Review of 'A new models of the globak biogeochemical cycle of carbonyl sulfide – Part 2: Use of OCS to constrain gross primary productivity of current vegetation models' by Launois et al., 2014.

Launois et al., uses atmospheric OCS to constrain the gross primary production of three dynamic vegetation models. The authors describe in detail the the different fluxes of OCS, their sources and sinks. The study also addresses the imbalances in the global OCS budgets with sinks exceeding by a factor of 100. They carried out the inversion of surface fluxes which helped balance the OCS budget, but, this would mean a steep reduction in soil and vegetation consumption. This study is detailed and is a right step forward towards the validation of biogeochemical models. I find the scientific basis and analysis sound and mostly have concerns regarding the organization of the paper. I would recommend publication after the consideration of the following comments given below.

Specific comments:

Below, I list my main concerns (not necessarily in the order of importance).

1) First and foremost, I would say that the paper is not very well organized. Due to its very descriptive nature, one lose the purpose of the paper. I would, hence suggest moving some of the techniques used in the paper to the appendix. For example, sections 2.4.1 and 2.4.2 can be moved to the appendix. Towards the end of section 2.3, the authors can add the first paragraph of section 2.4.1 accordingly, making necessary changes. Section 2.4.3 can be added as the last paragraph of section 2.3.
2) Give a brief description of the three DGVMs selected, atleast in the appendix.
3) Define “S2” reference simulation.
4) Use a common terminology – MSE or RMSE
5) The labelling on Figs 9 & 11 are tiny.
6) There are too many subsections and subsubsections under each section. I would recommend to avoid this. All the sections should be made more concise. For example, I suggest the following:

2. The different surface OCS fluxes and their representation in models
    2.1 Sea-air OCS emissions
    2.2 Uptake of OCS and CO2 during photosynthesis
    2.3 Soil-atmosphere OCS emissions
    2.4 Other sources and sinks of OCS
3. Models used in this study
    3.1 Terrestrial biosphere models (Move this here from section 2.1.2)
    3.2 Atmospheric transport model
4. Atmospheric OCS observations used for validation
5. Experiments and data analysis
    5.1 Forward simulations for OCS
    5.2 Forward simulations for CO2
    5.3 Optimization scenarios for OCS

5.4 Data analysis

I suggest, organize the 'Results' section accordingly.

Technical comments:

I wouldn't recommend abbreviations in the title. Replace 'of current vegetation models' to 'in current vegetation models'.

P-1 (Abstract).
7. define LRU in the abstract where it is first used
8. velocities *of* plants
14. *in* soil and vegetation uptakes.
P-3:
20: Here, we use OCS
29: For *this*, we modeled the ...
P-4:
9: In the next step, we define uncertainties ...
20: uncertainties *in* the surface fluxes
23: uncertainties *in* OCS surface processes
25: In *the* second *section*, we investigate..
P-7:
16-17: seasonal cycle from each model and compute the uptake of OCS by leaves using GPP (as described above).
P-8:
5: define C4 plants.
16: range *on initial estimate of surface fluxes* (Table 2).
P-9:
14. Here, we adopted a different approach *for* the uptake ...
P-10.
10. The last term in eqn.3 is not defined.
14. Two different approaches *for* estimating.. here. The first one is *from* Morfopolos ...
19-20. The second approach *is from* Bousquet et al., (2011) where an atmospheric ..... H2 concentration is used. < continue with the next papragraph here>.
24. allow*ing* for the
27. remove 'being paid'
P-11.
2. Therefore, the *representation* of OCS emissions by anoxic soils in our model was largely ...
4. ..., because *of the* large uncertainties associated with those fluxes ..., we, finally, ...
6-8. Rewrite as 'We used the seasonal maps of methane emissions by Wania ...from both categories of soils as simulated ... model, to locate the hot spots of OCS emissions from anoxic soils temporally and spatially.
13. remove 'a' from with an assigned +-30%...
P-15.
13-14: For each data point, we selected the closest monthly mean ..

21: '%' missing

P-16:

20: Mention '(refer Table 1 for details)'

25: replace 'to changes in' to ' for varying'

P-23:

14 & 22. Instead of 'methods section' , give the section no.

P-24:

24. Explain Fig.2 and then continue with the explanation

P-25:

7. The annual trends of OCS in SPO is not shown in Fig. 3. Remove '(Fig.3)' from this line.

10. Again, explain 'smooth seasonal cycle' in Fig.3 in the text.

P-25:

1. Replace the sentence by 'As a next step, we try to address the constraints of air-plant exchanges on the seasonality of OCS'.

P. 28-29

26-28: Line incomplete. Rewrite.

P.32

8. remove 'remaining' and replace with 'other biases still exists

12. Replace the title of section 4.1 as 'Additional biases in simulated atmospheric OCS concentrations'

P. 34:

8. ...pointing out again the *possibility* of too *high* leaf uptake, which ..

18. .. arise due to the optimization of only one global annual scalar for each flux component.

P.36:

8-11. Rewrite the sentence as ' The version of the LMDz model used here is believed to have large mixing in the ... , which would thus dampen the amplitude ..

P. 39:

13. Replace 'evidenced' with 'shown'

9-11. The sentence is not clear. Re-phrase it.