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Interactive comment on "Filling the gaps in meteorological continuous data measured at FLUXNET sites with ERA-interim reanalysis" *by* N. Vuichard and D. Papale

N. Vuichard and D. Papale

vuichard@lsce.ipsl.fr

Comment from Referee #2: In the end, what really matters is the quality of the simulated fluxes at Fluxnet sites. An assessment of the impact on simulated fluxes of using ERA-Interim (instead of local atmospheric observations) to force a land surface model would be instructive. I think that the supplement of Balzarolo et al. (2014) should be cited, at least, as it addresses this issue: http://www.biogeosciences.net/11/2661/2014/bg-11-2661-2014- supplement.pdf This document shows that using raw ERA-Interim data instead of local atmospheric observations has little impact (or a positive impact) on the scores of the simulations of a

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land surface model with respect to local observations of CO2 fluxes. It must be noted that ERA-Interim precipitation is not reliable in tropical areas (Balsamo et al. HESS (19, 389-407) 2015). Any tropical site in Table 1 ?

Author's response: We agree on the fact that the quality of the simulated fluxes at Fluxnet sites produced with a forcing is important. In this respect, ERA-interim has clearly proved its capacity of being a suitable forcing, as good as local meteorological data, in order to simulate CO2 and energy fluxes at Fluxnet sites. We will add Balzarolo et al. (2014) as a reference about this issue. We will also add as a reference the study of Zhao et al. (2012), which shows that the good performance can be partly explained by the fact internal model errors may compensate for the errors contained in the ERA-interim data. However, behind the quality of the simulated fluxes, what is the most important in the gapfilling method we developed, is to use data for the gapfilling that is consistent with the original in-situ data. In this respect, a systematic bias of the ERA-interim product that we will correct with the bias-correction method is less critical than a bias that only acts some periods of the year. We have one tropical site in our study (BR-Sa3) for which precipitation amount from ERA-interim is twice larger than the one measured locally. At monthly time scale, the bias-corrected ERA-interim has a relatively good correlation with the in-situ data, but its standard deviation is twice lower than the in-situ data, as a consequence of the bias correction.

Author's changes in manuscript: We propose to replace the sentence line 7 page 28 ("These data are however not measured at site level and for this reason a method to downscale and correct the ERA data is needed. ") by the following paragraph. "The ERA-interim reanalysis performs well in simulating most of the atmospheric variables that are used for the gapfilling method presented here (Dee et al., 2011), but precipitation is overestimated in tropical areas (Dee et al., 2011; Balsamo et al., 2015) compared to observation-based estimates of the GPCP (Adler et al., 2003). Zhao et al. (2012) and Balzarolo et al. (2014) have shown that using raw ERA-Interim data instead of local atmospheric observations has little or no impact on the scores of the

simulations of a land surface model with respect to local observations of CO2 and energy fluxes. However, the good performance is partly explained by the fact that internal model errors may compensate for the errors contained in the ERA-interim data (Zhao et al., 2012). Behind the quality of the simulated fluxes, the most important is to use data for the gapfilling method that is consistent with the original in-situ data. In this respect, diagnosed bias against in-situ data should be removed. "

Added References: - Balsamo, G., Albergel, C., Beljaars, A., Boussetta, S., Brun, E., Cloke, H., Dee, D., Dutra, E., Muñoz-Sabater, J., Pappenberger, F., de Rosnay, P., Stockdale, T., and Vitart, F.: ERA-Interim/Land: a global land surface reanalysis data set, Hydrol. Earth Syst. Sci., 19, 389-407, doi:10.5194/hess-19-389-2015, 2015.

- Balzarolo, M., Boussetta, S., Balsamo, G., Beljaars, A., Maignan, F., Calvet, J.-C., Lafont, S., Barbu, A., Poulter, B., Chevallier, F., Szczypta, C., and Papale, D.: Evaluating the potential of large-scale simulations to predict carbon fluxes of terrestrial ecosystems over a European Eddy Covariance network, Biogeosciences, 11, 2661-2678, doi:10.5194/bg-11-2661-2014, 2014.

- Adler, R.F, Huffman, G.J., Chang, A., Ferraro, R., Xie, P.P., Janowiak, J., Rudolf, B., Schneider, U., Curtis, S., Bolvin, D., Gruber, A., Susskind, J., Arkin, P., and Nelkin, E.: The Version-2 Global Precipitation Climatology Project (GPCP) Monthly Precipitation Analysis (1979–Present). J. Hydrometeor, 4, 1147–1167, 2003

Particular comments from Referee #2:

- P. 24, L. 16 and L. 21: "overall" or "over all" ? Author's response: "over all"

- P. 29, L. 20: "overall" or "over all" ? Author's response: "over all"

- P. 29, L. 11 and L. 25 ("It is assumed"): It should not be an assumption, it should be a solid attribute of the data. Any reason to think that this is not the case ? Author's response: No. We will correct the two sentences by removing "it is assumed"

- P. 32, L. 20 ("rescaled"): do you mean "interpolated" ? Author's response: Yes, we

will correct for this in the revised manuscript.

- P. 36, L. 12: "can not" or "cannot" ? Author's response: "cannot"

- P. 39, L. 6 and L. 13: "overall" or "over all" ? Author's response: "on average, over all sites"

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