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# *Interactive comment on* "Exploring Constraints on a Wetland Methane Emission Ensemble (WetCHARTs) using GOSAT Satellite Observations" *by* Robert J. Parker et al.

**Anonymous Referee #1**

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General comments:

The manuscript by Parker et al. provides an in-depth analysis of the correlation between seasonal variations in methane concentration based on the results of ensemble calculations using the WetCHARTs model and satellite-based observations on a global and regional scale. The set of methane emission data from wetlands is derived using external data on soil temperature, precipitation, heterotrophic respiration and wetland extent. The wetland emission data then processed together with anthropogenic and the other natural sources emission data using TOMCAT atmospheric chemistry transport model. The output data from TOMCAT simulations are compared with GOSAT



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satellite observation data. The paper is well written and structured but needs some improvement and clarification.

Specific comments:

P3,4: Global scale factor on the fig.1 is obviously not the same thing with “s” in equation 1, although the first paragraph on page 4 says otherwise. The right equation for “s” is given by equation 3 in [Bloom et al., 2017b]. It takes its own value for each of the 18 members of the ensemble.

P3: “V1.2.1 of WetCHARTs has improved North American wetlands”. This seems to need some explanation.

P3: I would also recommend to mention Eliseev et al. 2008 paper.

Section 2: No information on temperature data used for q10 dependence.

P4: Non-wetland ch4 emissions for TOMCAT are set using EDGAR (v4.2) data. Are such data available for the simulated period (2009-2017)?

Section 6: “The wetland extent is found to be the dominant explanation for the variance in all regions”. Unfortunately, only one model of soil heterotrophic respiration (CARDAMOM) is used in this work. Based on formula 1 in this paper and fig. S2 in [Bloom 2016], the strong divergence between the data from different models, especially in the tropics, can significantly affect the variations in the seasonal cycle of methane. For some regions (especially S.E. Asia and Indonesia) low correlation may be partly due to the use of annually-repeating values for rice paddy emissions. They can be comparable or even exceed wetland emissions, have their own seasonal cycle, and are highly dependent on the same meteorological parameters (temperature and precipitation).

Technical comments:

P2, L25: “wetland ch4 seasonal cycle”, which does make sense, transforms to P5, L25: “ch4 wetland seasonal cycle”, which does not, and then just to “wetland seasonal





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cycle" (seems incorrect) mostly used till the end of the paper. I would recommend to use the 1st sentence throughout the manuscript.

P8, L5: "observed emissions". I think here should be something like "variations in the WetCHARTs emissions"

P14, Fig.10 caption: ror

P23, L17: the sentence "argument for the approach that WetCHARTs takes in its ensemble approach" needs revision

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