Zhang et al.

L31-37: Is there a difference between the IFLUX approach and IFLUX proxy? Why does the IFLUX approach predict a 15% decrease in lightning while the IFLUX proxy predicts a 3.4% / K increase in lightning over the CONUS?

L31-37: How are water mass fluxes related to lightning amounts?

L60: are low → were low

L79: by subtracting temporal average → by subtracting the temporal average

L154-156: I am confused by the sentence beginning with "Although the simulated total flash densities …". I would suggest the following for lines 154-155.
→ simulated total flash densities are higher than observed by ENTLN over the Southeast US and lower than observed in the North Central US (Fig 2). The impact of these biases on LNOx production is discussed and mitigated in sections 3.1 and 3.4.

L164: for freshly produced lightning → to freshly produced lightning

L177: Hence, the tropospheric → Hence, much of the tropospheric

L180: compositions → composition
L180: fraction the NO2 → fraction of the NO2

L195-198: Is it possible to compare the 50 grid box minimum with the 3-5 pixel minima? If no, I would not mention the later minima. If yes, please explain how they relate.

L210-211: You need to state why you continue to use a relatively high flash threshold when it induces a low-bias. What are the advantages of your threshold?

The possible low-bias of your approach begs the question of what the PE would be if you changed your threshold to 1 flash box-1 from 2400 flash box-1. Can this calculation be made with limited effort. If yes, do so. If no, explain why it is not appropriate to use a low threshold.

L216: has a LNOx → has an LNOx

L235: condition of ratio > 50% → condition of more than half of the above-cloud NOx having an LNOx source

L240 needs to be included as part of the previous paragraph.

L240-244: The substantial decrease in PE as the CRF threshold is increased from 90 to 100% is somewhat concerning and not well explained. You hint that this is likely due to the decrease in valid days. Please explain this more clearly.

Section 3.2

L300: Improvement of our approach with respect to what?

L308: I don't understand this statement: "Generally, the profiles of background NO2 ratio are C-shape because LNO2 concentrations are higher than background NO2 in the UT". Wouldn't high NO2 concentrations result in lower background ratios?

L316: convections over → convective cases over

L321: The largest relative change is 153.8% among the six grids where the highest clouds occur. Is this what you mean?
-→ The largest change in PE due to changes in methodology (153.8%) occurs at New Orleans, which has the lowest cloud pressure and consequently the smallest visible column.

L333: concentrations is larger → concentrations are larger

L361: "Fortunately, the AMFs and estimated LNO2 change little in that region" Is this a fortuitous coincidence or is this because the profile shape is relatively insensitive to the magnitude of LNOx PE?

L392: Wasn't 0.46 their mean AMF and not their total sensitivity?

L431: Is 20% an uncertainty or a bias?

L458: → 100 – 250 mol per flash which is higher than but overlaps with our estimate

L449: 80 mol per flash is not 50% smaller than your estimate of 90 mol per flash. Please rephrased based on your updated values.

L464: Add sentence supporting your assertion that this method has reduced the sensitivity to background NO2. Presumably, using information from section 3.3.

L466: Unclear, if the method of Pickering et al. overestimates PE due to over-cloud background NO2 in polluted regions as they do an "after-the-fact" 18% adjustment to the PE to account for background pollution.

L468: "we find that the larger production model settings lead to larger retrieval of LNOx …. Be clear as to how important this finding is. How large a bias is induced by the larger production settings?