(6)l127: The relevant parameter is the charge moment change and the time over which the charge moment is reached, rather than solely the duration of the continuing current (Cummer, GRL, 2001, Fig. 3)
(7)l128: Explain how the lightning continuing current density is computed.
(8)l129: 'Nighttime' and the 'absence of solar radiation' is a rather gradual process ranging from civil to nautical, and astronomical twilight.
(9)l136: Sprites are generated by the quasi-static removal of a relatively large lateral charge distribution where lightning continuing current is perhaps the most prominent indicator, but not necessarily the only mechanism that contributes, eg consider IC lightning.
(10)l151: State the physical quantities that are interpolated and extrapolated.
(11)l164: ELF radio measurements are more indicative ~1000 streamers (Qin, GRL, 2012, L22803, p4).
(12)l230: Explain in more detail what is meant by 'good agreement', which is not obvious.
(13)l236: It is not clear why an annual global average is a meaningful measure, given the high level of detail provided by the simulations. Lightning mainly follows solar insolation over the continents, whereas ~71% of the earth is covered by water and the summer season covers ~25% of the year.
(14)l261, Fig. 6 caption: Explain how the differences are calculated, why % is not used and whether the scaling $\sim 10^{-15}$ is possibly numerical noise. What is the physical reason for the banded structures shown for NO_x and N_2O?
(15)l286, Fig. 8: The Congo basin in Africa tends to be the largest contributor to global lightning activity such that is somewhat unclear why South America and Southeast Asia appear to be more prominent on these global maps. Is there perhaps an association with aerosols?
(16)l298: Explain why an asymmetric latitude range is chosen.
(17)l308: It is not clear what the meaning of the t-test is, given that the data shown in Fig. 9 is obviously not normal distributed. In this case, a significance level should be stated, if it can be evaluated at all.
(18)Fig 9, caption: Reword to 'gray distribution'.
l328: Specify where these numbers given in % have been reported in the text or the figures.
l332: Delete the first 'globalscale'.