

QA/QC Meeting 19 Jun 2025

Participants: LH, ZG, SB, LS, YZ, LA, HSC, FLT, YW (9)

ALL SITES Data sharing: FLUXNET uploads 2025

including uploads in 2025, FLUXNET new list:

- GAW: Fluxnet and meteor 2016-2024, incl. 2025
- CHA: Fluxnet and meteor 2005-2024, incl. AGD and CHA 2017-2024 (Zürcher)
- DAV: Fluxnet and meteor 2007-2024, incl. CHA 2016-2025, 2026-2027
- FOR: Fluxnet 2020, CHA 2021-23 and meteor 2024
- LAE: Fluxnet and meteor 2016-2024, incl. CHA 2017-2024
- LAE: Fluxnet and meteor 2016-2024, incl. CHA 2017-2024, 2025-2026, and CHA 2027
- LAE: Fluxnet and meteor 2016-2024, incl. AGD and LAE

Site	Fluxnet	Meteor	AGD	CHA
GAW	2016-2024	2016-2024		
CHA	2005-2024	2005-2024	2017-2024	2017-2024
DAV	2007-2024	2007-2024	2016-2025	2016-2027
FOR	2020	2021-23		2024
LAE	2016-2024	2016-2024	2017-2024	2017-2024
LAE	2016-2024	2016-2024	2017-2024	2017-2024, 2025-2026, and CHA 2027
LAE	2016-2024	2016-2024	2017-2024	2017-2024, 2025-2026, and CHA 2027



APPENDIX

Including uploads in 2025, FLUXNET now has:

- **AWS:** fluxes and meteo 2006-2024, excl. 2012
- **CHA:** fluxes and meteo 2005-2024, incl. N2O and CH4 2012-2022 [Overview](#)
- **DAV:** fluxes and meteo 1997-2024, incl. CH4 2016-2017, 2020-2023
- **FOR:** fluxes (N2O, CH4, CO2+?) and meteo 2024
- **FRU:** fluxes and meteo 2005-2024
- **LAE:** fluxes and meteo 2004-2024
- **OE2:** fluxes and meteo 2004-2024, incl. CH4 and N2O 2022-2023, and CH4 2018
- **TAN (Tnk):** fluxes and meteo 2024, incl. N2O and CH4

Available Level-1 Fluxes

• For info about the different flux levels, see [Flux Processing Chain](#)

UPDATED

also for other sites

COLUMNS PRINT EXCEL CSV COPY PDF

Show All entries Search:

↓ Site & Year	SA	GA	CO2	H2O	N2O	CH4	Current Version	EFDC Version	EFDC Upload	EFDC Calcs	Details
CH-CHA 2005	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2006	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2007	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2008	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2009	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2010	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2011	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2012	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2013	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2014	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2015	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2016	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2017	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2018	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2019	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2020	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2021	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2022	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2023	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	UPDATE	Show
CH-CHA 2024	R350	IRGA75	CO2	H2O			FF-202503	FF-202503	20 Apr 2025	NEW	
CH-CHA QCLGR 2012	R350	QCL			N2O	CH4	FF-202501	FF-202501	28 Feb 2025	UPDATE	Show
CH-CHA	R350	QCL			N2O	CH4	FF-202501	FF-202501	28 Feb 2025	UPDATE	Show

General Info

- **Attendance:** If you are (Tech-)SRP, please attend QA/QC meetings or tell LH if you can't, needed for planning of the meetings.
- **Short statement:** SRP & Tech-SRP: please prepare short statement about your site and post it on the slide together with the plot(s). You can also extend the already available text snippet(s) from previous meetings. (max. 2 sentences)
- **Purpose:** The purpose of QA/QC meetings is to check on current, incoming data. SRPs choose specific issues we should look at together and discuss in the group. Fluxes are checked if the respective SRP wishes to do so.
- **Variables:** There is a list of known variable abbreviations that you can use in case you wonder what an abbreviation means: [Variable Abbreviations](#)
- **Check of EC raw data files:**
 - Recommended check for SRPs and T-SRPS: take a look at EC raw data files and check if they look OK
 - Current EC raw data files are automatically converted to ASCII each day (done by the Python script bico)
 - Files and their plots can be found here, e.g. for CH-LAS:
`gl-processing\CH-LAS_Lae-Subcanopy\20_ec_fluxes\2022\raw_data_ascii`
- **Weekly flux calculations on the RDS:**
 - Please calculate fluxes and check them once per week, or more often if you wish to do so.
 - If you cannot calculate the fluxes, try to find a substitute, e.g. LH.
 - Please move your Level-0 results from the RDS to the respective Level-0 folder.
- **RDS folder:** The folder P:\Flux\RDS_calculations is a temporary folder. Please move Level-0 flux calculations (preliminary fluxes) to the Level-0 folder on gl-processing. For example, for CH-CHA move files to Z:\CH-CHA_Chamau\20_ec_fluxes\2022\Level-0 (gl-processing is mounted as drive Z in this example).
- The RDS now has access to the database. This means that we now have a shared working environment where we can run Jupyter notebooks.
- **FluxCoffee:** separate meetings to discuss data related issues, e.g. flux processing and technical issues, started and will continue to take place. There are extensive notes available in the Data/FluxCoffee group on Microsoft Teams.
- **List of QA/QC Meeting dates:** [QA/QC Meetings 2024](#)

Webcam | CH-AWS



Webcam | CH-CHA | GF4



Webcam | CH-DAV



Webcam | CH-DAV | FF1



Webcam | CH-DAV | FF2



Webcam | CH-DAV | FF3



Webcam | CH-DAV | FF4



Webcam | CH-DAV | FF5



Webcam | CH-FRU



Webcam | CH-LAE



Webcam | CH-OE2



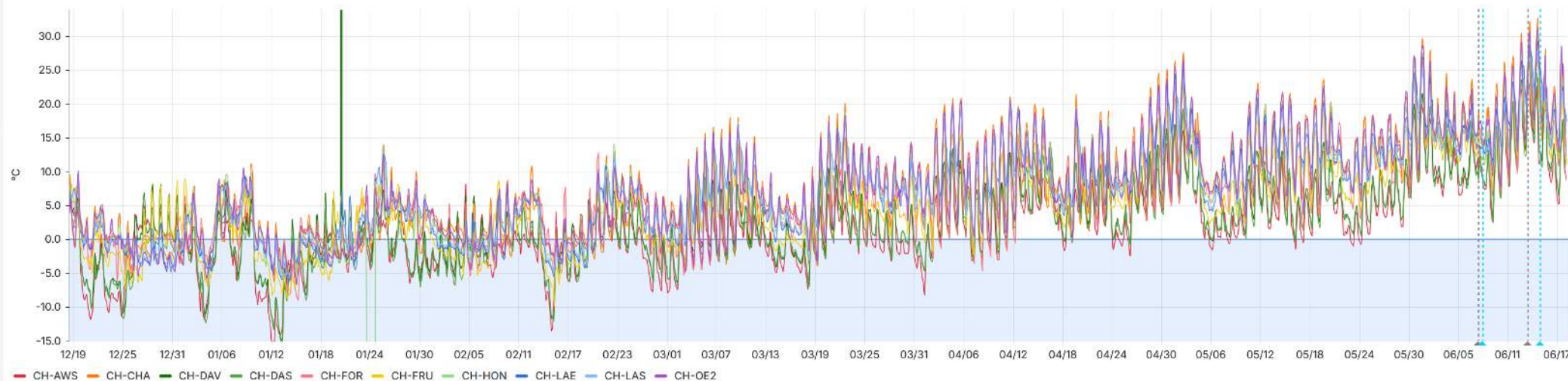
Webcam | CH-TAN



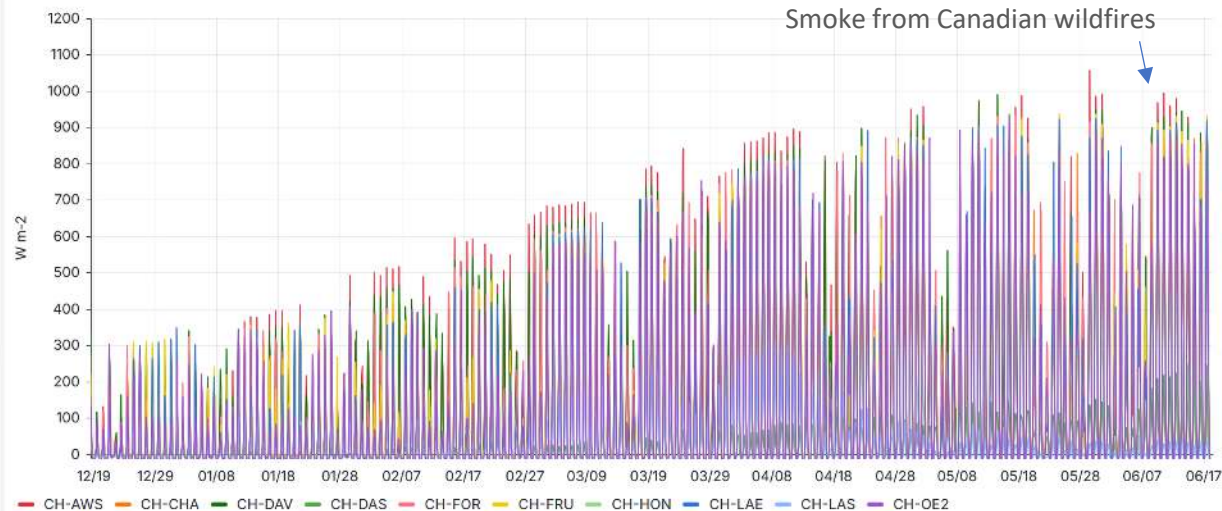
outdated!
Images missing on server

dismantled

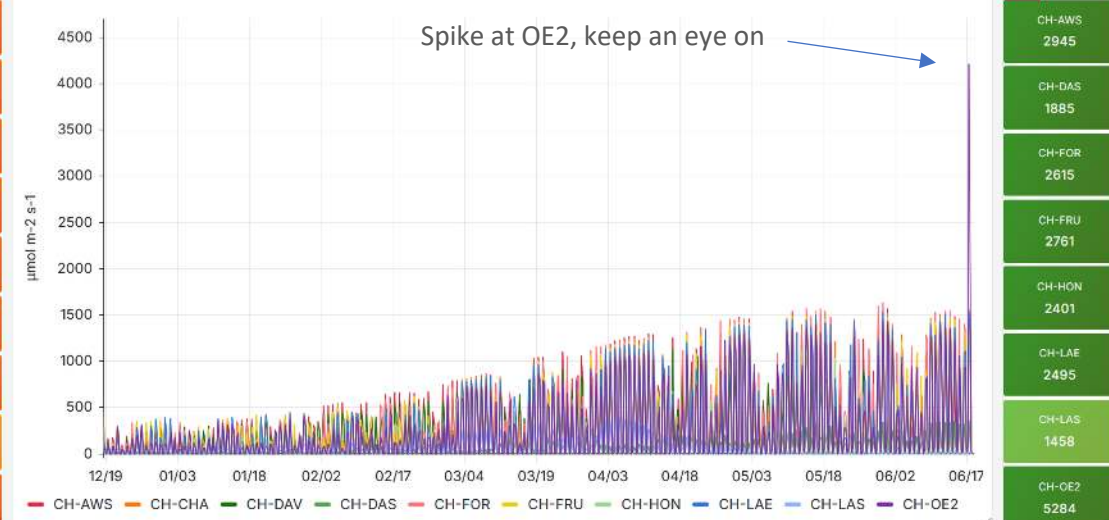
Air Temperature (°C) ♥



Min	Mean	Max
CH-AWS -15.6 °C	CH-AWS 1.9 °C	CH-AWS 24.5 °C
CH-CHA -7.7 °C	CH-CHA 7.2 °C	CH-CHA 33.7 °C
CH-DAV -16.0 °C	CH-DAV 7.9 °C	CH-DAV 7648100.0 °C
CH-DAS -16.2 °C	CH-DAS 2.4 °C	CH-DAS 26.3 °C
CH-FOR -8.6 °C	CH-FOR 6.8 °C	CH-FOR 31.4 °C
CH-FRU -11.2 °C	CH-FRU 5.7 °C	CH-FRU 28.0 °C
CH-HON -100.0 °C	CH-HON 7.6 °C	CH-HON 31.1 °C
CH-LAE -6.4 °C	CH-LAE 7.6 °C	CH-LAE 30.0 °C
CH-LAS -5.9 °C	CH-LAS 7.4 °C	CH-LAS 28.7 °C
CH-OE2 -7.4 °C	CH-OE2 7.5 °C	CH-OE2 39.1 °C

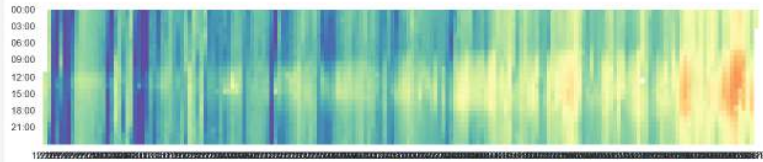
Shortwave Incoming Radiation (W m⁻²)

Max
CH-AWS 1471 W/m²
CH-DAV 1483 W/m²
CH-DAS 933 W/m²
CH-FOR 1276 W/m²
CH-FRU 1209 W/m²
CH-HON 1122 W/m²
CH-LAE 1363 W/m²
CH-LAS 781 W/m²
CH-OE2 1307 W/m²

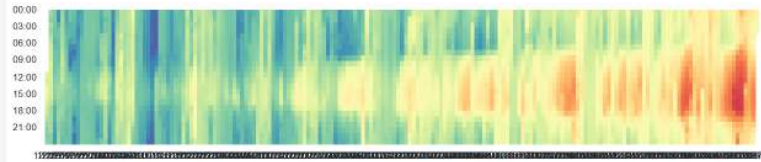
Photosynthetically Active Radiation (μmol m⁻² s⁻¹)

Max
CH-AWS 2945
CH-DAS 1885
CH-FOR 2615
CH-FRU 2761
CH-HON 2401
CH-LAE 2495
CH-LAS 1458
CH-OE2 5284

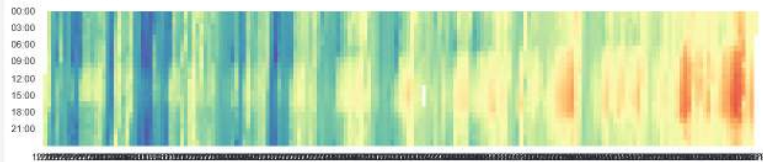
CH-AWS (hourly)



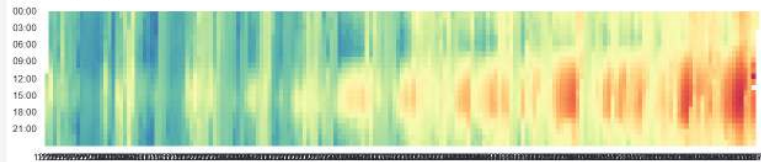
CH-FOR (hourly)



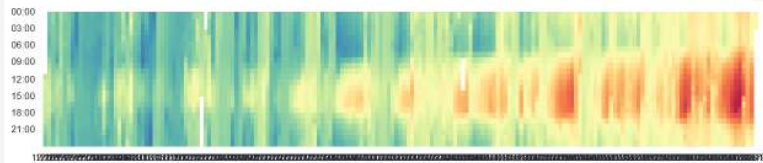
CH-FRU (hourly)



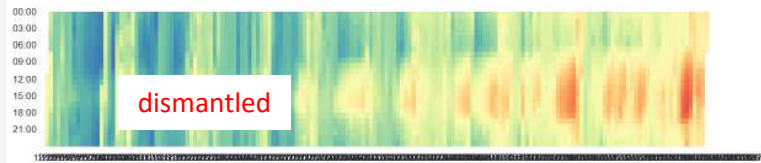
CH-OE2 (hourly)



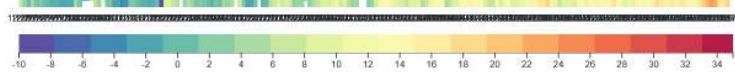
CH-CHA (hourly)



CH-TAN (hourly)



CH-HON (hourly)



CH-DAV (hourly)

Configure your query

Define a data source query that return at least the following fields:

