Reproducible Quality Checking of Eddy Covariance Data with R Software Package eddyczechr

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It is well known that in order for eddy covariance (EC) to provide reliable flux estimates it is required that the underlying assumptions of the method are met. Post-processing software provides users with variety of statistics extracted from high frequency data that can be used for quality checking (QC). Here we present new R software package eddyczechr that facilitates QC tasks and we report on the results obtained for different site-years from Czech Carbon Observation System (CzeCOS).

The eddyczechr package allows to use already predefined tests or filters and to introduce new ones for site-specific problems. It also introduces effective naming strategy that associates flag names with appropriate fluxes (momentum, sensible heat, latent heat and CO_2 fluxes supported) and therefore simplifies their incorporation to composite flag. In combination with proposed standard QC workflow this approach leads to reproducible QC results. Very important part of the package is also tools for data visualisation. Plotting of fluxes together with meteorological data time series makes identification of problems easier while QC summary plots evaluate the importance of each QC flag. Important features of the package are also unit conversions, data aggregation and plotting of gap-filled and partitioned fluxes in different time scales. This bridges the current gap in R environment EC data processing chain and together with already existing software provides the capabilities for computation of yearly budgets from post-processed halfhourly data.

Application of the QC scheme on CzeCOS data demonstrates that data quality can differ among sites due to local micrometeorological conditions despite the fact that the site setup and instrumentation are similar. Also year to year differences in data quality can be observed even when problems with instruments are not considered. To conclude, eddyczechr is a reliable tool for flagging compromised or outlying EC fluxes.