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

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Short Comment: I have a confusion about the presentation of section 3.2 and Fig. 4. What does the "diurnal signal" mean? Considering the backgrounds in section 2, I would like to believe the authors do the statistics with all available "good" (fqc==0) half-hourly observations and the de-biased and downscaled ERA-Interim data. If this is true, I would prefer "half-hourly signal" to "diurnal signal" since the WS and LWin would not display significant diurnal variations. Or the authors do the statistics with each full diurnal cycle data and then average the statistics metrics for all days? I suggest the authors give more details about the statistics in this section.

Author's response: Thank you for this valuable comment. Yes, indeed, more details about the statistics regarding the evaluation of the diurnal cycle is needed. As you believe, we did the statistics with all available "good" (fqc==0) half-hourly observations and the de-biased and downscaled ERA-Interim data. However, in order to specifically evaluate the diurnal cycle interpolated from the 3-hourly ERA-interim data, we remove the daily mean value to each data point. Consequently, we are evaluating time series of "anomaly" to the daily mean value. For this reason, we think it is more appropriate to use the term "diurnal cycle" rather than "half-hourly signal". Here below are the details we proposed to add to the section 2.4 dealing with the statistics used for evaluating the gapfilling method:

Author's changes in manuscript: "We also specifically evaluate the diurnal cycle interpolated from the 3-hourly de-biased meteorological fields of the ERA-I dataset. To this end, two new time-series have been constructed from F and E_F^d by removing their daily mean values. The correlation between these two time-series of "anomaly" is calculated at each site, as well as the standard deviation of the time-serie inferred from the ERA-I dataset, normalized to the standard deviation of the one inferred from the FLUXNET dataset."

Short Comment: Regarding with the dataset provided on the website, I have made a first try to use this dataset and I'd like to report one exception about the LWin_era at FR-LBr sites. I come across unexpected high values at this sites and there may be a small scaling error during file writing process.

Author's response: Thank you for this check. This is related to the issue that we raised in the section 4.2 'Checking for data quality'. Because, our bias-correction method is only based on the FLUXNET data, when there are errors in the FLUXNET data (from measurements or the post-processing steps), they automatically impact on the de-biased ERA-interim dataset. That's exactly what happens at some sites. We only detect such problems for the Longwave Incoming radiation flux. For all years at all sites RU-HaX, a 0 value was set instead of the standard missing value (-9999). This

was also the case for the year 2002 for the site CA-NS4. For these two sites, we diagnose in advance this problem and we consequently corrected for, before applying our bias-correction method. For the site FR-LBr, we did not detect the problem. After having check the data for this site, there is indeed an outlier value in December 2004 in the original dataset. This also happens for the site NL-Hor, which has outlier values in January and June 2006. If possible, we propose to correct for these two sites, in the dataset we archived on Pangaea and in the manuscript. However your comments confirm the importance of the meteo data check and quality control also at FLUXNET level and this is in fact under implementation.

Short Comment: Another concern is about the hours shifting to UTC time at some sites, such as BE-Bra, BE-Jal, ... As the longitudes fall in [-7.5, 7.5], there should be no time shifting, right?

Author's response: No, indeed, the local time does not follow strictly the longitude of a place but account also for country specificities (see this map for instance, http://upload.wikimedia.org/wikipedia/commons/8/88/World_Time_Zones_Map.png) For instance, Belgium where are located the BE-xxx sites is in the UTC+1 time zone.

Short Comment: I would also suggest the authors to add the surface pressure variable in their dataset and extend the time series beyond the yeas of available FLUXNET observations as spin-up process is generally needed in land surface modeling.

Author's response: Thank you for these suggestions. Adding the surface pressure is definitely something we would like, too. We mention this in fact in the last section 4.3 "Improving the Fluxnet dataset for modelling purpose". Currently, surface pressure field is not available into the level 4 Fluxnet dataset but it is measured in most of the sites and under collection in the context of the new FLUXNET activities. The two suggestions you mentioned are for sure new features that we will consider in a next version of our dataset.