fluxible: an R package to process ecosystem gas fluxes from closed-loop chambers in an automated and reproducible way

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A proxy for ecosystem balance

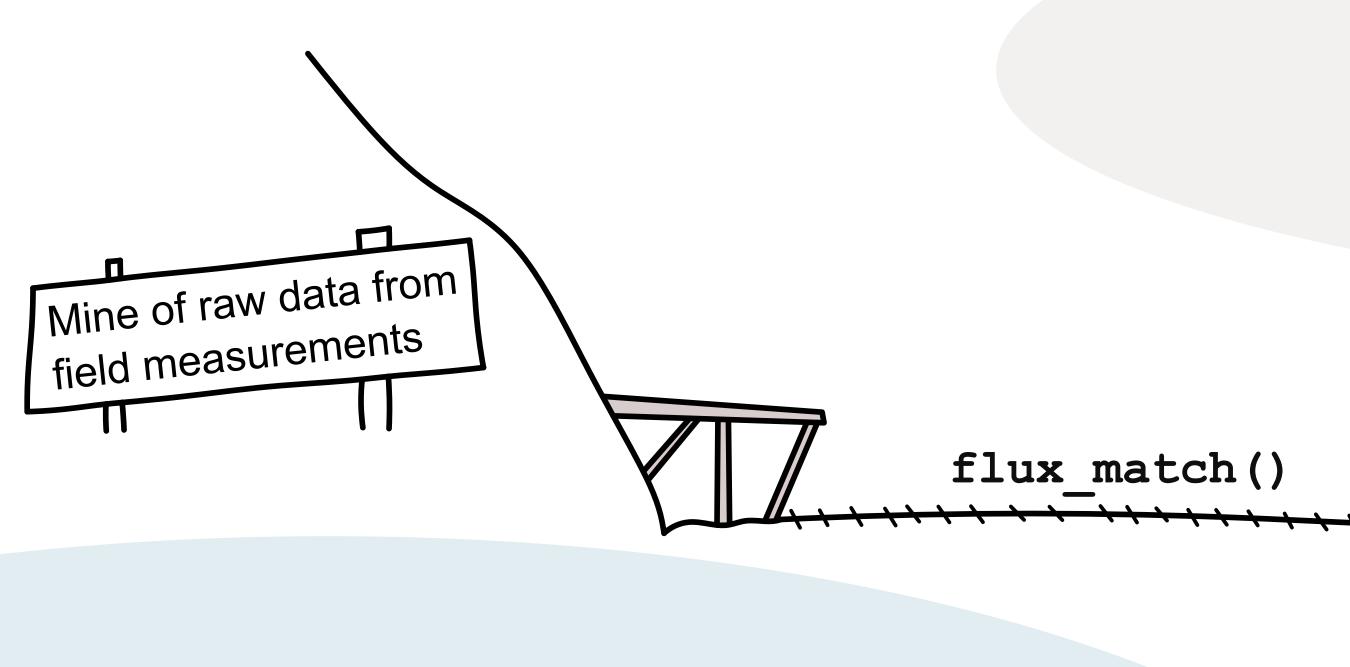
IIUXID

Troll of cherry

picking

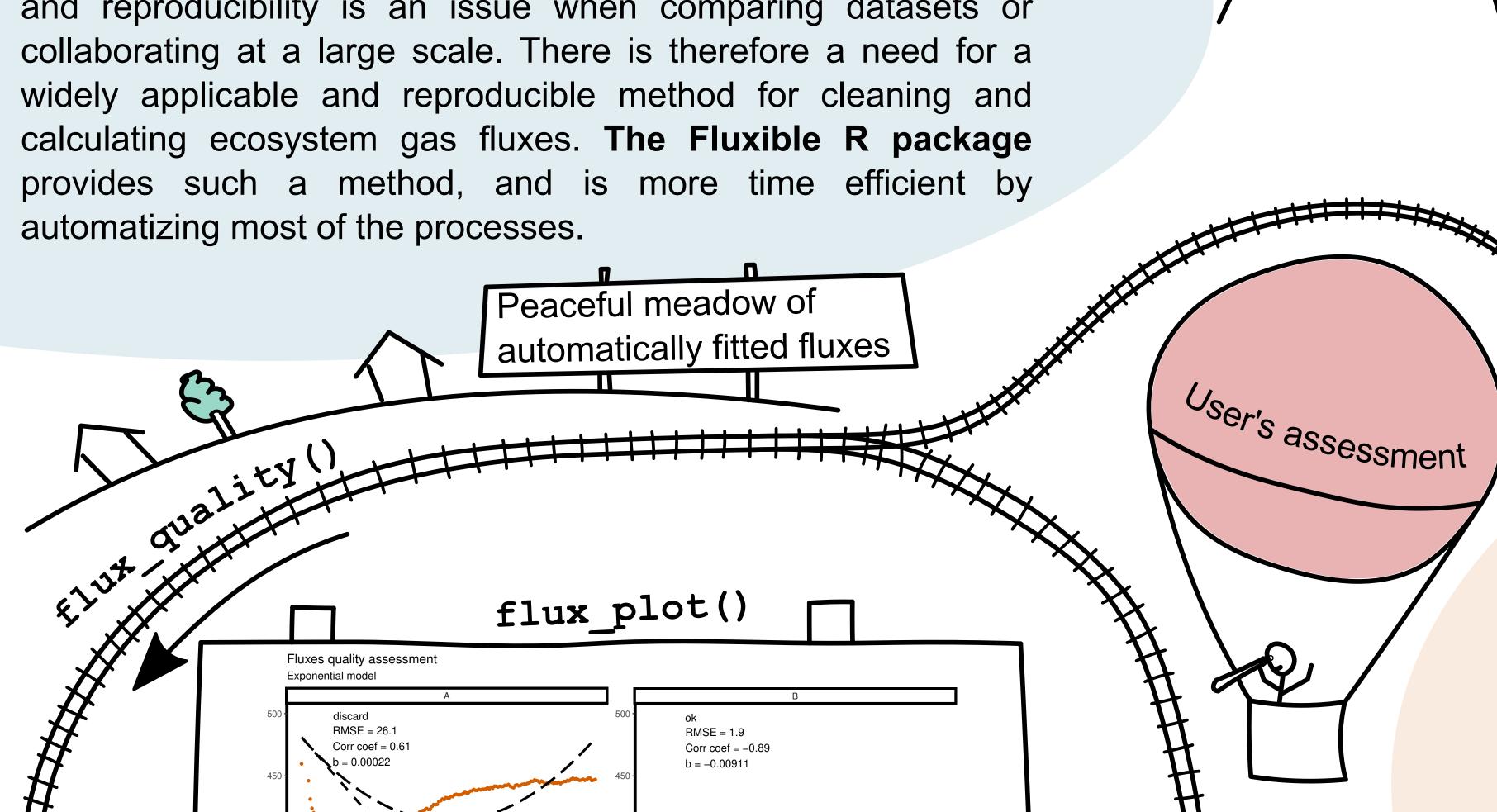
fluxID

Ecosystem gas fluxes allow to measure the balance of an ecosystem in a non destructive way. In particular, carbon fluxes measurements are used to assess ecosystem carbon storage. They are widely used to study the effects of global changes on ecosystem functioning. These data are crucial to understand ecosystem responses to future climate, compare landscapes and biomes, and to train land surface models.



The need for reproducibility

Gas fluxes are calculated data from measured changes in gas concentration over time. These calculations typically involve manual steps or user-prompted decisions, which is not reproducible and may be prone to bias. This lack of homogeneity and reproducibility is an issue when comparing datasets or automatizing most of the processes.





