

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

Anonymous Referee #2

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This manuscript presents an evaluation of the WetCHARTs product using GOSAT methane measurements taken over the 2009-2017 period. The TOMCAT model is used to represent these modelled measurements. This analyses both the seasonality and amplitude of the wetland methane emissions on global and regional scales. Wetland models of this type are of great value to the community and it is important that the impact of the drivers, limitations and applicability is understood. This paper addresses this by highlighting both the strengths and shortcomings of the model and undertakes a thorough analysis. It is well-suited for publication in this journal given the clarifications highlighted below.

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[pg 4 Line 27] When using the EDGAR database - how are years beyond the range of the dataset represented (2012)? Has any trend being included to cover 2009-2017 period? This is also annual dataset so have any seasonal cycles associated with different regions been included?

[pg 4 Line 27] Similarly which data has been used for GFED 4.1s to cover 2009-2017? Has the beta release data been used for the latter years?

[pg 5 Lines 11-14] Are any corrections made to the GOSAT dataset based on the comparison to the TCCON network? If so, is this a global correction or are any regional variations taken into account?

[pg 5 Line 29-31] "This makes the assumption that wetlands dominate the uncertainty in interannual variability of the CH₄ emissions and the remaining CH₄ sources are in comparison far less uncertain" - is this a valid assumption for all regions? Could biomass burning have larger uncertainty in some regions?

[pg 6 Figure 2] Why is there are 1.00 correlation between ensemble members 1913,.. and 2913,.. (and 3913,..)? These different ensemble members represent those where the global scale factor has been altered - so is this expected? It would be worth clarifying this as the different ensemble members look very well correlated overall but this is perhaps a bit misleading if this is just due to a scaling factor difference in some cases.

[pg 7 Figure 3 / pg 9 Line 5-8] Are the defined East and West Amazon (and perhaps the Congo) regions, traversing the equator? How does their regional behaviour relate to the hemispheric differences seen? May be easier to see this if the equator/tropics were plotted in Figure 3.

[pg 8 Figure 4] What do the ranges here represent for the box and whisker plot? e.g. Is this presenting the mean or the median? Is the box representative of 1 sigma uncertainty or the inter-quartile range or something else? Please just clarify this within the caption (and does this match to Figure 6 and 7?).

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[pg 10 Figure 5 & pg 14 Figure 10] "Colours indicate the different groupings" - which groupings do each of the colours represent? There seems to be different colours for panels 1 and 2 than panel 3 (e.g. pink)? Without additional clarification here this does not make it clear which ensembles show better correlation / lower standard deviation.

[Section 8, Case study 2: Congo] The implication here is that the low correlation with temperature dependence in the Congo could be due to the high magnitude. Since globally, and for most other regions, some temperature dependence is seen, would this explain the difference in this region?

[Section 9, Case Study 3: Sudd] Would be useful to clarify what the underlying temperature database being used is. Is there any reason why this would be misrepresenting the temperature variations in this region?

— Technical corrections:

[pg 9 Line 14] Commas should be added around "however" → This, however, is not the case

[pg 14 Figure 10] "ror" → "for"

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