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Biogeosciences Discussions

Interactive comment on "Modelling LAI at a regional scale with ISBA-A-gs: comparison with satellite-derived LAI over southwestern France" *by* A. Brut et al.

Anonymous Referee #3

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The work presented in this paper is important, simply because it provides an idea of the "correctness" of the representation of the vegetation in land surface models. However I am a little disappointed because I think the comparisons of the simulated LAI with satellite data could be done better.

The simulated LAI of a "pure" vegetation type is compared to satellite data products which show "mixed" vegetation, even when the 70% threshold criterion is applied. There are two ways to improve the comparison: 1) to compare simulations where the model simulates the aggregation of the different patches in the vegetation tile, in order

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to better agree with the different vegetation types seen by the satellite. As this is probably the way how ISBA-A-gs runs within SURFEX for the Météo-France simulation, I wonder why this is not shown here. 2) to use satellite time series at a higher spatial resolution (not for the entire domain, but to look at specific areas with a strong dominance of the vegetation type of interest). Corrected daily NOAA/AVHRR 1 km reflectance data can be obtained for Europe, e.g. from the Meteorological Institute of the Free University in Berlin. There is no LAI is provided, but it could probably be calculated in some way.

When it comes to the comparison of the leaf onset, the information on how the this is derived from the satellite data is missing. The combined use of other phenological data would have made the comparison more solid.

The test with the Laqueille grassland is interesting and much more of such local tests are required to evaluate large-scale models. But the authors should extend the discussion to the need of implementing some parameterizations of management practices within the model.

Generally, I am in favour of the publication of this paper. I am not sure if it is possible, but I would greatly appreciate to see the Figure 4 redone with ISBA-A-gs simulating mixed patches. Here below are some detailed comments:

p.3: "... at this scale, different types of vegetation can be found in a model grid cell...": it is written as if it was not the case before, although the resolution was coarser (1 degree). What should we understand?

2.1 The ISBA-A-gs model: the text of the 1st section could be improved.

2.2 why are irrigated crops not distinguished in C3/C4 crops?

p.11. I certainly agree that the the crop mixture is the reason for the difference between the simulated and the observed LAI for C3 crops. More than the presence of other C3 crops (the phenology of barley and rape do not differ so much to that of wheat), it is the

BGD

6, C537–C540, 2009

presence of other vegetation types (C4 crops, forests, grasslands) which is responsible for the longer cycle seen by the satellite. The satellite pixels are not pure: up to 30% is covered by other vegetation types. Why was it not possible to include these patches as well (with the appropriate weighting factor) in the simulation? The same problem arises for all vegetation types, and is even more acute for coniferous forests. Indeed the Pine coniferous forest Les Landes in not very dense. Some lots are regularly cut, maize fields and grazing areas occur between plots. It is therefore normal that the simulation of the LAI of a pure coniferous forest does not fit with the observations. For the C3 crops alone, the simulated senescence is too late: these crops are already yellow before July and they are harvested in early summer.

p. 12. The second growth in summer for C3 crops is actually rather correct regarding the vegetation impact on the climate. Depending on the farming practices, grass is allowed to grow after the main C3 crop cycle, or some inter-cop is used, e.g. nitrogen-fixing legumes. Cases of patches being kept "bare soil" may exist, but they are probably not dominating. It would be nice if the authors could precise the usual practices in the area.

Fig.8: there are many methods to calculate the leaf onset from satellite data. How is that done here with the MODIS data?

End of p.13 As already mentioned above, the model simulates a pure field and is therefore able to show a regrowth in 2002. The satellite sees a mixture of different fields: even when C3 crops dominate, other vegetation types are present, and the different C3 crops fields certainly also differ (difference in soil, orientation, variety, management...). The fact that the satellite LAI displays a smoother descent of the LAI curve compared to its sharp growth indirectly confirms the presence of some active vegetation in late summer. The second cycle simulated by ISBA-A-gs seems however too long. In many places in Europe, C3 crops are largely winter crops, sown already in autumn. The authors say that the parameters used for C3 crops permit to represent wheat, but which one: winter or summer? In any case, winter crops remain in a vegetative phase during

BGD
6, C537–C540, 2009

winter, due to several processes (photoperiod and vernalization response) which slow its development. If it is expected that the simulated LAI reproduces reality more closely, ISBA-A-gs would need an appropriate crop phenological model, which responds not only to the climate variability, but also to the management practices.

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