Dangerous mountains of

manual flux modelling

Non reproducible

- Time consuming

flux match attribute meta data and unique ID to each measurement

Avalanche³

overwhelm

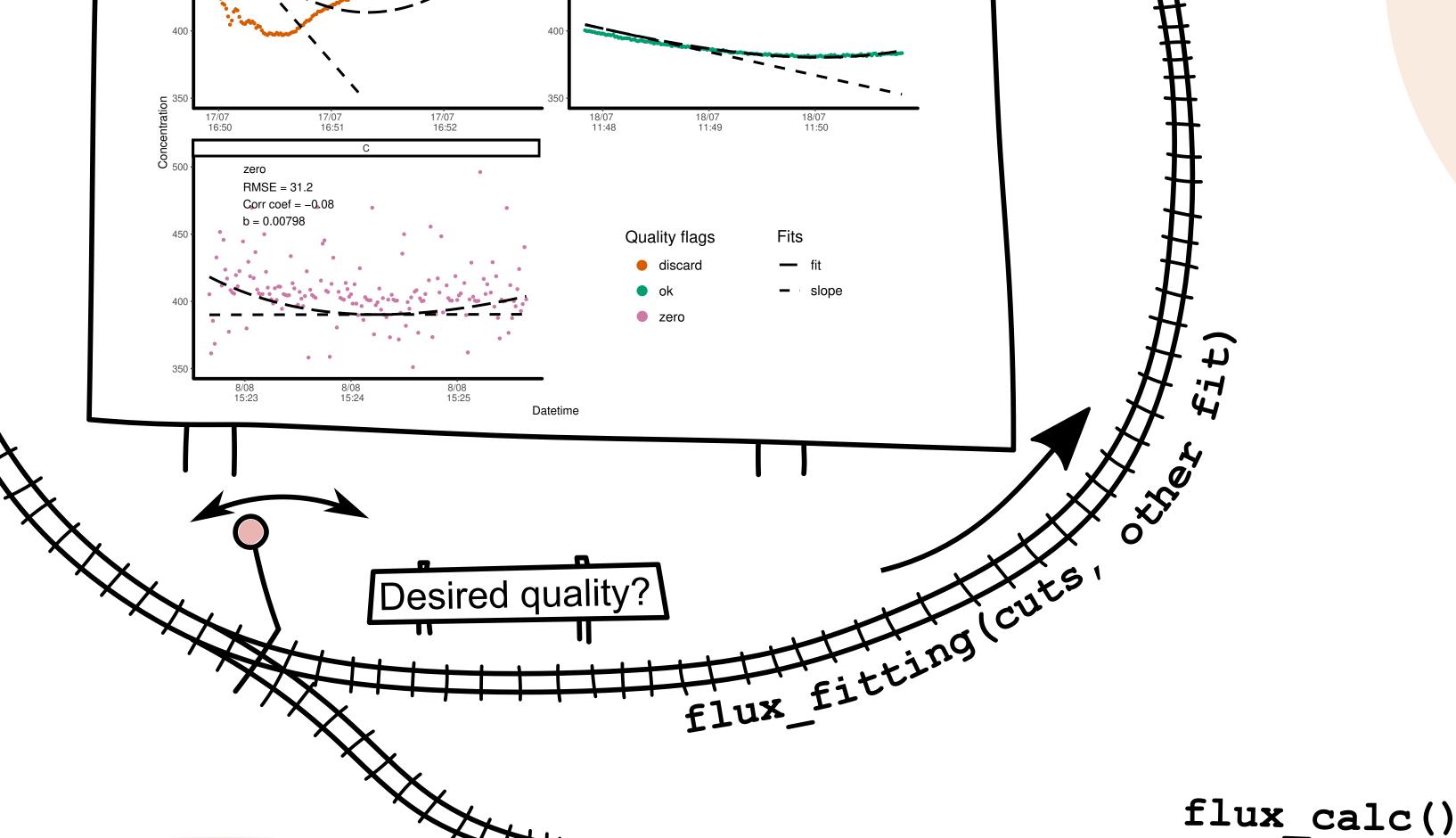
of data

flux_fitting fit a model (linear, exponential or quadratic) to the data and obtain the slope for each flux

flux_quality obtain diagnostics on the fits quality

flux plot visually assess and check the fits

flux_calc calculate the fluxes



Supporting infrastructure

wet air correction flux drygas

flux_flag count summarises quality flags

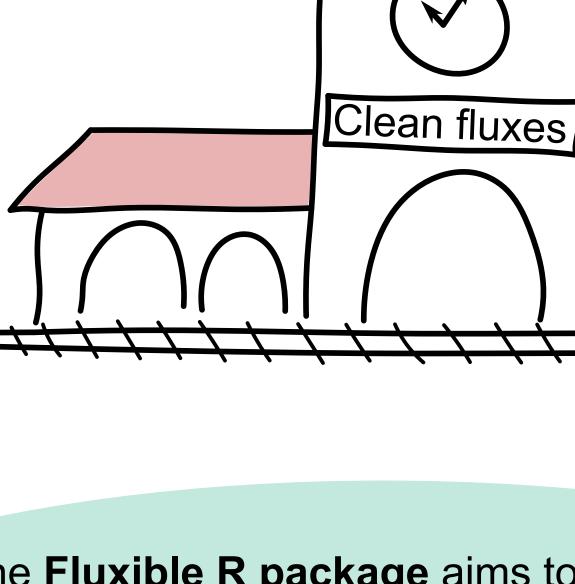
> difference between paired fluxes flux diff light response curves for CO₂ flux lrc

> > fluxes

imports LI-COR gas analysers licoread R

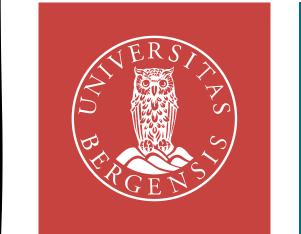
raw data in R as fluxible-friendly package

dataframe

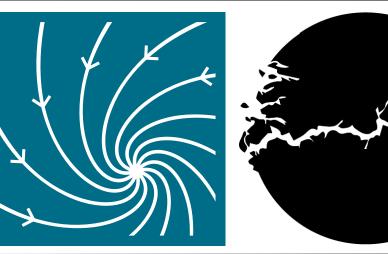


The Fluxible R package aims to:

- bridge the reproducibility gap in the cleaning method of raw field measured flux data
 - increase compatibility between datasets
- provide an efficient, flexible and user-friendly workflow.







BETWEEN THE FJORDS

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References: Bastviken et al., "Critical method needs in measuring greenhouse gas fluxes." 2022; Zhao et al., "On the Calculation of Daytime CO2 Fluxes Measured by Automated Closed Transparent Chambers." 2018; Kutzbach et al., "CO₂ flux determination by closed-chamber methods can be seriously biased by inappropriate application of linear regression." 2007. Acknowledgments: M Kerdoncuf (troll), J Knutson (avalanche), M Zwier (inkscape help), Between the Fjords lab (feedback and

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Analysis