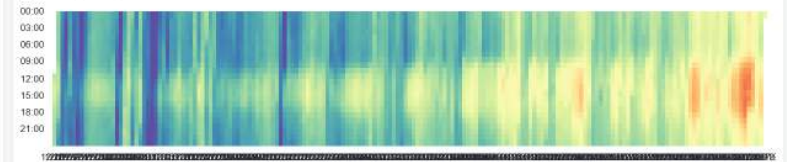
☐ Time

☐ Number

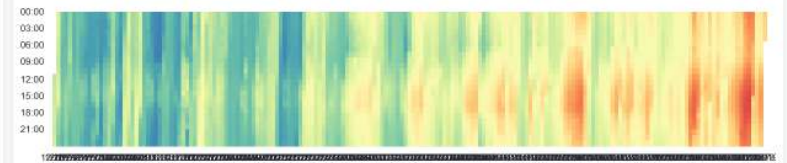
Unknown error

[Read more](#)

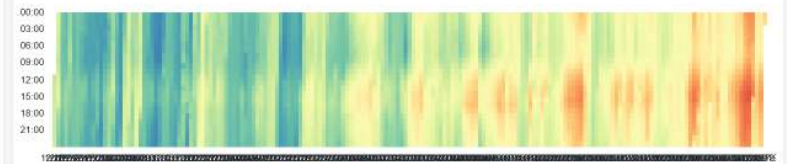
CH-DAS (hourly)

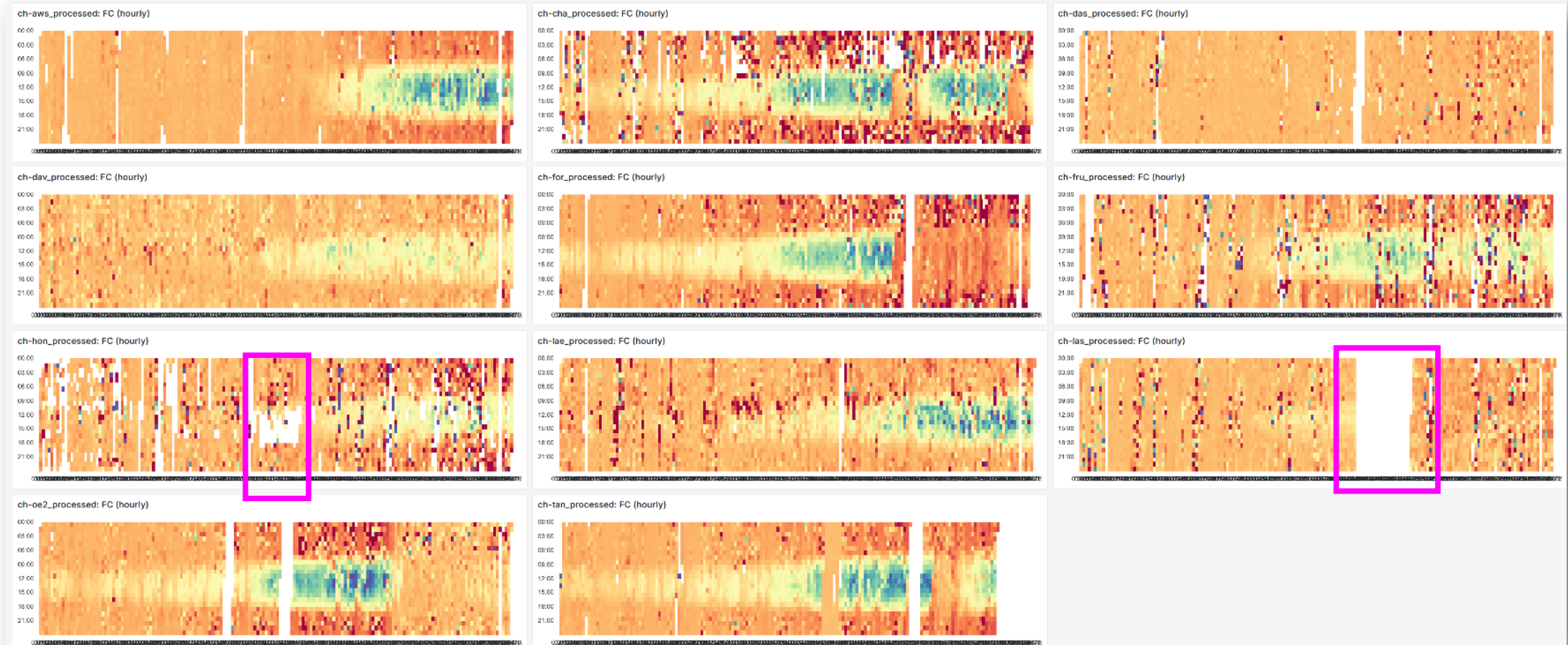


CH-LAE (hourly)



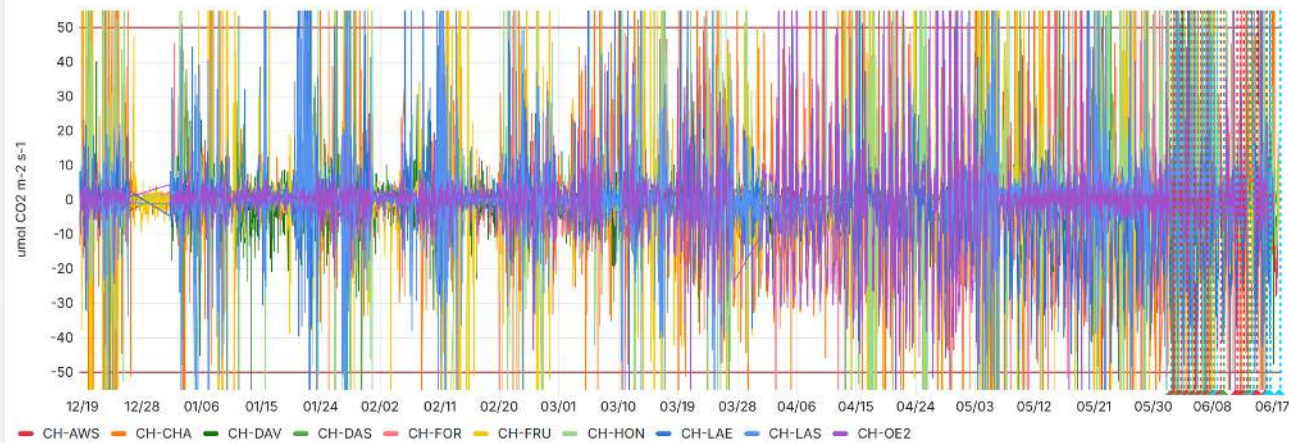
CH-LAS (hourly)



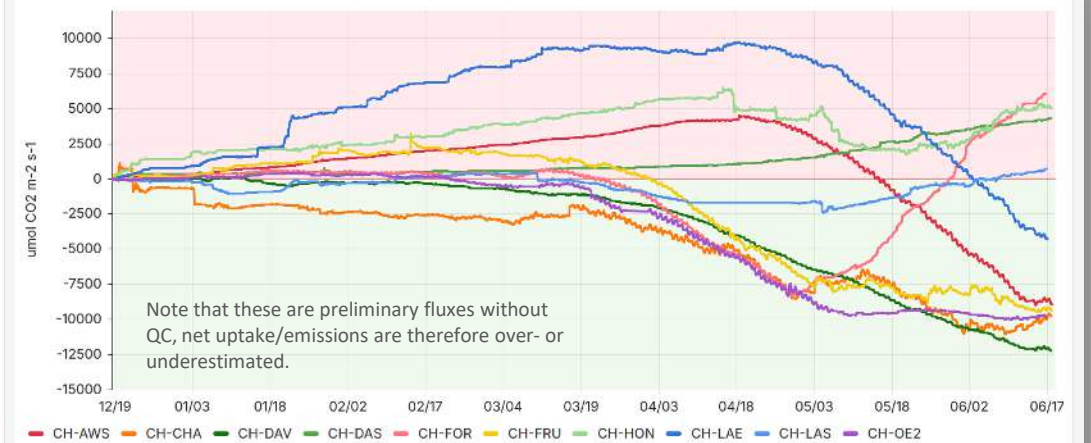


Last 6 months

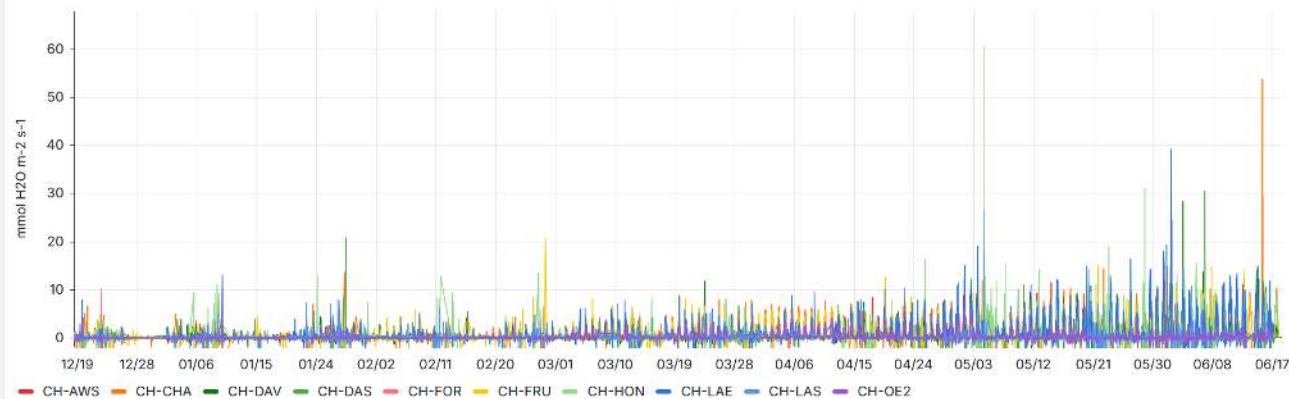
CO₂ Fluxes (Level-0) ❤️



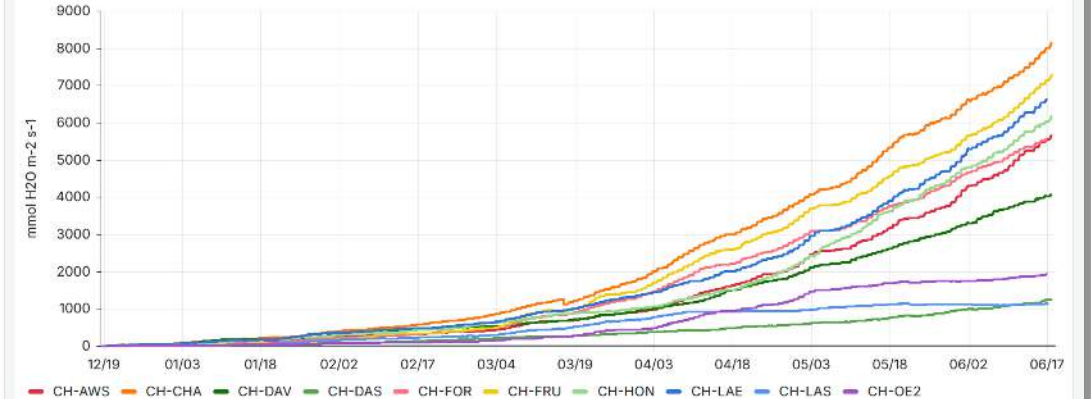
Cumulative CO₂ Fluxes (Level-0)



H₂O Fluxes (Level-0)



Cumulative H₂O Fluxes (Level-0)

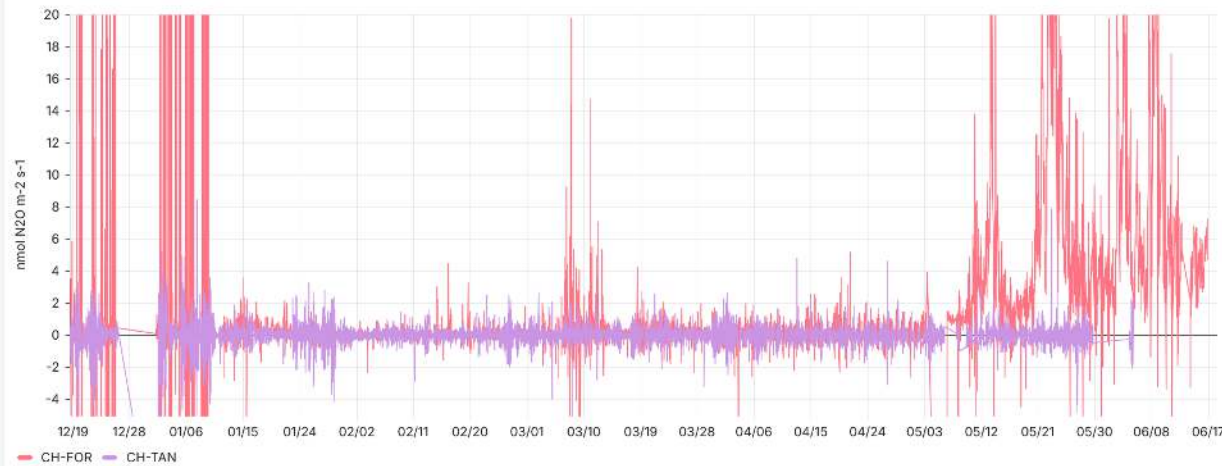


<https://dataviews.swissfluxnet.ethz.ch>

ALL SITES N₂O and CH₄ fluxes

Last 6 months

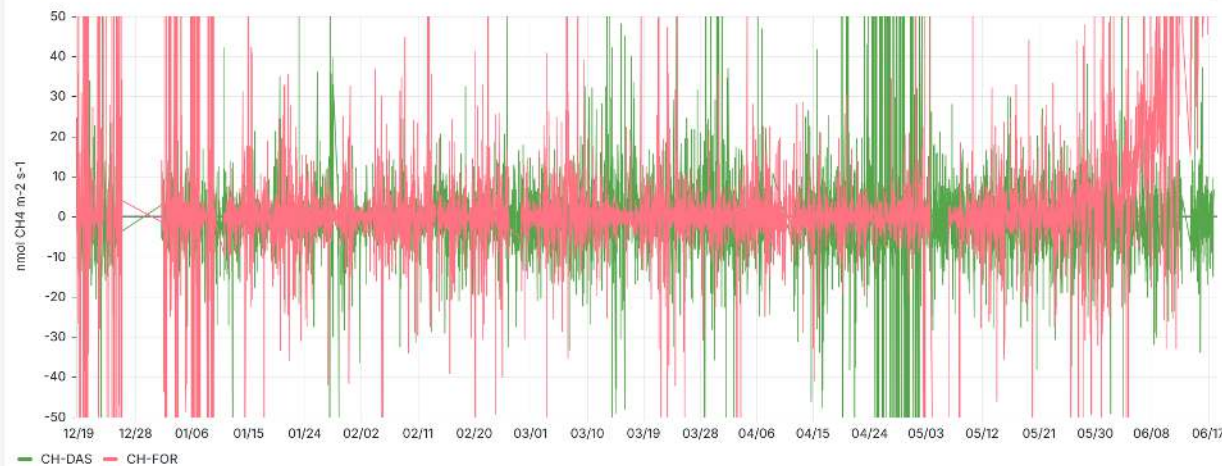
N₂O flux (Level-0)



Cumulative N₂O flux (Level-0)



CH₄ flux (Level-0)



Cumulative CH₄ flux (Level-0)



