ChamberFlux (working title)

An adapted version of the R package "RespChamberFlux" to calculate gas fluxes measured with the PICARRO system (SUBTITLE TO BE ADAPTED)"

authors

6/7/24

Introduction

Background and Problem setting

- Broad overview about gas flux measurements in general
- Quickly introduce Picarro system

Time intervals from picarro are irregular.

Aims and structure of this article

In this article, we present *[NEWPACKAGENAME]*, which is an adapted version of the R (R Core Team (2024)) package *RespChamberFlux* (Wutzler and Priego (2024)), suited for the use with the *Picarro* system (Reference) that measures the flux of various gases, including CO2, H2O, N2O, NH3, AND CH4.

RespChamberFlux (Wutzler and Priego (2024)) has been successfully used in the past for the XXXX Chamber system (ADD REFS), which measures CO2 and H20. Advantages of the package are its ability to….

We demonstrate the use of the package for Picarro measurement data from a case study located in Córdoba, Spain (ADD STUDY SITE FIGURE).

Methodology

All calculations were done using R Statistical Software version 4.4.0 (R Core Team (2024)).

We extended the package *RespChamberFlux* (Wutzler and Priego (2024)) by various functionalities: - For selected coordinates, additional environmental parameters are automatically

downloaded using the packages “openmeteo” (Pisel (2023)) and “elevatr” (Hollister et al. (2023)).

Results

Case study: Data Jesus

Overview of the measurement data

First, the time series of the Picarro measurement data on 31/05/2022 for the study site XXX (REF to figure studysite) is shown (Figure 1).

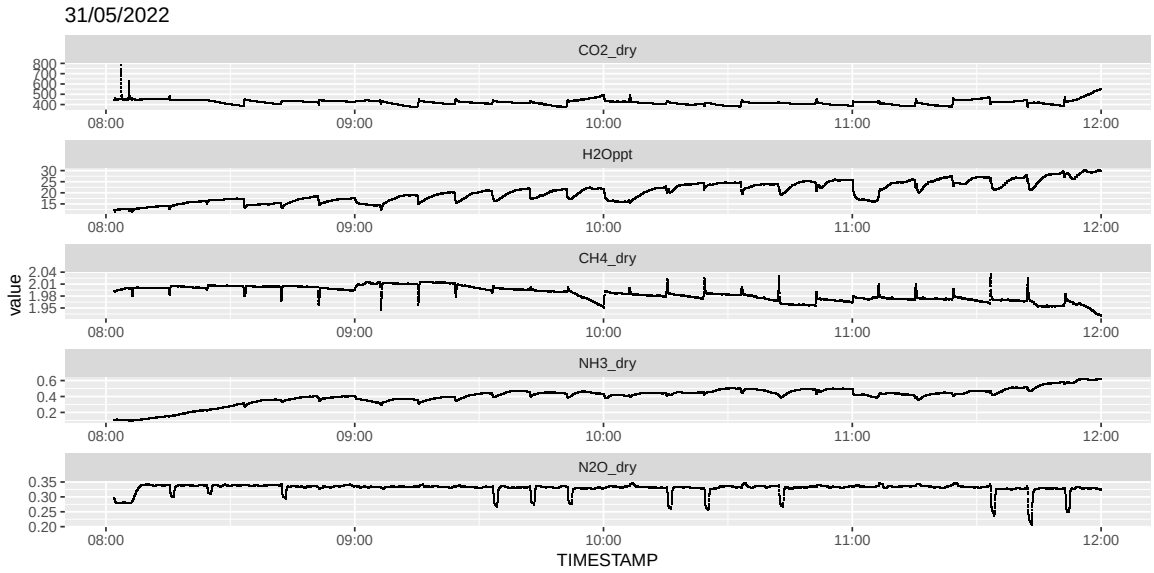


Figure 1: Time series of various gases measured with the Picarro system

The function `subsetContiguous`from *RespChamberProc* subsets the entire time series into chunks that are identified by an index variable, here termed “Collar”.

The function `calcClosedChamberFlux` from *RespChamberProc* calculates the chamber flux for various gases and estimates the best fit, as shown in Figure 3 for chunk ‘4’

