

Interactive comment on “Observed and modelled ecosystem respiration and gross primary production of a grassland in southwestern France” by C. Albergel et al.

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The authors thank the anonymous referee #2 for his/her review of the manuscript and for the fruitful comments. For an easier comprehension, general comments of the referee are also reported (2.XX).

2.1 [I agree with and support the comments of referee 1.]

Response 2.1 Please refer to the authors' response to reviewer #1.

2.2 [The presentation of the results should be more consistent in a way that all results are related to a reference (measured data). Most of the results are already related to

C562

a measured dataset (SMOSREX measurement site). Please add this reference data also in figure 2, figure 6 and table 5.]

Response 2.2 Figures 2 and 6, and Table 5 are based on continuous model simulations aggregated at the monthly scale or at the annual scale. Since the observations are not continuous (missing data and removal of observations acquired during water deposition periods), it was not possible to present the same results based on measured data.

2.3 [Both, figure 7 and 8 basically compare measured and simulated values. I would suggest that the results from figure 7 are presented as scatter diagram similar to figure 8 or vice versa. This may increase the consistency and comparability of the results.]

Response 2.3 Presenting Fig. 7 (root zone soil moisture and LAI over the 2001-2007 period) as a scatter diagram similar to Fig. 8 (surface soil moisture over the 2005-2007 period) would not permit to appreciate the seasonal and the interannual variability of those variables over the 7-year period considered. We propose to add to Fig. 7 a third plot presenting the temporal evolution of the surface soil moisture modelled by ISBA-A-gs along with observations. Statistical scores for this variable will be added and discussed in the text ($r^2=0.65$, bias=-0.03 m³m⁻³ and RMSE=0.07 m³m⁻³). In Fig. 8, where a shorter period of time is considered (2005-2007), the statistical scores are similar ($r^2=0.65$, bias=-0.04 m³m⁻³ and RMSE=0.07 m³m⁻³).

2.4 [Add error measures (r^2 and RMSE) in line 23/page 444 to make the statement about the correlation between measured and simulated surface soil moisture content more objective.]

Response 2.4 The statistical scores will be added and discussed as mentioned in [Response to 2.3].

2.5 [The discussion should contain some statements with respect to the transferability of the approach to other test sites.]

Response 2.5 Yes. See response 2.6.

C563

2.6 [For my understanding, the surface soil moisture content is not well estimated with the ISBA-A-gs model (figure 8 and line 23, page 444). The authors did an analysis to quantify the impact of this effect on the simulation of Reco. However, a description of possible reasons should be included in the discussion to judge the problem with respect to a potential model transfer to other test sites and other environmental constellations.]

Response 2.6 In the 2-layer version of the model used in this study, the surface soil moisture (w_g) simulated by ISBA-A-gs corresponds to a skin soil surface layer whereas the observed surface soil moisture at the SMOSREX site, with a vertically installed ThetaProbe, corresponds to a relatively thick soil layer of 6 cm. The same wilting point and field capacity values (Table 1) are used for the two layers of the model, whereas in the real world, the soil properties close to the surface usually differ from those of deeper layers. However, scaling w_g to field capacity in Eq. (3) permits to limit the impact of this effect on Reco, as shown by Fig. 8. The SMOSREX site is characterised by a thick litter layer, at the surface of the soil, which may govern the heterotrophic component of Reco. This is why w_g is used in this study as a factor of Reco (Eq. (4)), instead of the root-zone soil moisture w_2 . An attempt to use w_2 in Eq. (4) produced lower scores on nighttime observations of NEE. For other sites, it is likely that using w_2 would produce better results, but this needs further confirmation.

2.7 [The quality of the figures should be improved, especially the text size on the diagram axes.]

Response 2.7 The quality of the figures will be improved. In particular, the text size will be increased for Figs. 1 and 5, and Fig. 6 will be redrawn (see response 1.9 to Reviewer 1).

Interactive comment on Biogeosciences Discuss., 7, 429, 2010.