

# ***Interactive comment on “The implementation of NEMS GFS Aerosol Component (NGAC) Version 2.0 for global multispecies forecasting at NOAA/NCEP: Part I Model Descriptions” by Jun Wang et al.***

## **Anonymous Referee #2**

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This paper describes a substantial revision of NGAC, from a dust-only model to one including the usual fuller set of aerosol species (adding sea-salt, sulfate, black carbon and organic matter). Although there are no particularly novel scientific features compared to existing aerosol schemes, this paper serves to document the development of a well-used operational system. It is a well-written model description paper, and more extensive evaluation is provided in the companion paper (which is subject of a separate review). I would recommend publication in GMD subject to the following minor comments.

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- p.2, lines 3–4:** “sea salt particles tend to reflect all the sunlight they encounter” – this is a rather simplistic description of their scattering behaviour.
- p.2, lines 10–12:** “Polluted air. . . leads to a weak hydrological cycle” – please clarify the limited conditions or scales for which this is true, since in general precipitation will be constrained by surface evaporation.
- p.2, lines 16–17:** I would suggest “aerosols **may** have significant impact” as the magnitude of such impacts outside idealised scenarios remains quite uncertain.
- p.3, line 25:** “full aerosols” would suggest that e.g. nitrate aerosol is included; perhaps “a wider range of aerosols”?
- p.5, line 14:** it would help to specify the actual resolution of this Gaussian grid rather than the spectral truncation, for those unfamiliar with the particular spectral–gridpoint mapping used.
- p.5, lines 17–18:** which AeroCom emissions dataset? There have been several recommendations for different phases of experiments – a specific link or reference would be helpful.
- p.5, line 21:** “Organic carbon has Terpene emission” – more detail on this rather terse statement would be welcome. Are terpenes emitted directly as organic carbon aerosol? Or emitted in the gas phase and subsequently converted to aerosol? From what inventory are these emissions derived, covering what sectors?
- p.6, lines 30–31:** “NGACv2 is closer to GEOS-4” – but does that mean it is closer to truth or observations?
- p.7, lines 26–29:** These plots compare results from CMAQ using NGACv2 vs GEOS-5 monthly boundary conditions, but observations should also be included to give some indication of which is performing better (as is done for the next example); otherwise the statement which follows that the forecast is improved is not justified.

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**p.8, line 9:** although the run using NGACv2 is closer to observations here, it is worth noting that the values are still too low.

**p.8, line 14:** please define CRTM.

**p.8, lines 14–15:** please explain what is meant by the term “aerosol column density”.

**p.8, line 23:** there appear to be two section 5.2s.

**p.8, line 32:** each of the different experiments presented here should be properly described.

**p.9, line 25:** should “GFSC” here be “GSFC” instead? Otherwise it should be defined.

**p.9, line 25–26:** the MAM aerosol scheme and MG cloud microphysics don’t appear elsewhere in the paper – if their use is to be mentioned in the conclusions as more than a possibility for the future, more detail should be given at an appropriate point in the body of the paper.

**Table 2:** this is quite confusing with a lot of numbers, and I would consider finding a more accessible way to present the data (perhaps with the aid of a bar chart).

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Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2017-306>, 2017.

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