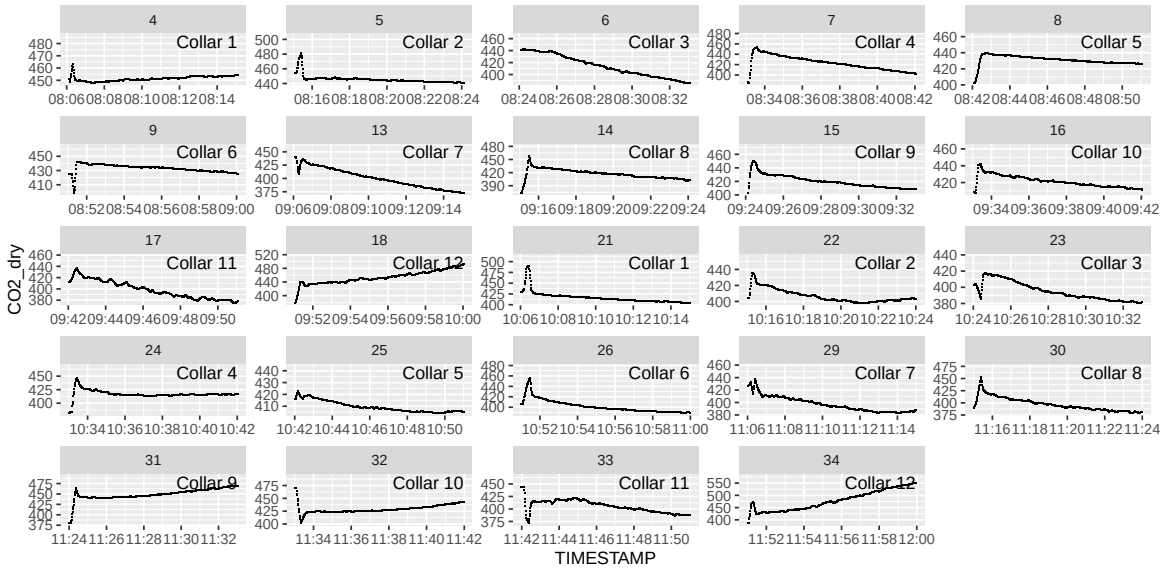


Figure 2: Compilation of various chunks that were created from the CO2 time series

Discussion

Conclusions

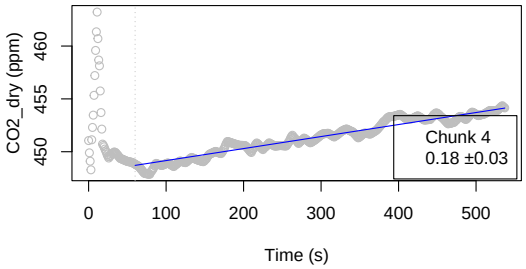
References

Hollister, Jeffrey, Tarak Shah, Jakub Nowosad, Alec L. Robitaille, Marcus W. Beck, and Mike Johnson. 2023. *Elevatr: Access Elevation Data from Various APIs*. https://doi.org/10.5281/zenodo.8335450.

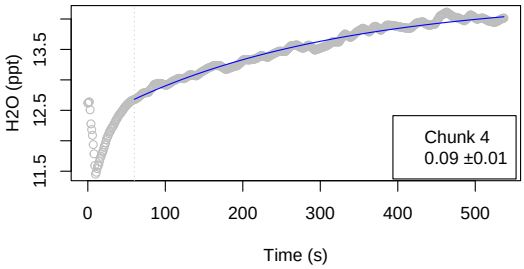
Pisel, Tom. 2023. *Openmeteo: Retrieve Weather Data from the Open-Meteo API*. https://CRAN.R-project.org/package=openmeteo.

R Core Team. 2024. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

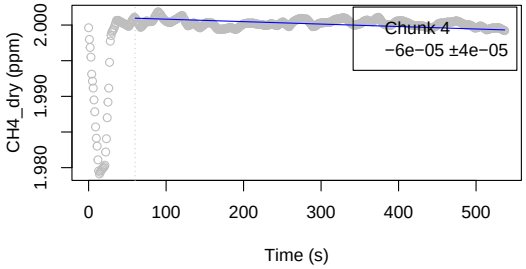
Wutzler, Thomas, and Oscar Perez Priego. 2024. *RespChamberProc: Processing Data from Respiration Chambers*. https://github.com/bgctw/RespChamberProc.



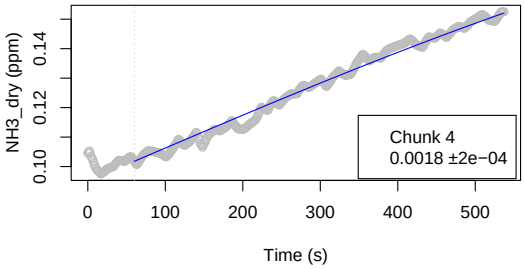
(a) CO2



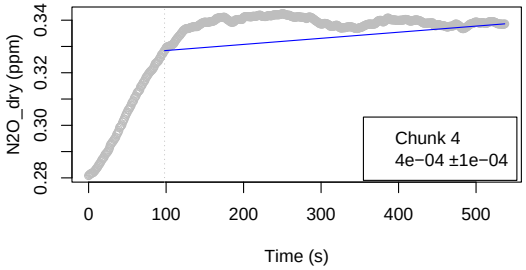
(b) H2O



(c) CH4



(d) NH3



(e) N2O

Figure 3: Fitted trends for a selected chunk