<https://dataviews.swissfluxnet.ethz.ch>



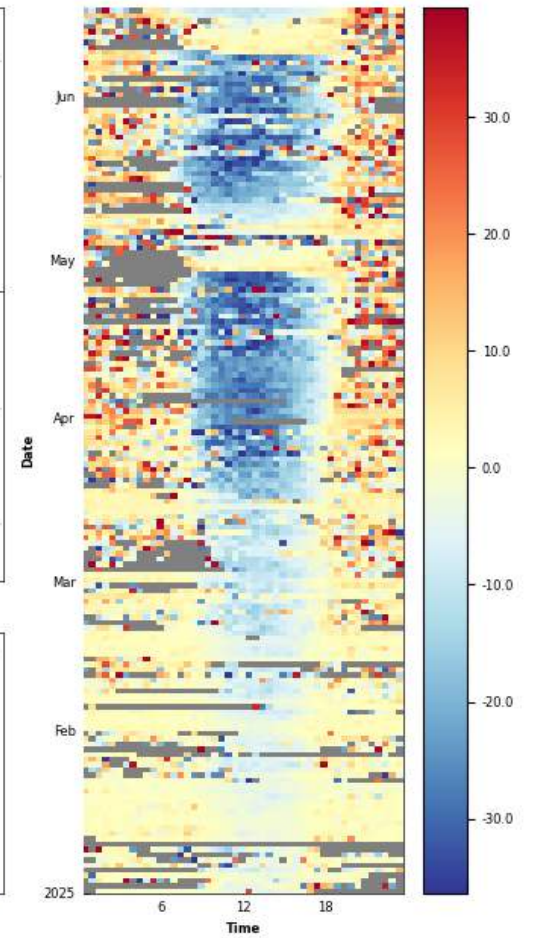
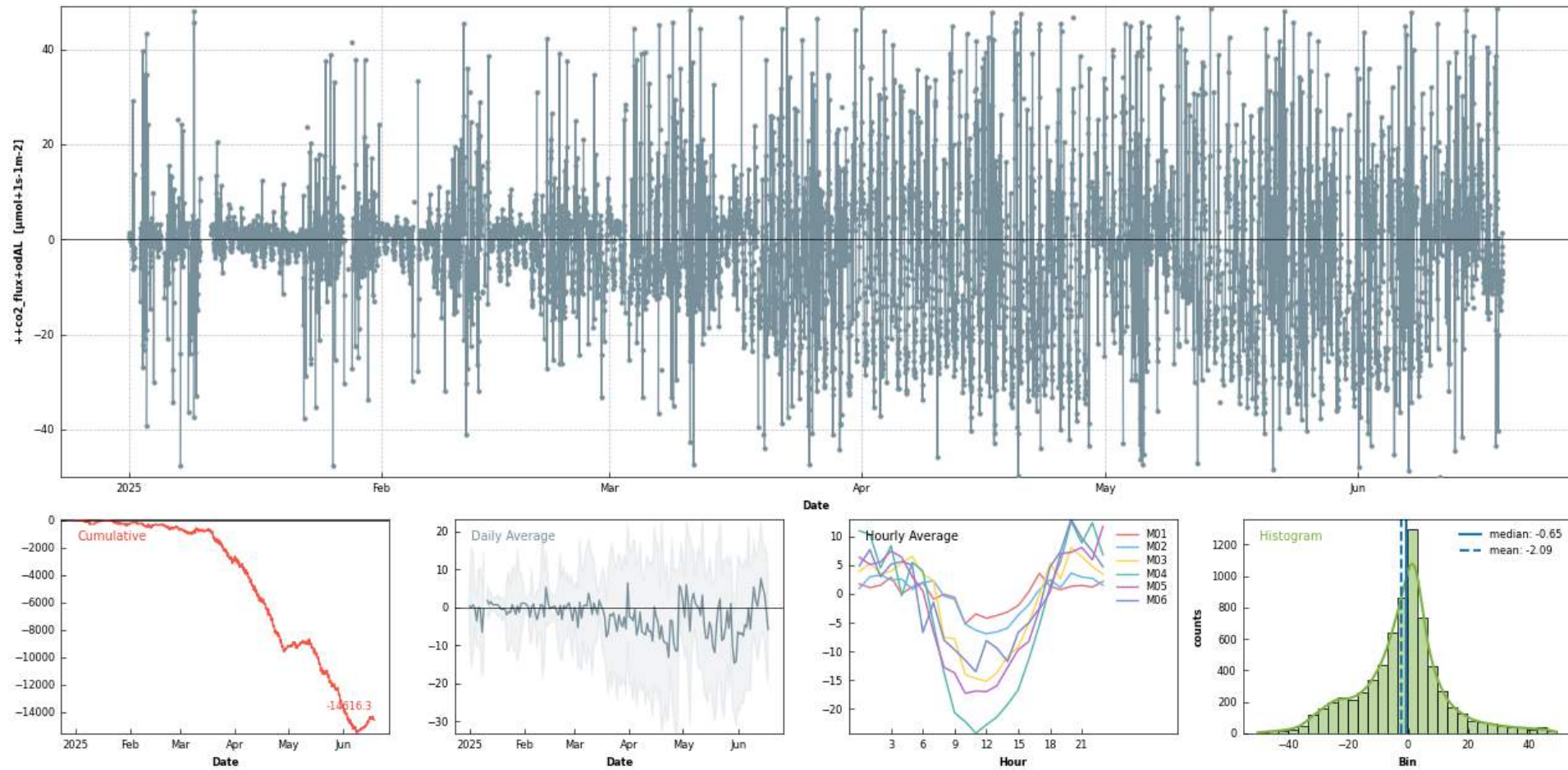
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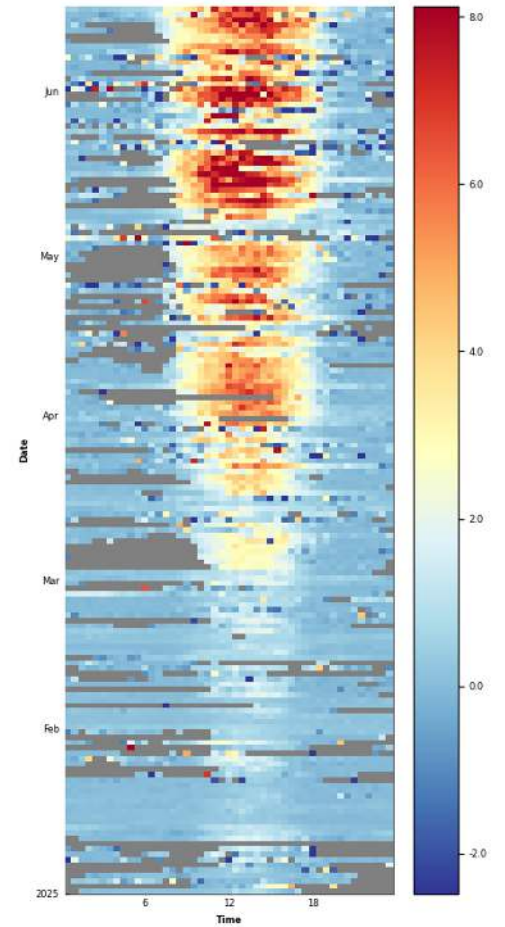
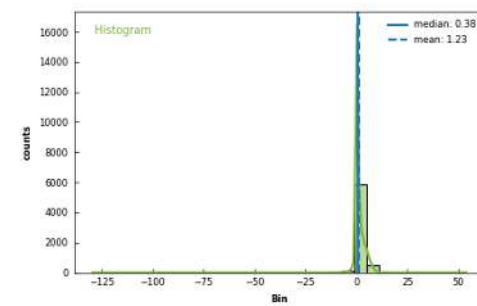
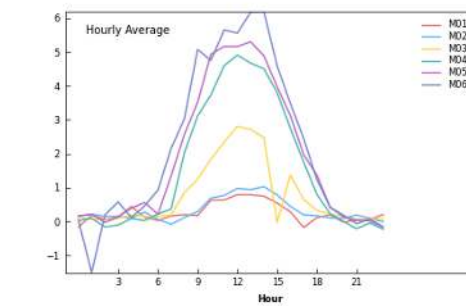
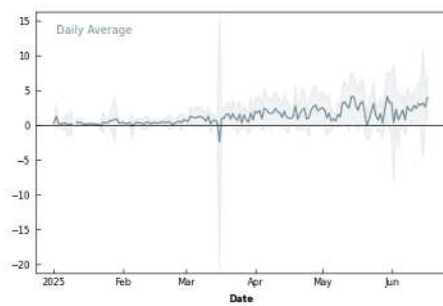
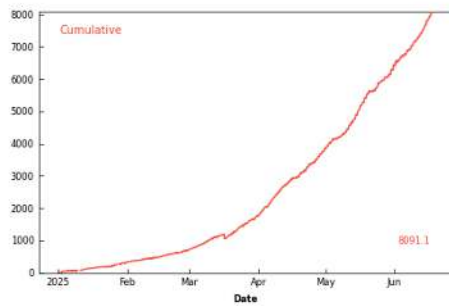
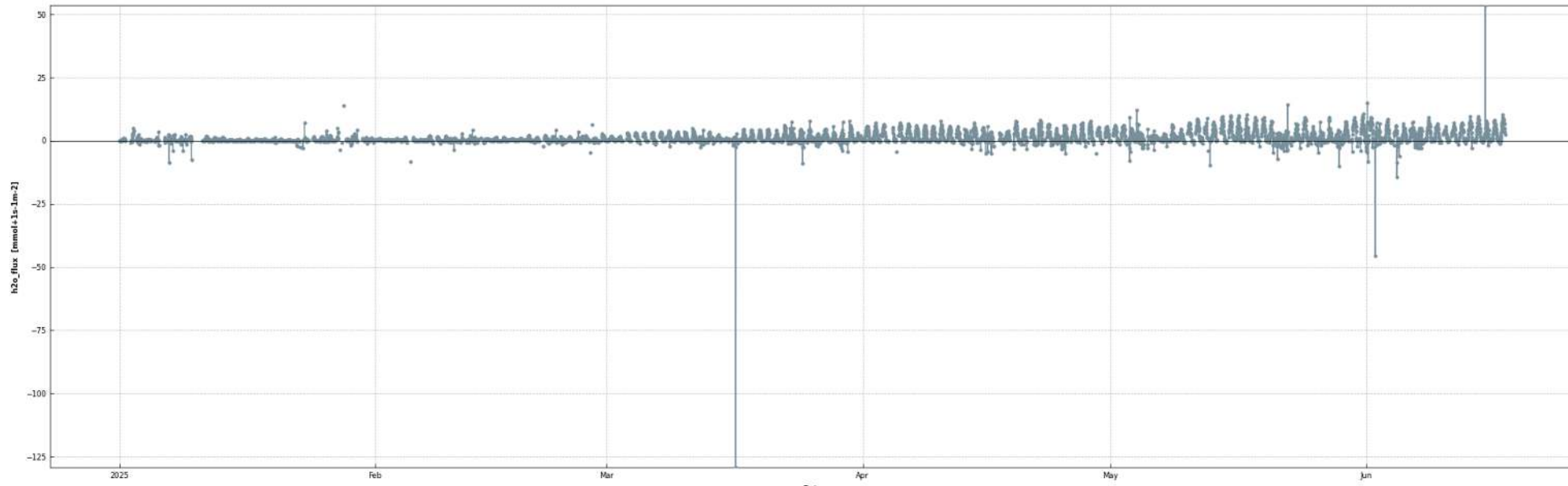


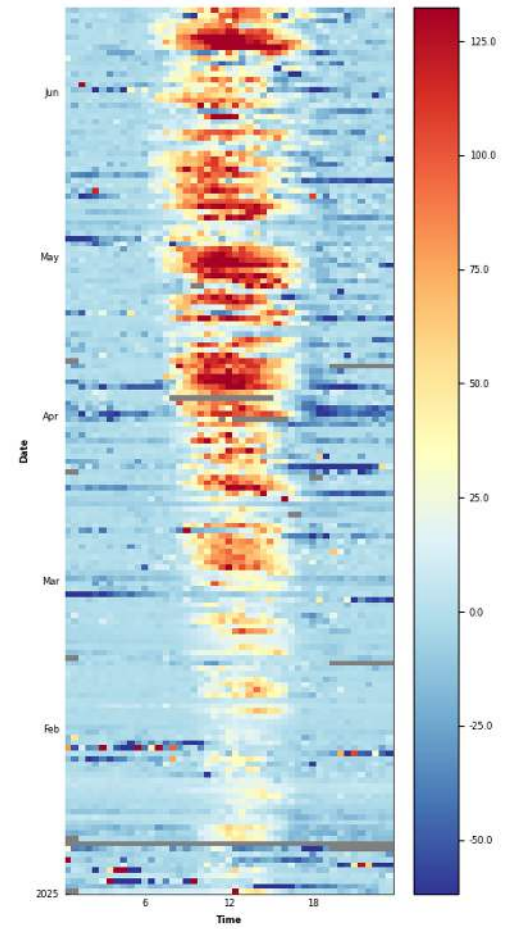
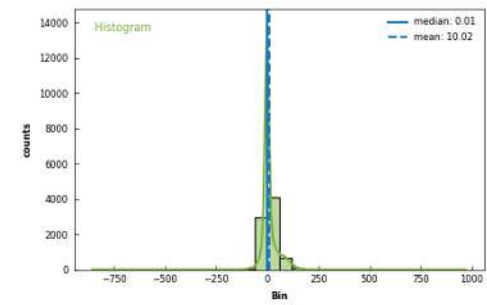
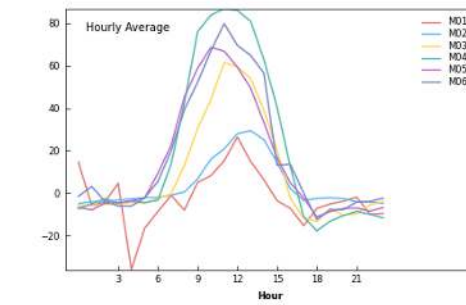
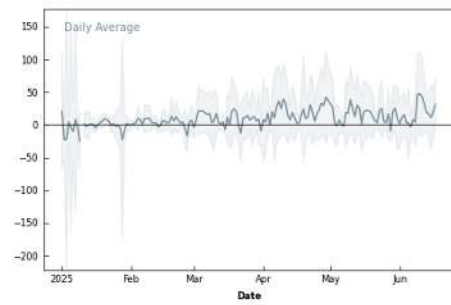
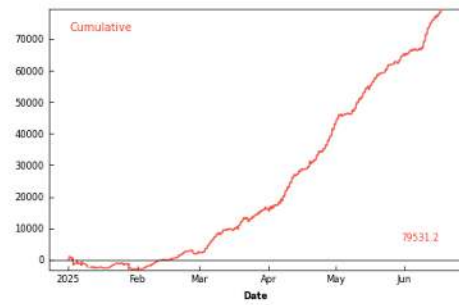
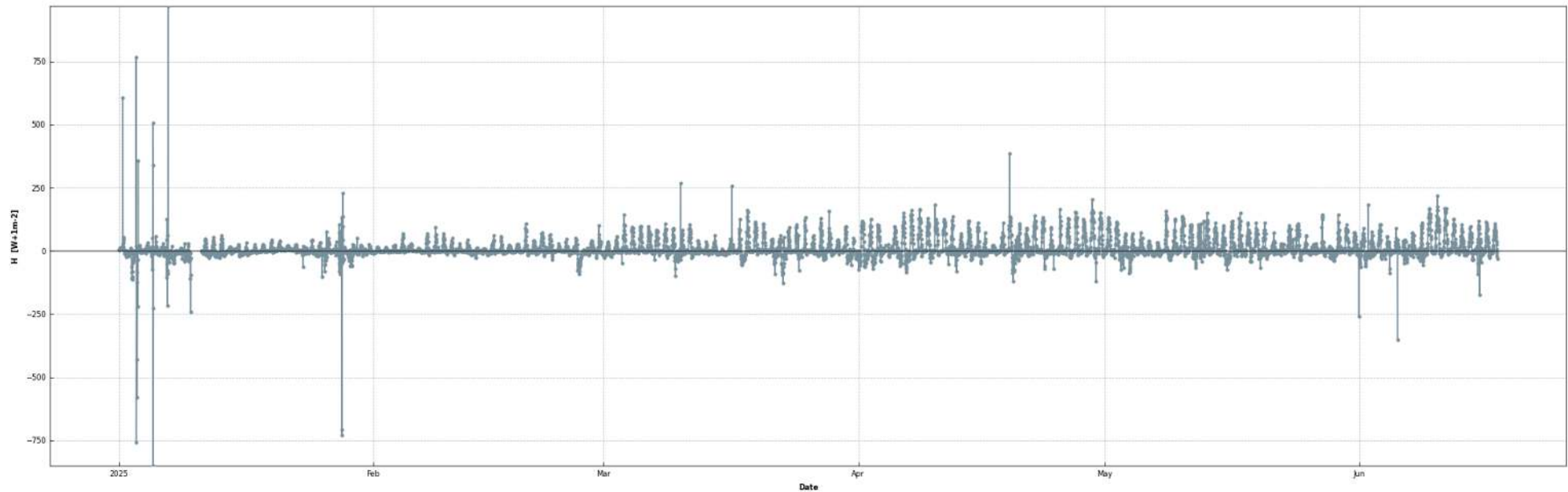
Photo: Lukas Hörtnagl

