

## ***Interactive comment on “Evaluation of the offline-coupled GFSv15-FV3-CMAQv5.0.2 in support of the next-generation National Air Quality Forecast Capability over the contiguous United States” by Xiaoyang Chen et al.***

**Anonymous Referee #2**

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This contribution details a region-specific, time-specific, and categorical evaluation of the meteorological and chemical forecasts from the offline-coupled GFSv15-CMAQv5.0.2 for the year 2019. This manuscript fits the scope of the journal of Geoscientific Model Development. However, the manuscript has important limitations. Although the paper is well organised and detailed, the results shown in the paper are, in my opinion, not sufficiently original and new to merit publication in this specific journal.

Major comments.

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1. My main objection focuses on the fact that it is not clearly stated which elements of the study are genuinely new and original and which echo the findings of previous studies. I cannot clearly state either new methodology developed or any new results, apart from applying state-of-the-art validation methods to a new set of simulations with the GFSv15-CMAQv5.0.2.

2. Furthermore, objective (3) states that one of the aims of the manuscript is to "investigate underlying causes for the biases to provide a scientific basis for improving the model representations of chemical processes and developing science-based bias correction methods for O<sub>3</sub> and PM<sub>2.5</sub> forecasts.". However, after reading the manuscript, I don't find any specific section of the manuscript devoted to understanding the physics-chemical processes causing over- or underproduction of air quality parameters (apart from some general comments). The authors should deepen into the processes leading the levels of air pollution so that objective (3) can really be achieved.

3. Despite the large number of statistical figures presented, I have the very personal opinion that the authors do not take the advantage of the compiled information to point to the specific causes for model biases.

Other comments: 1. The authors should compare the skills of the model (categorical evaluation) with other published model studies, in order to have a flavor of the behavior of the model when compared to other forecasting systems worldwide.

2. Emissions are really important in forecasting system; however, this manuscript lacks information about the emissions used (time series, spatial patterns, seasonal behavior, etc). The authors should explain in a higher degree of detail how emissions are considered and implemented in the forecasting system.

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