

Interactive comment on “Basic and extensible post-processing of eddy covariance flux data with REddyProc” by Thomas Wutzler et al.

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RC: The paper describes the R package REddyProc containing tools for post-processing of eddy covariance data with a focus on CO_2 . The REddyProc package contains tools for reading halfhourly data from different formats, estimating u^* thresholds, gapfilling, flux-partitioning, data visualisation, and estimation of uncertainties. The results obtained with the routines of the package are compared with other state-of-the-art tools. This resulted in no significant differences in the results from the different tools on a monthly or annual scale. The REddyProc package contains a more sophisticated way of the treatment of seasons and the possibility to run and take advantage of multi-year data sets. Discussion paperThe paper provides a good description of the rationale of the package and the difference in calculation method between this package

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and earlier available tools. The paper also includes an appendix with example of how to run the routines on a full annual dataset. In general, I find that the paper is well written and documented, and that it can provide a very useful reference for scientist using the package. I have some suggestions for improvements in the specific comment below. Providing this package is very good for the flux research community and by using standardized methods the results from different research groups become much more comparable.

AC: We thank reviewer 2 for his encouraging comments.

0.1 Specific comments

RC: Table 1. I find it a bit lazy to write "uStar" instead of the correct symbol " u_* ".

AC: We want to keep consistency throughout the manuscript. Since in the programming source code and most processing output the multiplication character cannot be used, we consistently used "uStar". If required by the editor, we sacrifice a bit of consistency in favor of convention and we will change the manuscript to use the symbol " u_* " in places other than source code and processing output in the revised version.

RC: Figure 2. Caption: I suppose it should be "night-time NEE". The "season-temperature subset" is only understandable after careful reading of the main text.

AC: In a revised version we will adapt the figure caption 2 to: "Concept of the u_* -filter: Night-time NEE at low u_* friction velocities below a threshold, i.e. with low turbulence, is biased low compared higher u_* with otherwise similar environmental conditions. The u_* threshold (dashed line) is estimated by a moving point method on u_* bins (crosses) across half-hourly records (circles) here for a subset of data from DE-Tha."

RC: p.6, l.12-13: It is not completely clear from the text which time-frame is used for the flagging. What is the chosen aggregation period for a "robust u^* estimate" (l. 10).

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AC: u_* values of each half hours are compared to the threshold determined for the corresponding season. In addition each half-hour with too low u_* in the previous half-hour is flagged to be invalid. We will describe this better in a revised version.

The aggregation periods, i.e. seasons, are specified by the user and default to three months, starting in months, 3,6,9, and 12, as described at page 14 lines, 14ff.

RC: p.7, l.8.: Probably this is the first time in the paper the "BGC online tool" is mentioned, and should thus be explained and referenced here.

AC: Thanks for noting. In a revised version, we will keep the description of the BGC online tool in the benchmarking section, but insert a link in this method description section.

RC: p.9, l.22: The abbreviation "LRC" should be explained.

AC: Thanks for noting. In a revised version, we will keep the description of the Light response curve (LRC) in the specific day-time partitioning section, but write in this general section "fits a model to observations of daytime NEE and global radiation"

RC: p.12, l.13: The choice of the software used for comparison (here called "benchmarking") should be explained better. The u^* filtering is compared to Papale et al. (2006) and the gap-filling and flux partitioning to the BGC online tool. Do these represent (previous) state-of-the-art or have exactly those routines been used for calculating the FLUXNET data-sets?

AC: The required more detailed description of the role of the benchmark tools is currently described in the more specific sections, 3.2 and 3.5. In a revised version, we want to keep the details in the specific sections, but will move some parts from section 3.5 to section 3.3.

RC: p.14, l.6: Should read "To explore these consequences ..."

AC: Thanks for noting the typo.

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RC: Discussion paper Fig.4+5: I find it quite interesting that there seems to be a fairly large scatter in the estimated u^* thresholds, but this does not seem to translate into a similar scatter in the annual NEE estimates. It would be valuable to have a further discussion on this. Does it e.g. mean that the value of the u^* threshold is not very important? A lower u^* threshold means that more data are kept which could potentially lower the uncertainty on the annual estimate.

AC: We also did not expect to which extent the scatter in u^* thresholds did not propagate to the aggregated flux results, and discussed this at sections 3.2.3: "indicates that the sensitivity of NEE to the u_* threshold estimate in the inferred ranges is low, which also explains the large uncertainty of the u_* threshold estimate". In a revised version we will experiment with elaborating a bit more on it, while keeping in mind the manuscript-length constraints.

RC: Fig. 6: The symbols of the quality flags are very difficult to read and distinguish. The legend refers to the sub-figures as "top" and "bottom". Here it should be "left" and "right".

AC: In the final (as opposed to review) two column mode formatting, the labels "top" and "bottom" are the correct ones. The symbol transparency is a compromise between reading a single symbol and conveying the message that most of the values overplot at the 1:1 line. In a revised version we will adjust towards less transparency.

RC: Appendix B: I tried out the REddyProc package on my MacBook, First I tried to update all packages and after a little tweaking I managed to load REddyProc. Following the example went very smooth until running the function `sEstUStarThresholdDistribution()` where I got the message "Error: could not find function "sEstUStarThresholdDistribution". This is probably a minor trivial issue in my implementation that can be solved.

AC: Thanks for noting. `sEstUStarThresholdDistribution` is a method of the EddyProc class, not a function, and is called as in example B2. In a revised version we

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will update the line in B5 to explicitly include the class:
`EddyProc.C$sEstUStarThresholdDistribution(...)`.

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