Linkages between land initialization of the NASA-Unified WRF v7 and biogenic isoprene emission estimates during the SEAC^{4}RS and DISCOVER-AQ airborne campaigns
Huang et al., GMDD, 2017

General Description of manuscript and recommendation:

The authors use aircraft, surface, and satellite observations to estimate isoprene emissions at high spatial resolution over the southeastern US. This study demonstrates that long-term initialization of land cover substantially improves modelled meteorology relevant for estimating isoprene emissions and boundary layer dynamics. The work is relevant to GMD, but in reviewing the manuscript I had to spend a considerable amount of time sifting through errors and poor grammar. This hampered my ability to evaluate the quality of the science, the interpretation of the results, and overall conclusion of the study. I suggest major revisions be applied to the manuscript so that it is more accessible to the GMD readership.

General Comments:

The manuscript is not carefully edited. There are many errors (e.g. page 6, line 27 exponential "12" should be "-12"), many misuses of punctuation (e.g. semicolons and colons in the sentence on page 6, lines 4-10), and often lengthy hard-to-follow sentences (e.g. page 2, lines 7-10; page 2, lines 11-14; page 6, lines 4-10). All of these issues stand in the way of communicating the science and leave the reader confused. Some examples of these are provided, but please read through the manuscript carefully to identify and address these issues.

There are many instances where "the" is used when it is not necessary, e.g. the is not needed in "the sunset" or "the sunrise" (page 7, lines 27-28). "The" is only needed when the noun is specific or particular, for example there is only one NUWRF-MEGAN model (page 8, line 2), one North America (page 2, line 14) and one sunrise (page 7, line 27), so "the" is not needed.

Figures are not presented in order in the text. The authors first introduce Figure 2(d) then goes on to mention Figure 1. Reorder figures to reflect the order in which they appear in the text.

There is unnecessary repetition, in particular in Section 3.1. That SEAC^{4}RS has no/minimal biomass burning interference (page 10, lines 2-3) is already stated in Section 2.2.1, as is the limited contribution of anthropogenic VOC interference to measurements in Conroe (page 10, lines 7-10). No need to state all this again in Section 3.1.

Possessive is not necessary when describing data from a model or measurement platform. For example, replace "NUWRF's day time surface air temperature" with "NUWRF day time surface air temperature". There are many other instances where apostrophes are used, but aren't required. Please identify and correct these.

The equation used to infer isoprene emissions relies on OH concentration and boundary layer height as input. I would like to see some discussion and evaluation of the diurnal variability of these parameters, as these are used as input in Eq. (2) to estimate isoprene emissions from the isoprene concentration observations.

Specific Comments:

Page 4, line 4: What emissions come from the atmosphere to the canopy? Do the authors mean the emissions consumed/deposited within the canopy (term ρ in Eq. (1))? If this is not considered in the emission model used in this study, then please clarify that this value is set to 1 to avoid confusion.

Page 5, lines 15-18: What is the difference in land cover between the IGBP-derived land cover that is used in this study and the default used in MEGAN to justify using an updated land cover map? Some discussion of how using this updated land cover impacts isoprene emission modelling is needed.

Page 5, lines 23-24: What is "the urban surface option"?

Page 5, line 26; Table 3 footnote: What is "full clocks"? This isn't standard terminology. Rather describe this in a way that can be understood.

Page 7, lines 4-5: Why mention the August western US flights? Seems it has no relevance to this study and so can be removed.

Page 11, line 32: Is "vastly similar" correct? In the next clause, the authors state that the difference is >30%.

Page 12, lines 29-31: Why does resolution induce a difference in isoprene emissions in the atmospheric initialization sensitivity test in Figure 7c) and not in Figure 4c)?

Page 16, lines 1-2: Please provide references to back up the statement that many model comparison studies don't adequately assess the impact of model inputs.

Figure 3: Please increase the size of the points in the Figure 3a) Observations panel so that the reader can easily compare the observations and model or instead show a scatterplot of the model versus the observations and include regression statistics.

Figure 3 caption: Please say where the temperature observations are from. Are these NCEP?