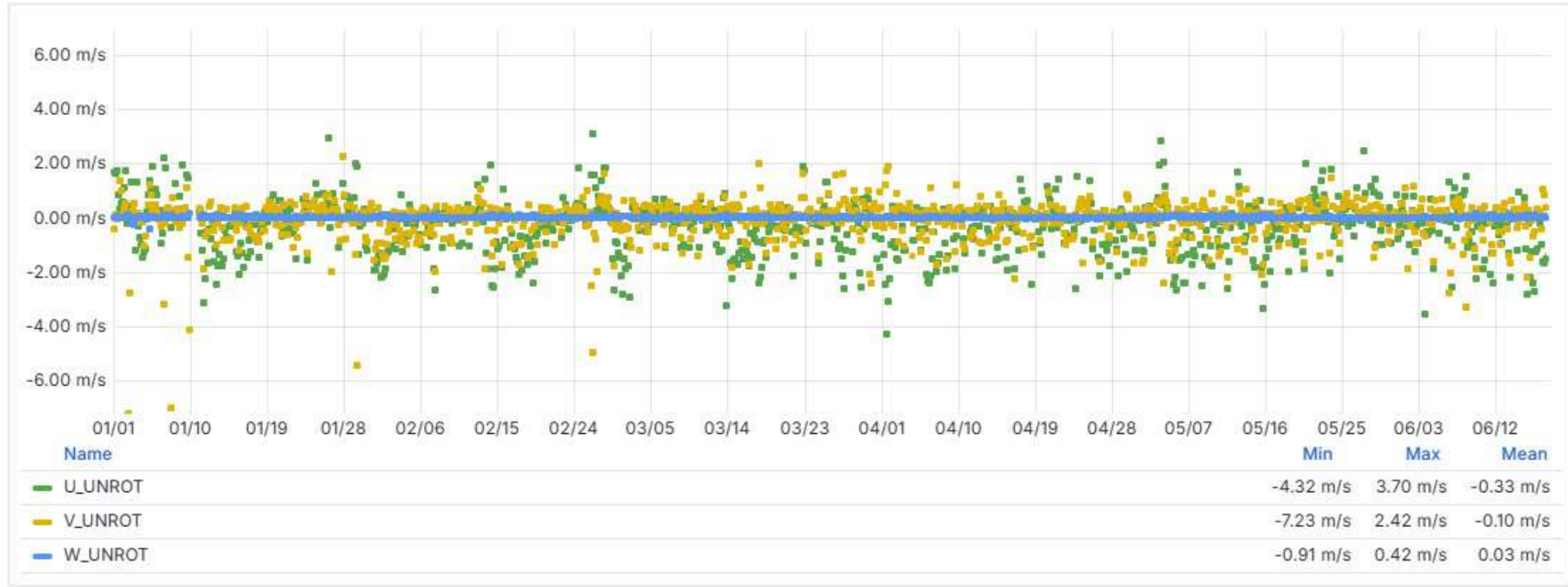


- last mowing: 2025.06.10









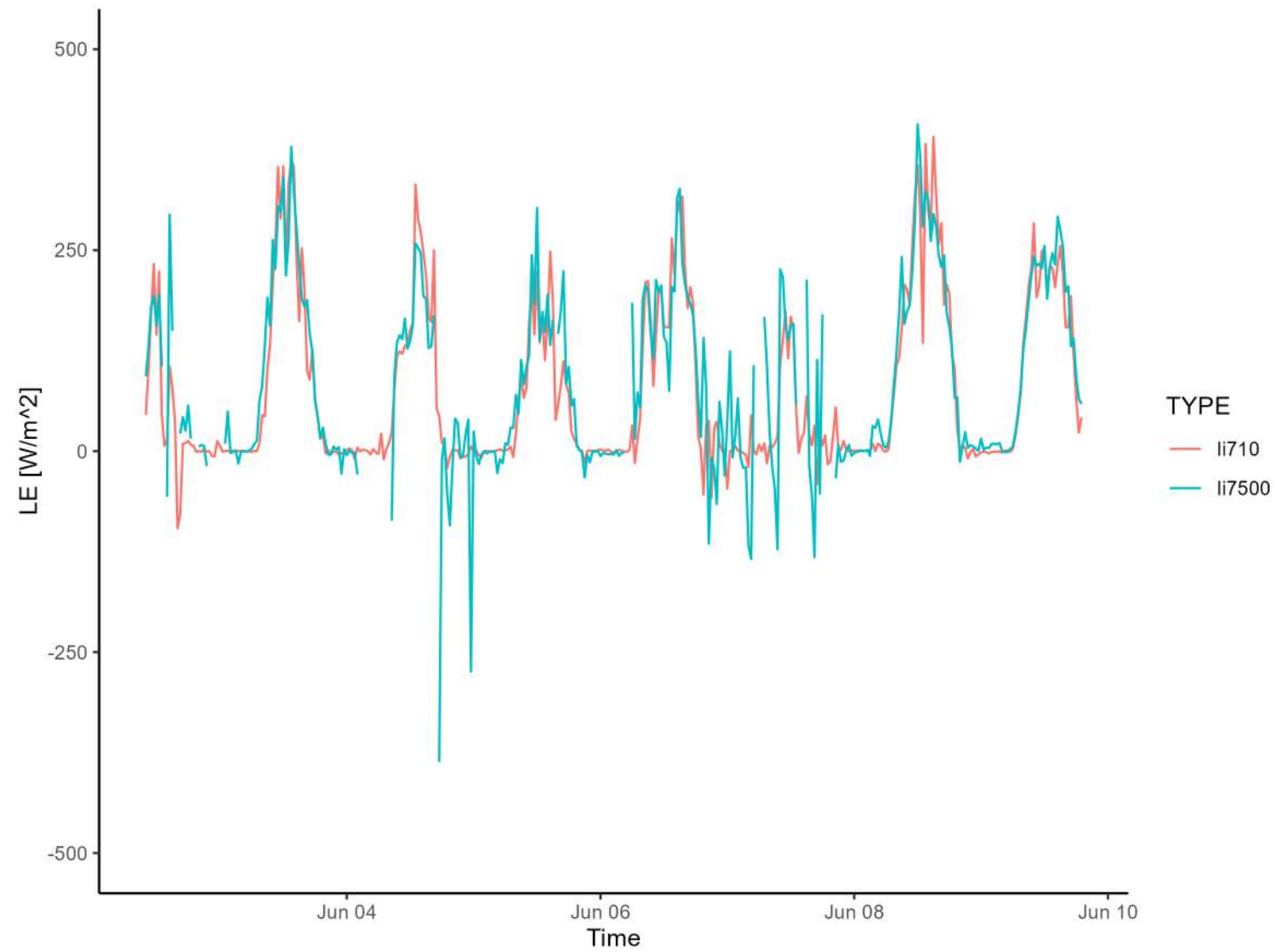
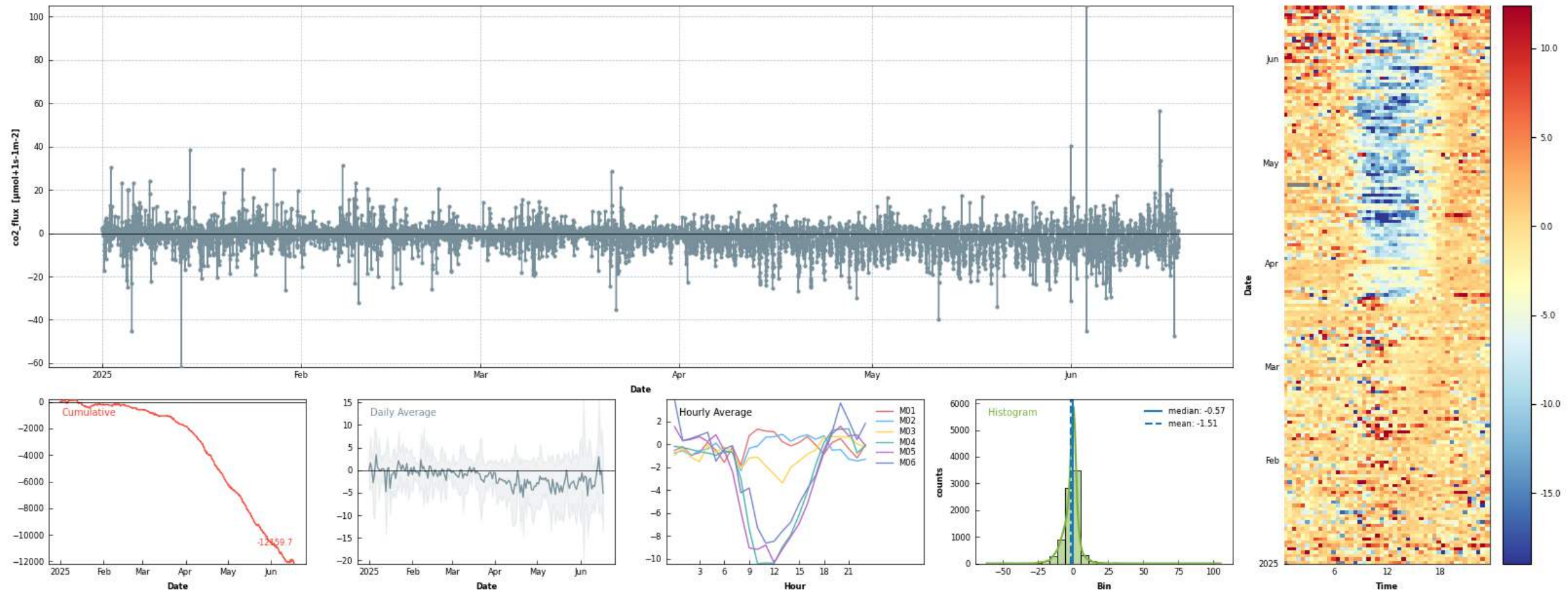


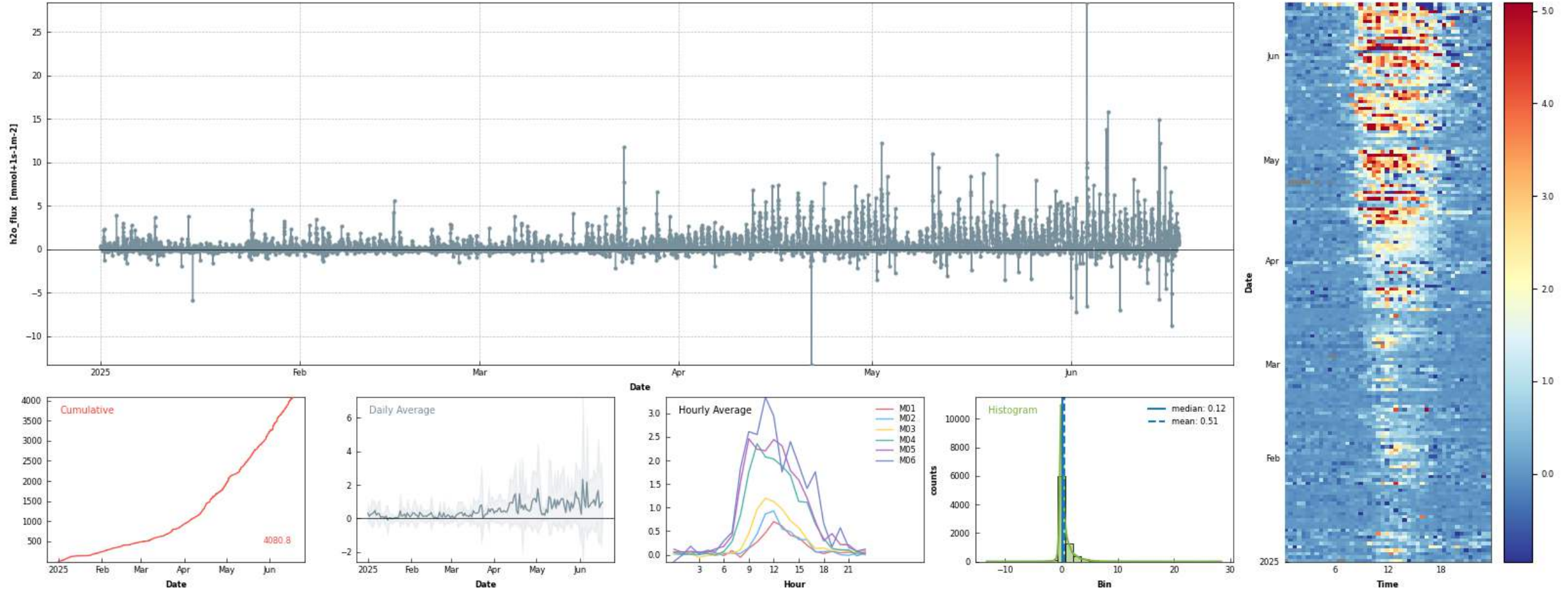


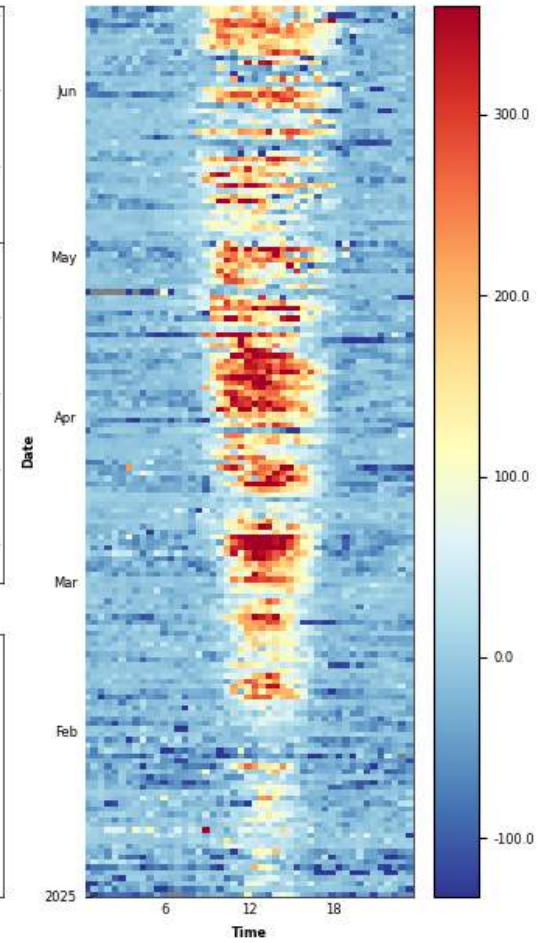
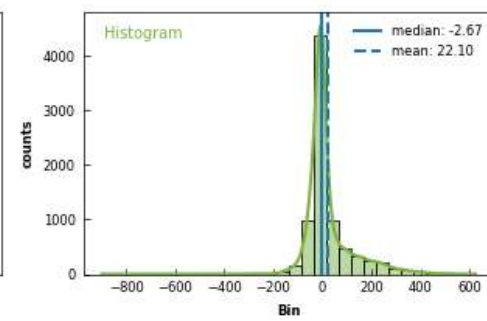
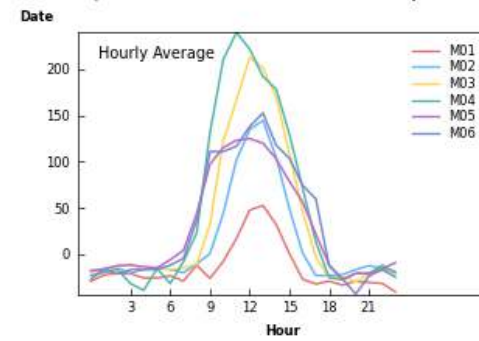
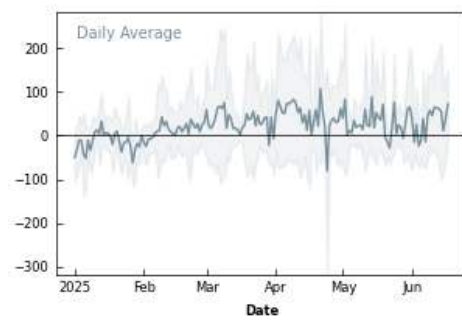
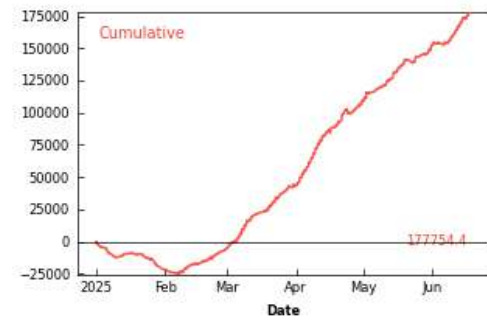
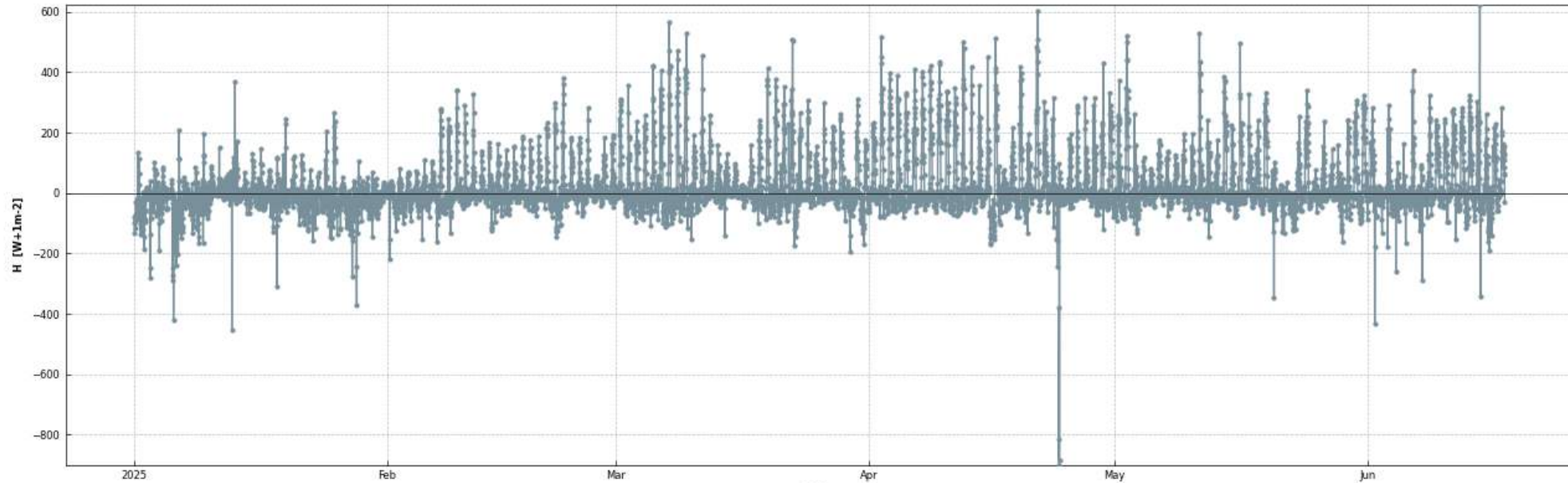
Photo: Lukas Hörtnagl



