Interactive comment on "Simulating Lightning NO$_X$ Production in CMAQv5.2 Using mNLDN, hNLDN, and pNLDN Schemes: Performance Evaluation" *by* Daiwen Kang et al.

Anonymous Referee #1

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This article appears to be the evaluation side of GMD-2019-33 "Simulating Lightning NOX Production in CMAQv5.2: 2 Evolution of Scientific Updates", which is cited numerous times in the manuscript, and with similar authors (although the order is not exactly the same). I would suggest to make the link more specific and make these two papers companion papers, possibly entitled "Simulating Lightning NOX Production in CMAQv5.2: part 1, new parameterizations", and part 2: evaluation for example.

The paper is well written, concise, and of good scientific quality, with a thorough evaluation of the impact of the three new schemes that have been implemented into CMAQ. I have a few remarks that should in my opinion be addressed before final publication:

âĂć Please add a short descriptive summary of the three lightning schemes that are evaluated in the paper,

âĂć It would be desirable to remind the reader of the different chemical links between NOx, O3 and nitrate precursors; this is partially done at the beginning of section 3.3 for nitrate.

âĂć Perhaps a discussion on the skill of the forecasts of convective precipitations in the WRF forecast (and possibly of its diurnal cycle) should be discussed or at least mentioned since this is a critical input of the three schemes,

âĂć For nitrate, perhaps it would have been simpler to evaluate the nitrate concentrations against observations from the CASTNET network, rather than nitrate wet deposition, which depends again on modelled precipitation: this adds another layer of error/uncertainty.

âĂć Tables 1 and 2 are very big; the bold parts are not always easy to spot. Is there a way to present this key information in graphics?

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