- Net CO₂ uptake period
- Almost no data gaps







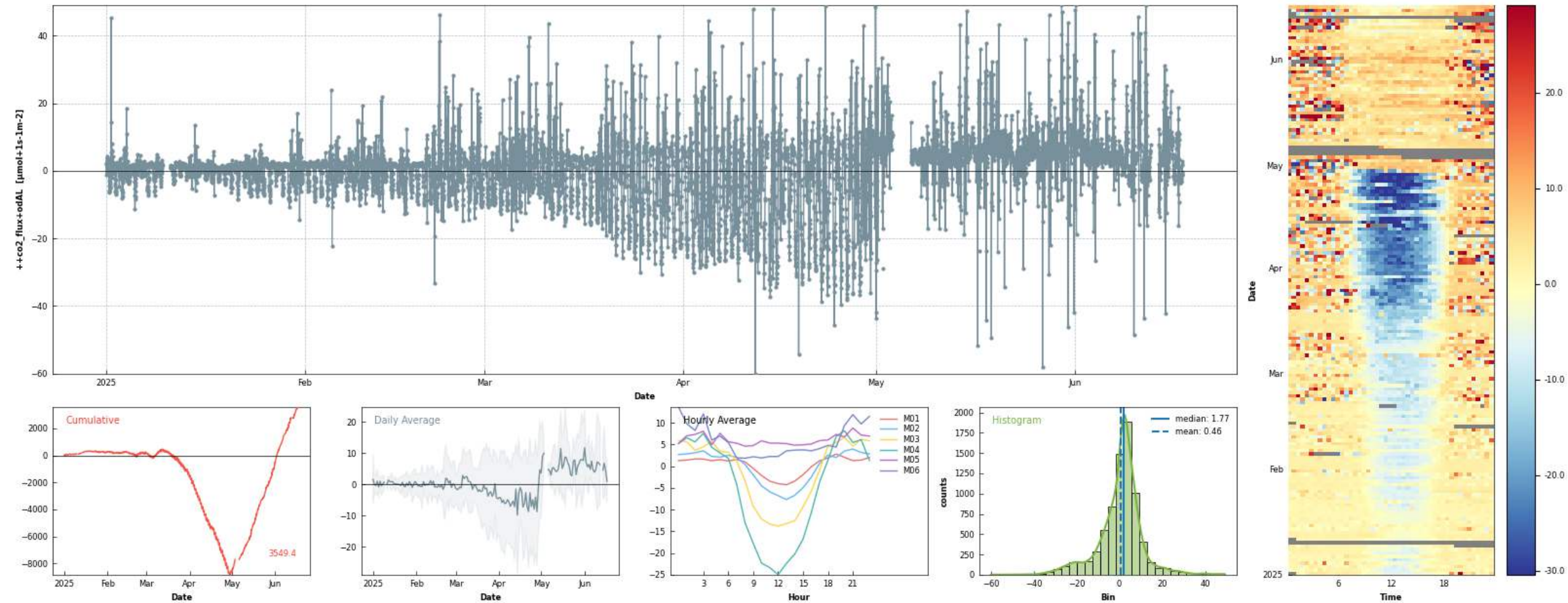


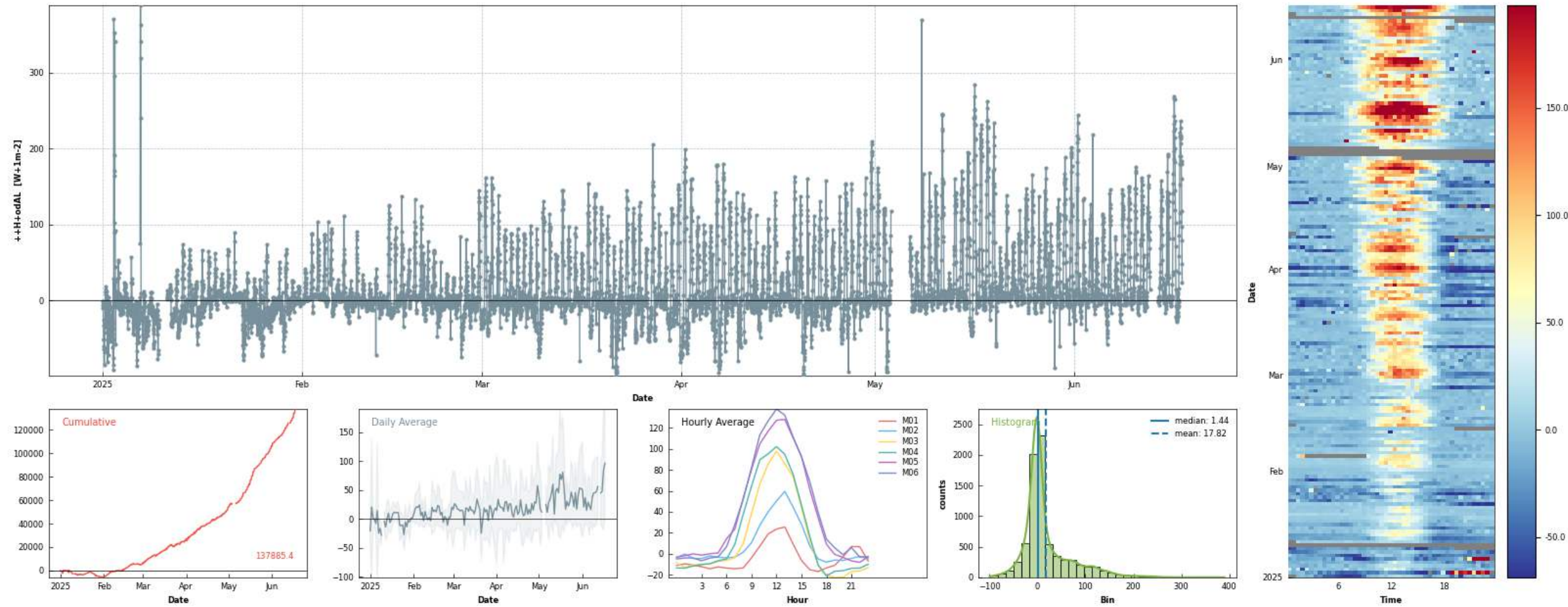
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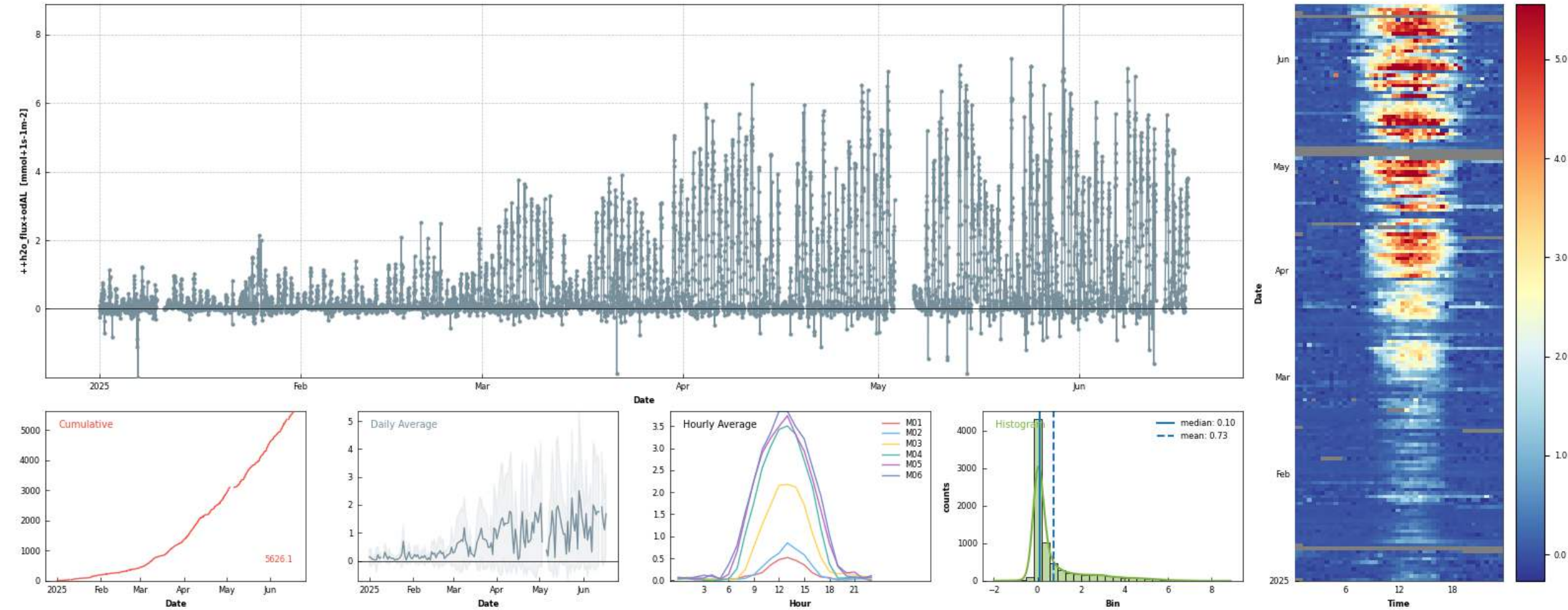


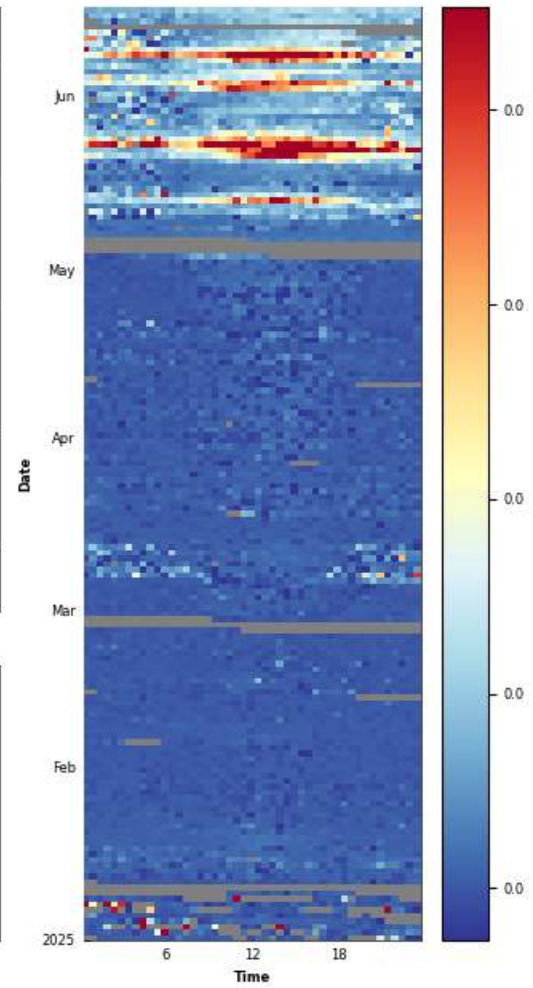
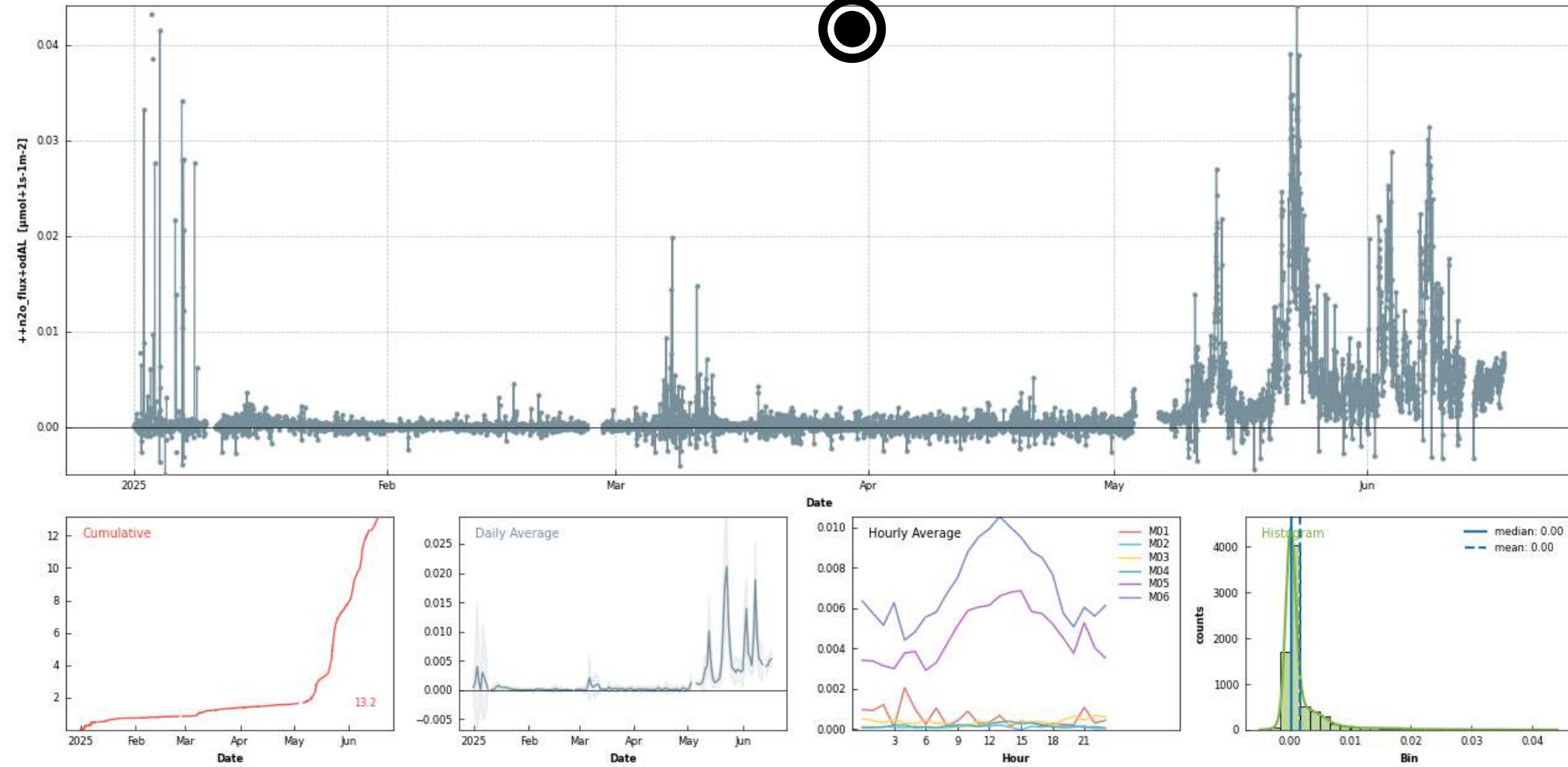
Photo: Lorenz Allemann 26

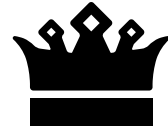
- 11.05 Maize sowing
- 06.06 Mineral fertilization











- 11.05 Maize sowing
- 06.06 Mineral fertilization

Highest GHG emitter of the group!

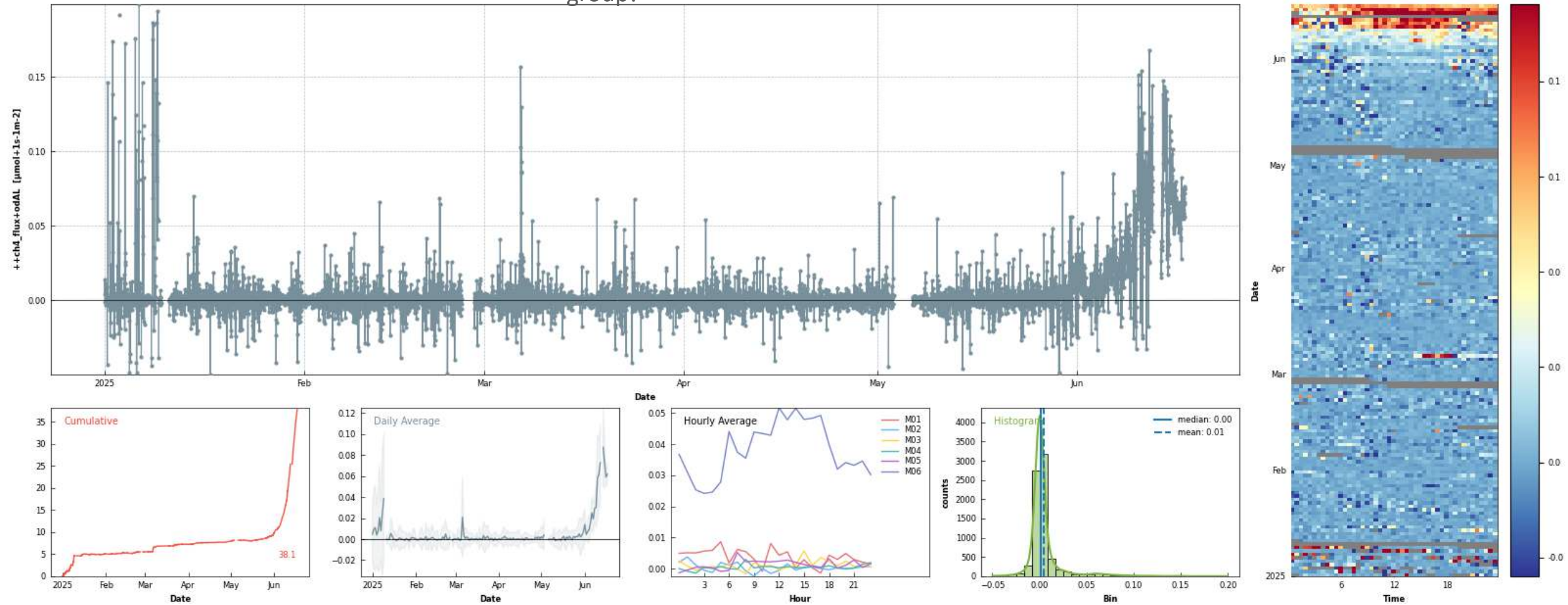




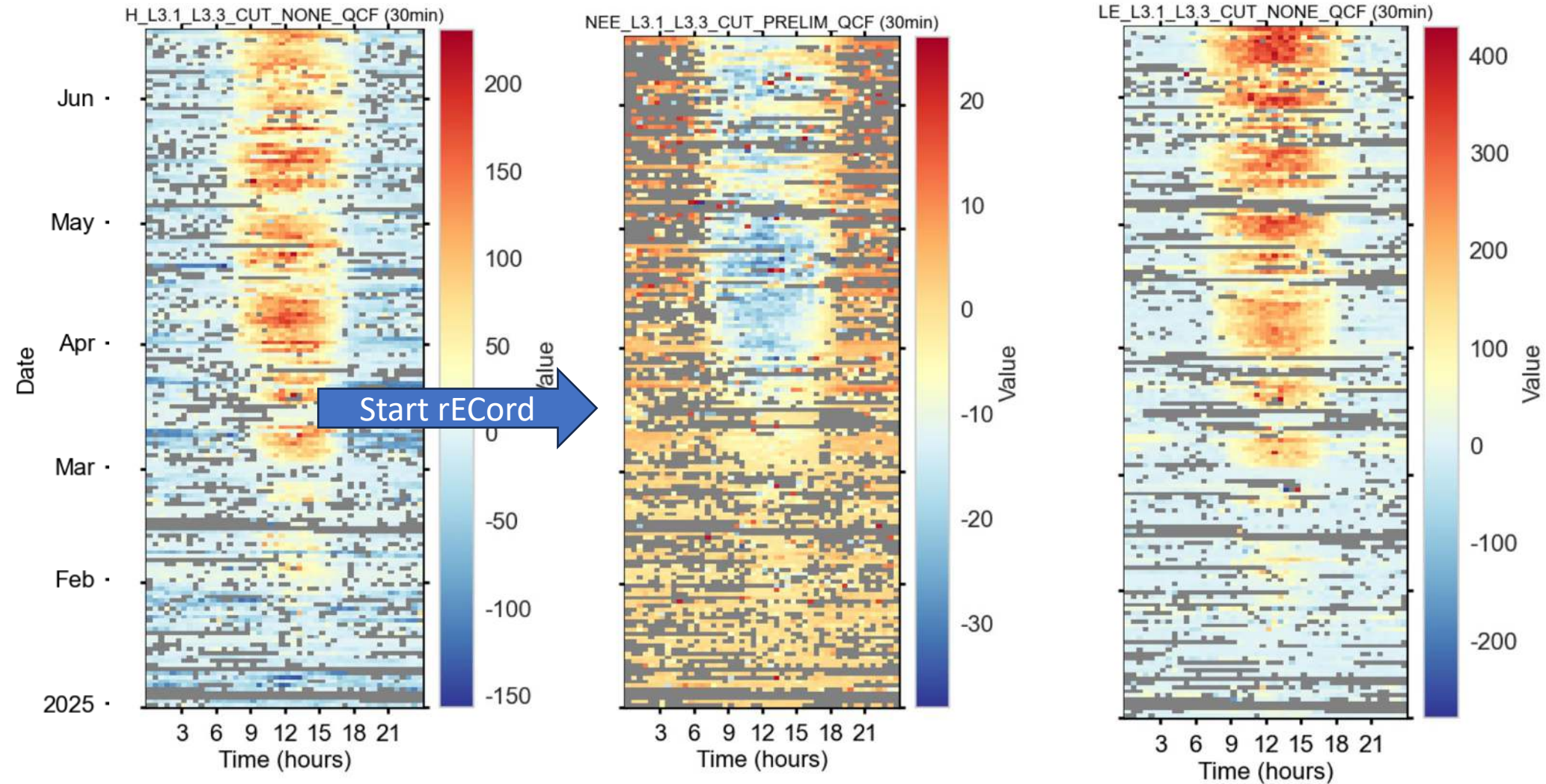
Photo: Lukas Hörtnagl

MAIN TOWER (sonicread+rECord)

H

CO₂ flux

LE



- With preliminary QCF using the diive notebook `notebooks/FluxProcessingChain/QuickFluxProcessingChain.ipynb`
- High and medium-quality fluxes
- Preliminary outlier removal
- With preliminary USTAR filtering for NEE



Photo: Lukas Hörtnagl

H

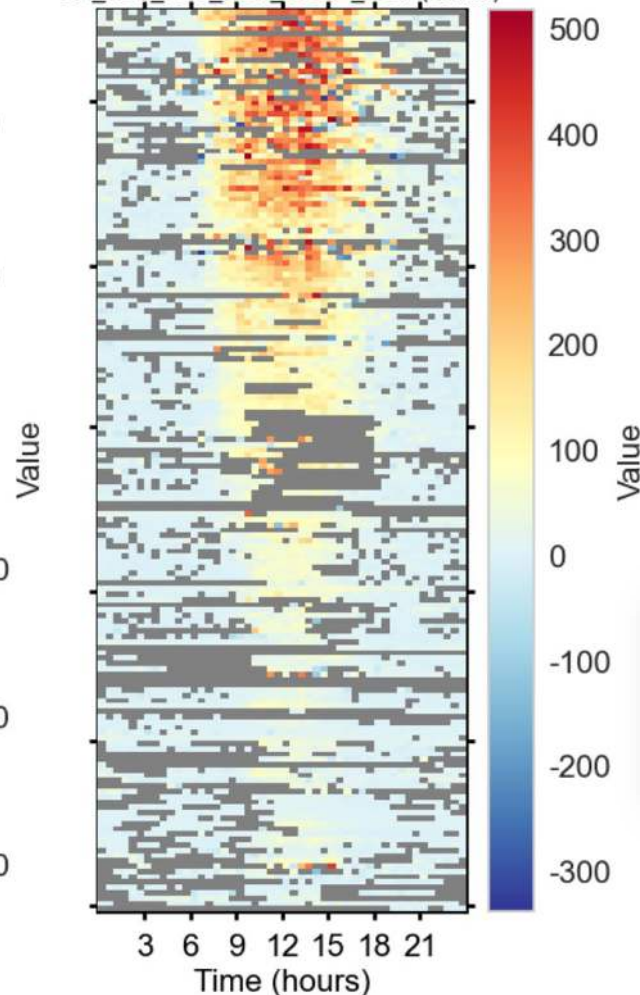
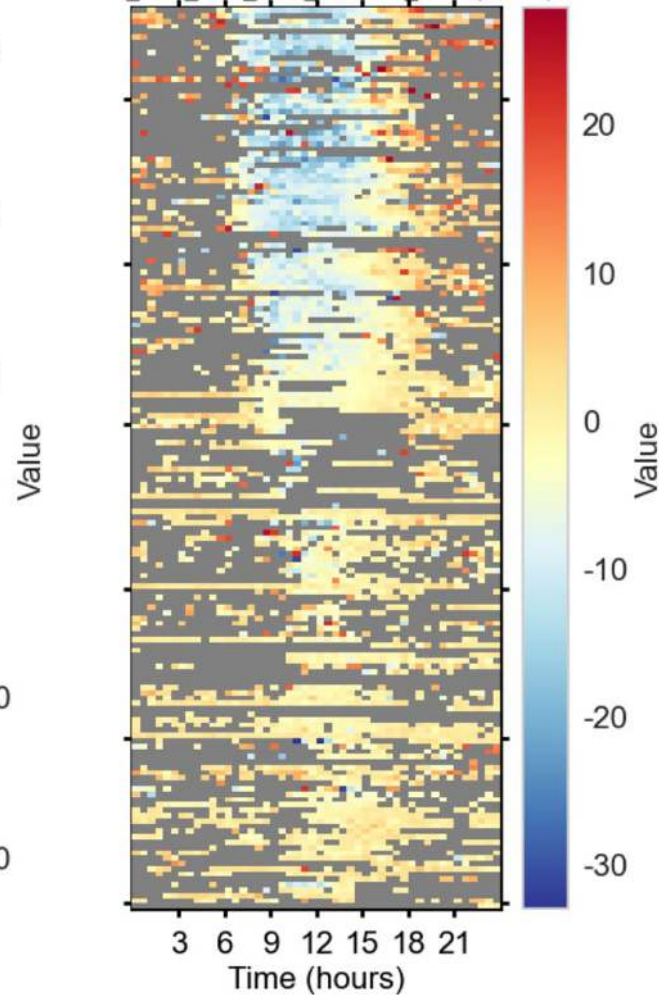
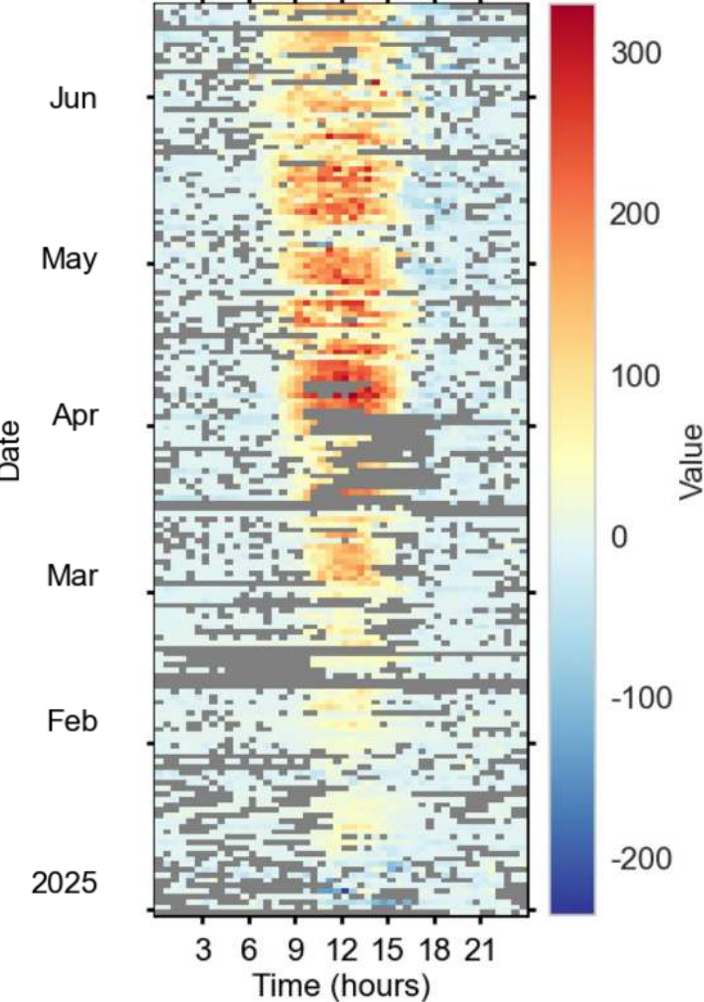
CO₂ flux

LE

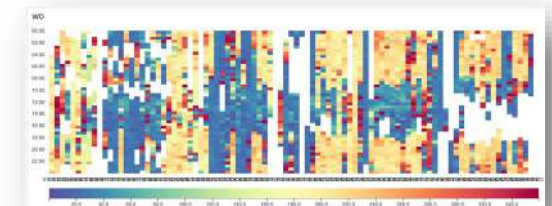
H_L3.1_L3.3_CUT_NONE_QCF (30min)

NEE_L3.1_L3.3_CUT_PRELIM_QCF (30min)

LE_L3.1_L3.3_CUT_NONE_QCF (30min)



- With preliminary QCF using the diive notebook notebooks/FluxProcessingChain/QuickFluxProcessingChain.ipynb
- Highest- and medium-quality fluxes
- Preliminary outlier removal
- With preliminary USTAR filtering for NEE



- Wind direction this year so far
- red/blue/green = footprint of interest
- Orange = behind tower, on path
- Will need QC with wind direction included

Mar 2024 – Feb 2025: the young forest was a strong CO₂ source, 442 g C m⁻²

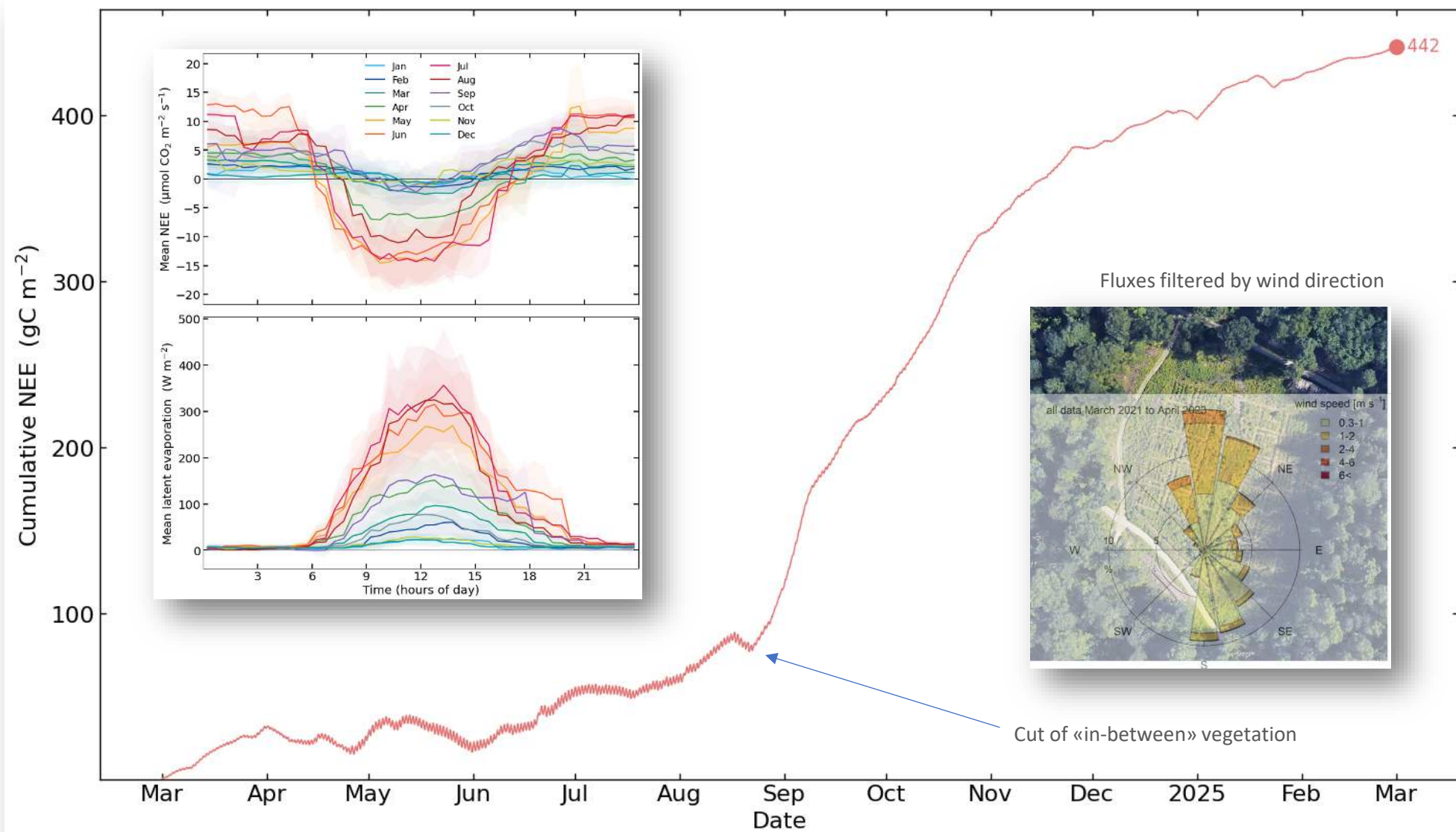
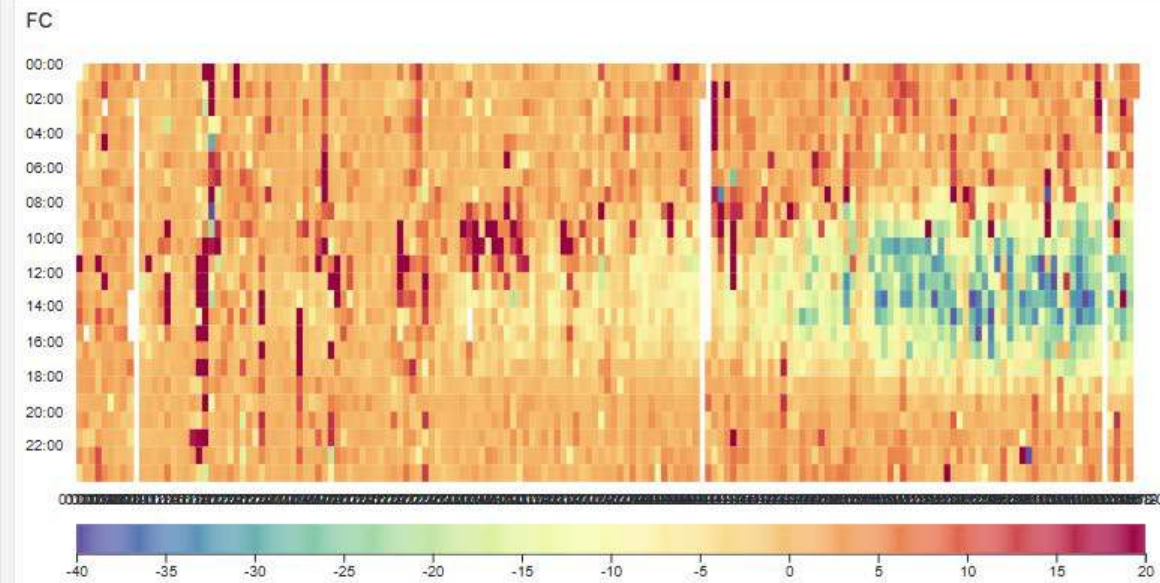
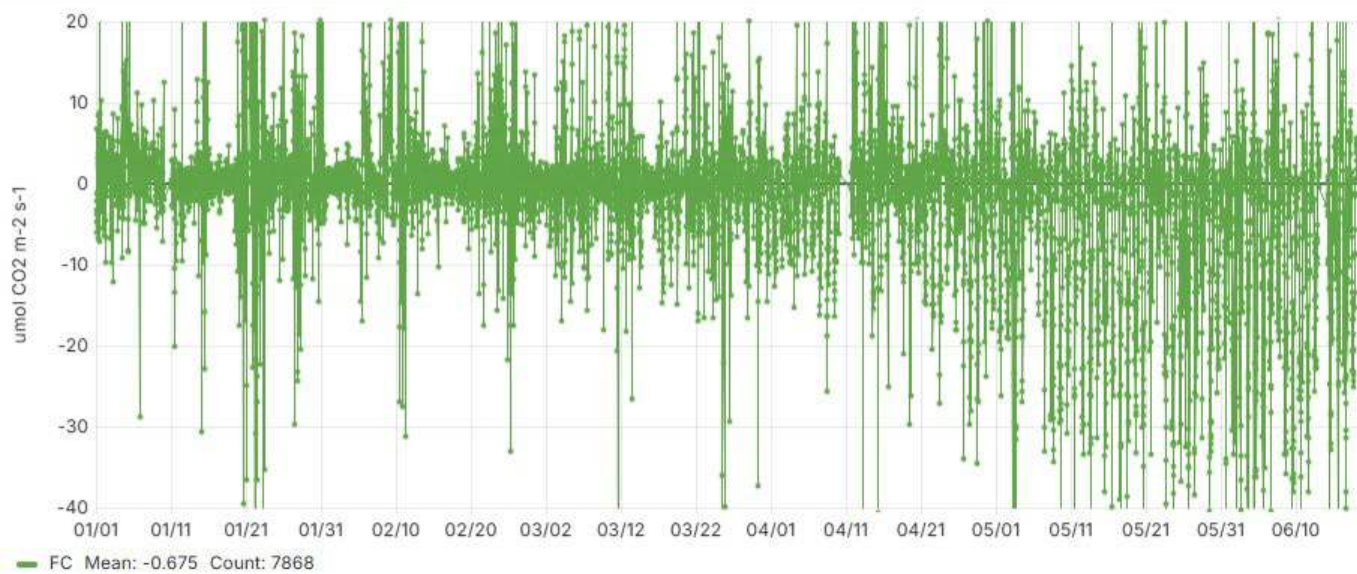
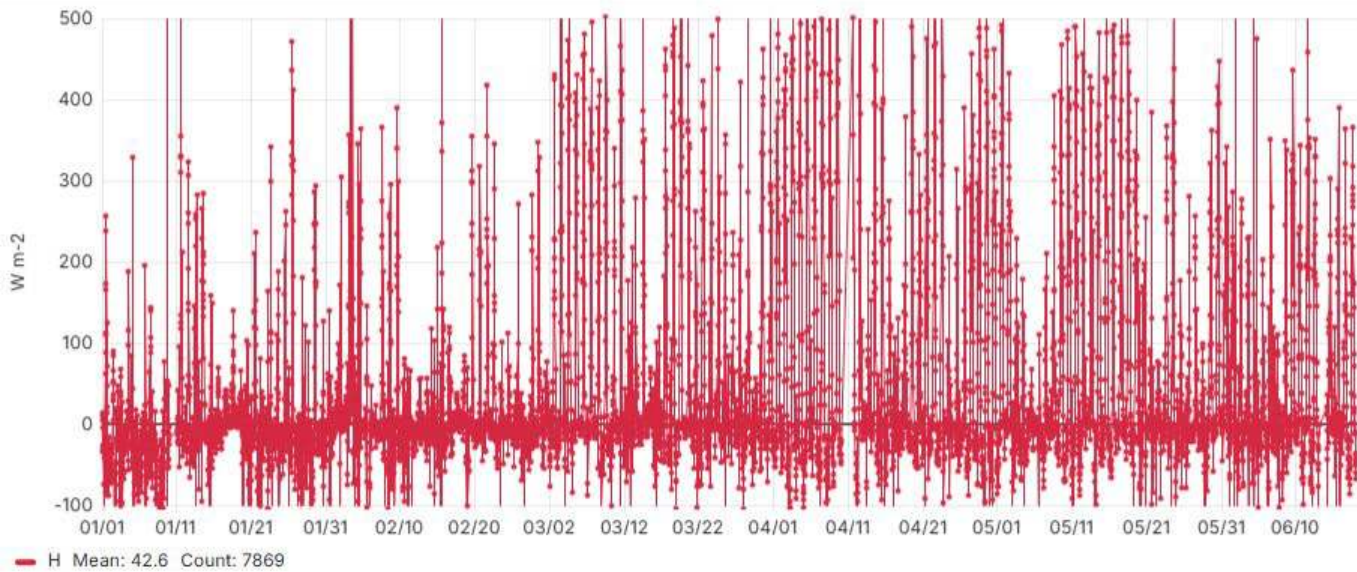
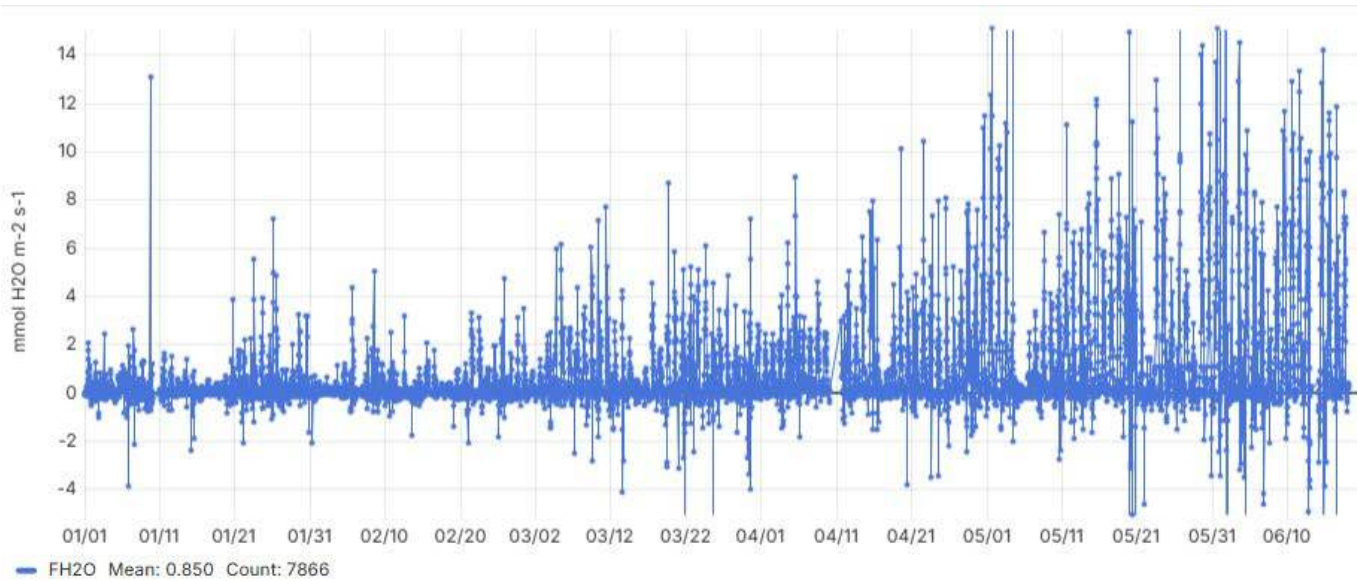




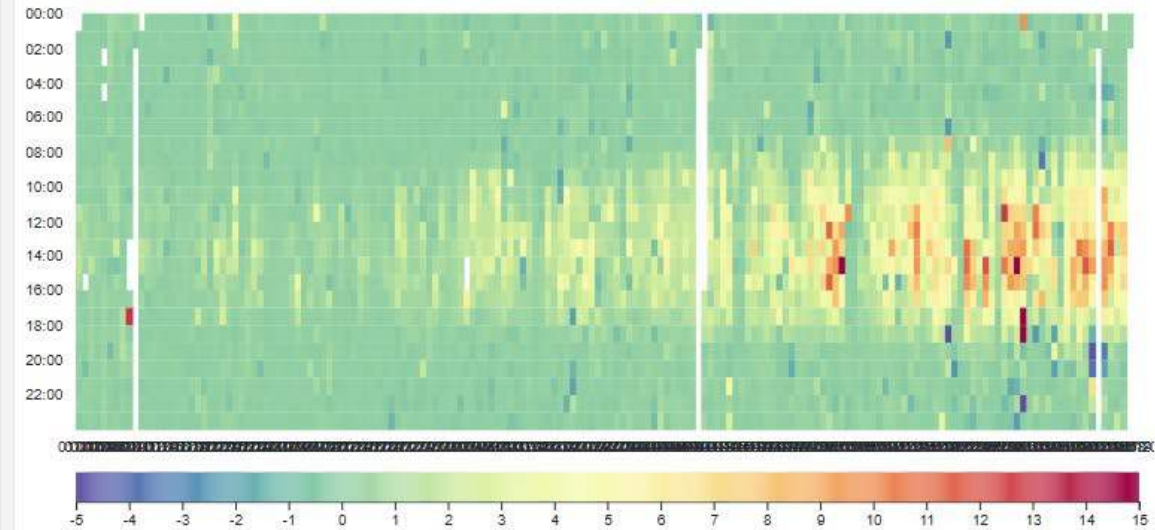
Photo: Markus Staudinger



- Hot days max temp ca. 29°C 13-14 June



FH2O



FH

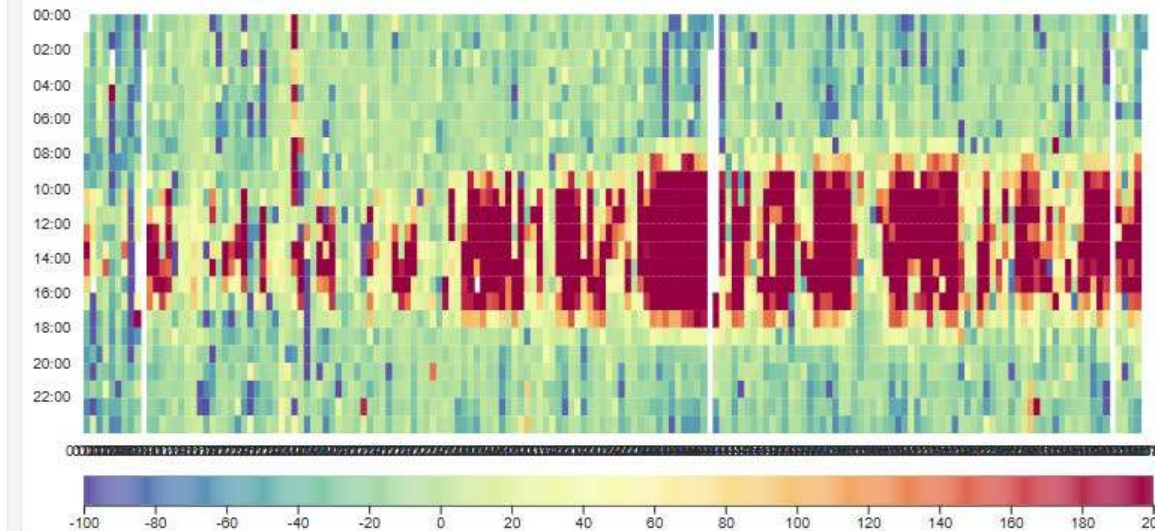
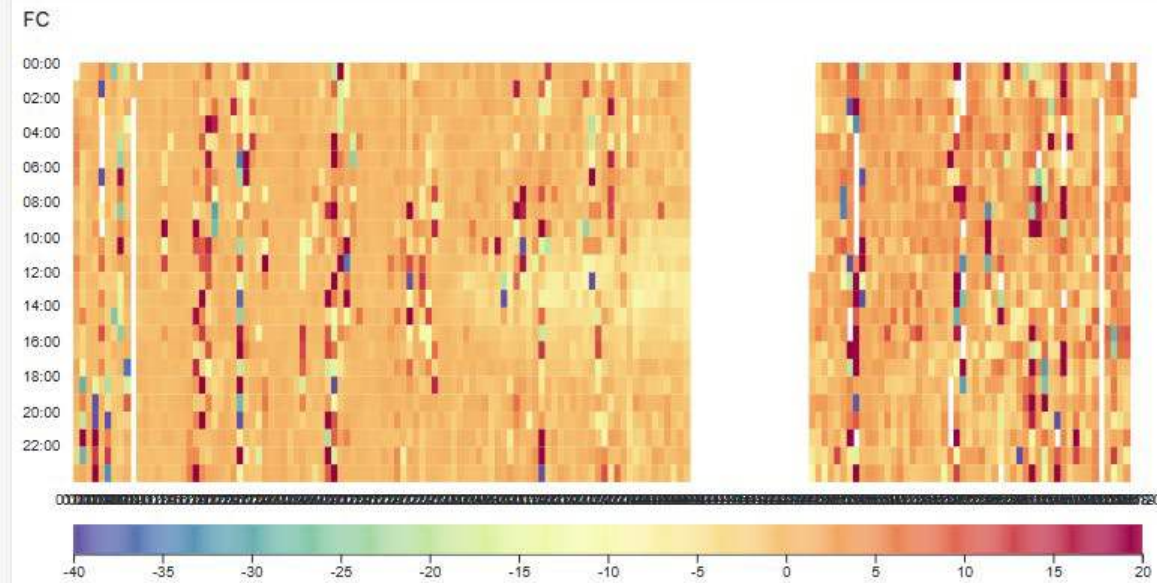
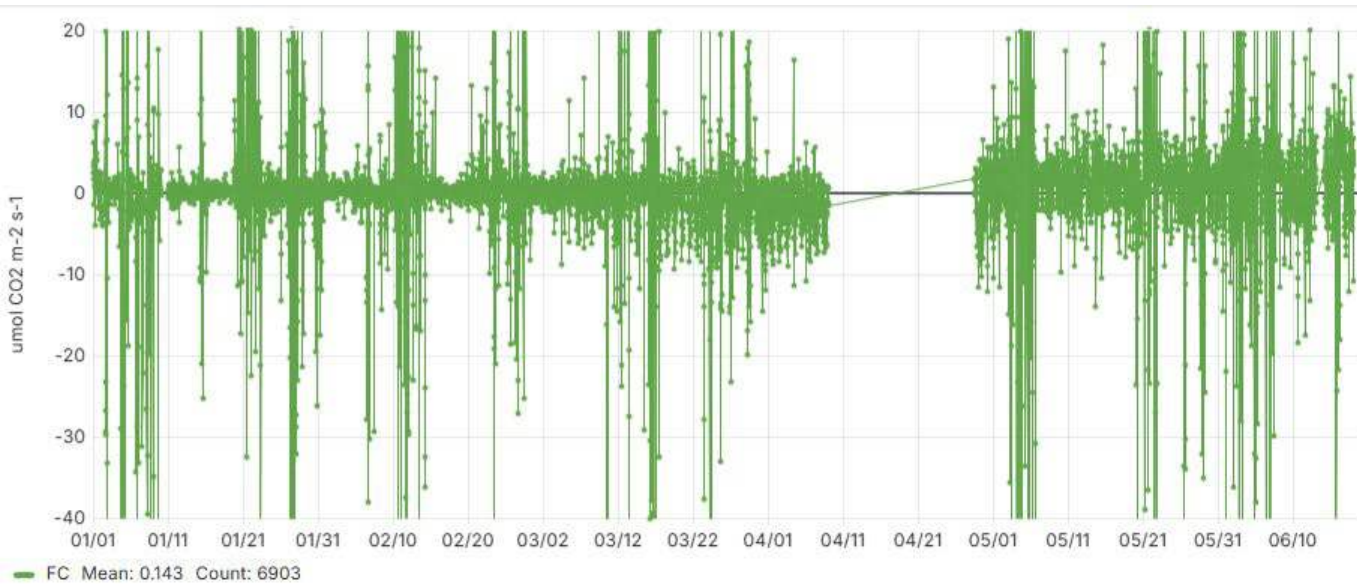
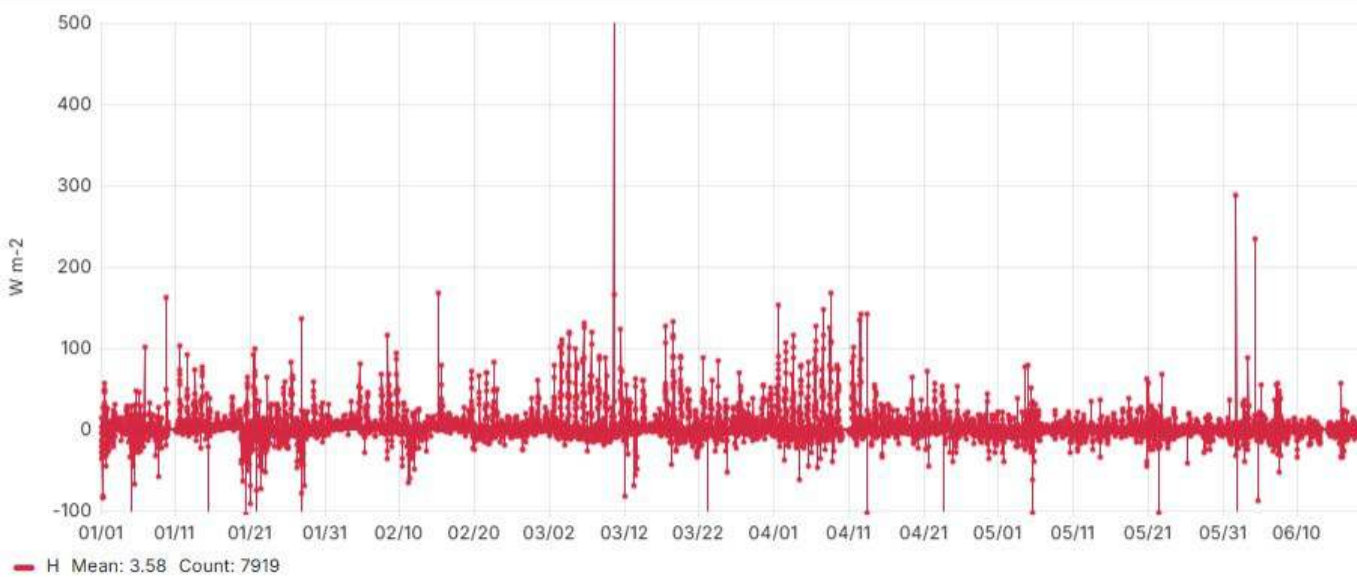
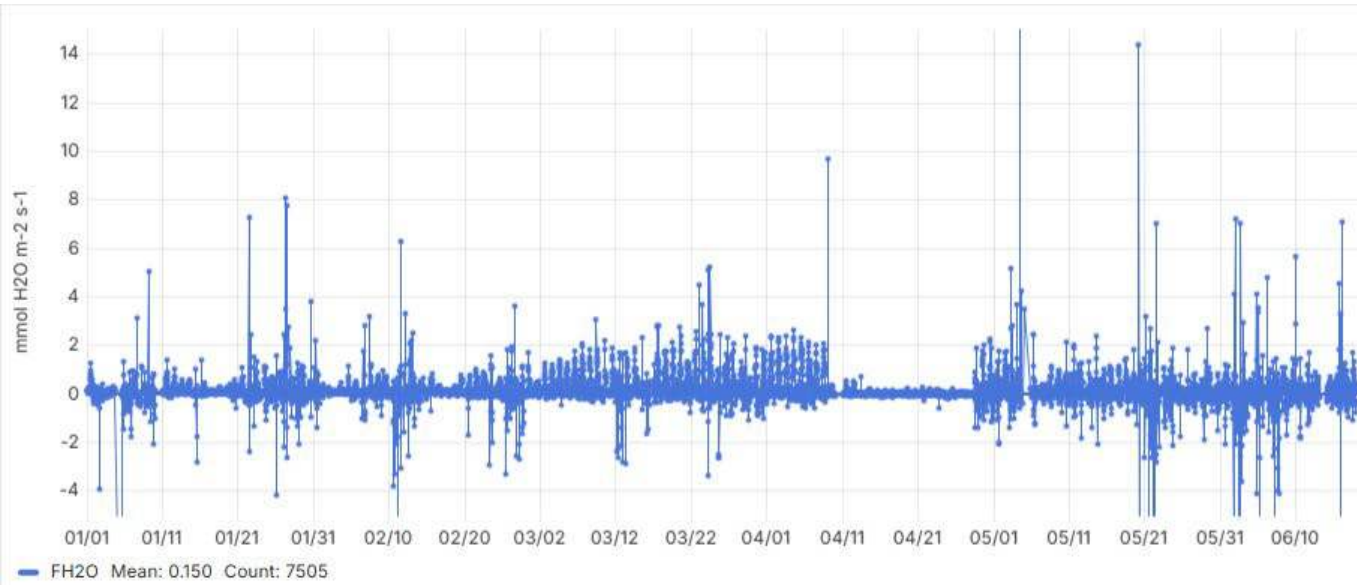


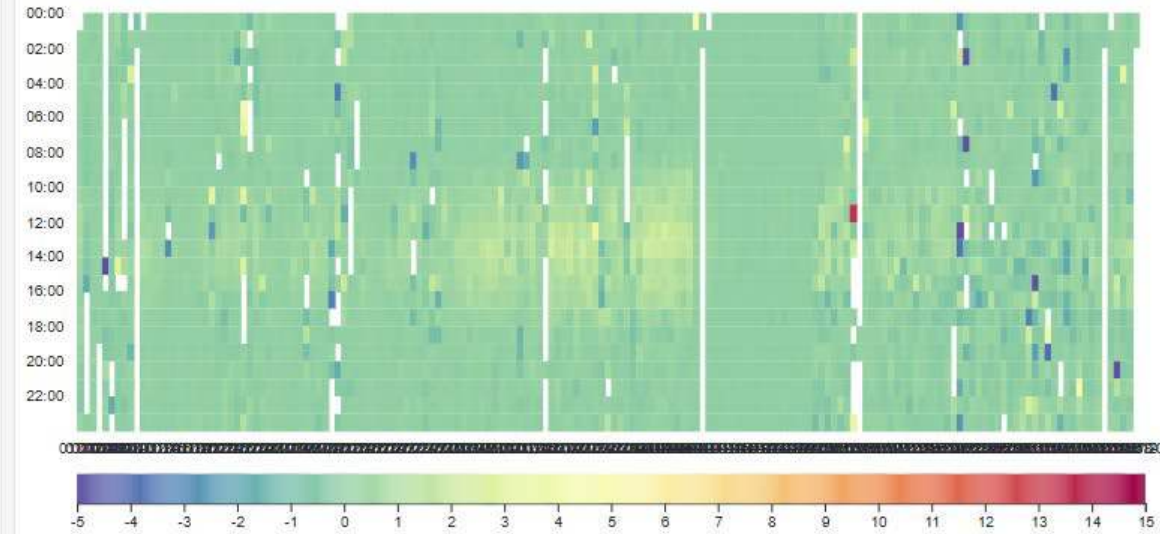


Photo: Liliana Scapucci





FH2O



FH

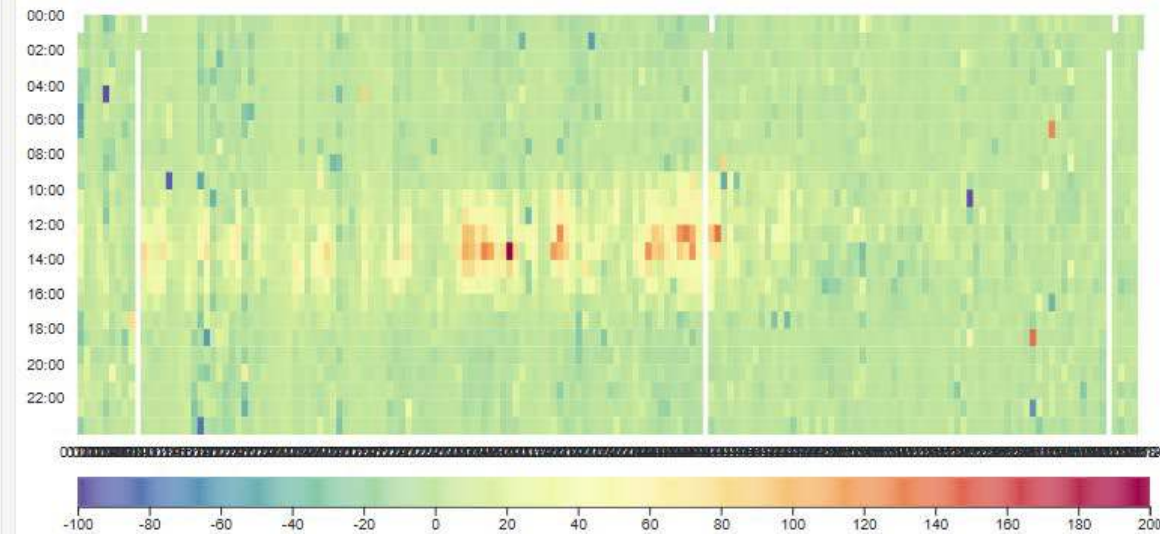




Photo: Regine Maier

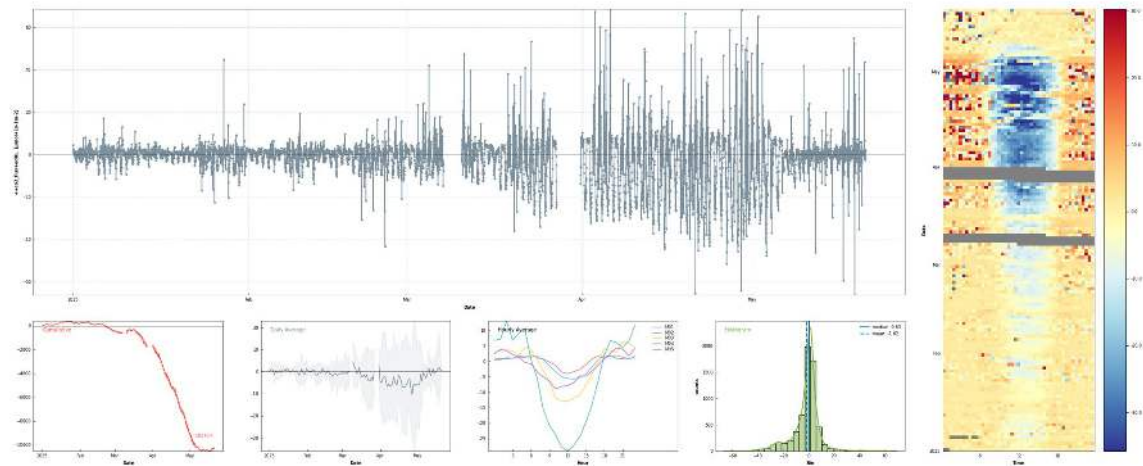
Picture from May 6th

Visiting station for the
introduction to how to
maintain/clean the instruments



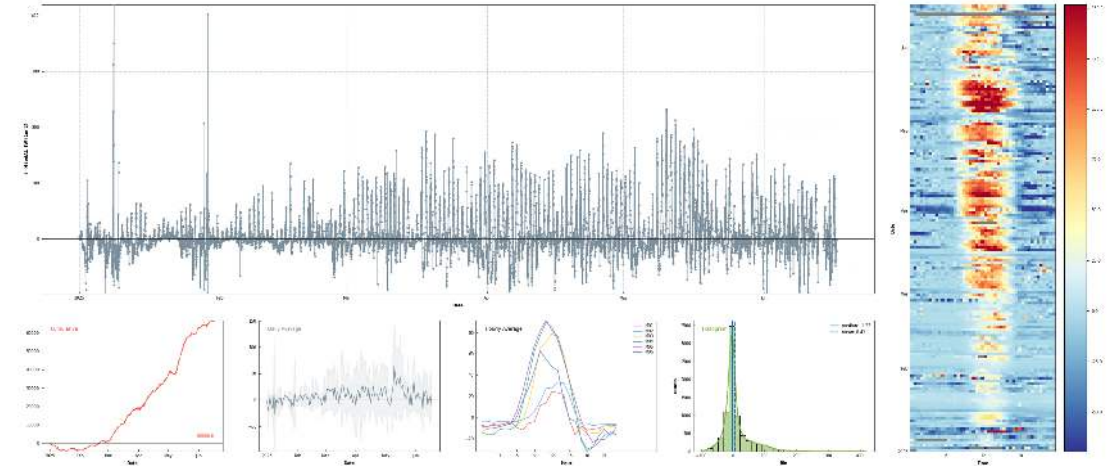
CO₂ flux

Abs limits: -70+70

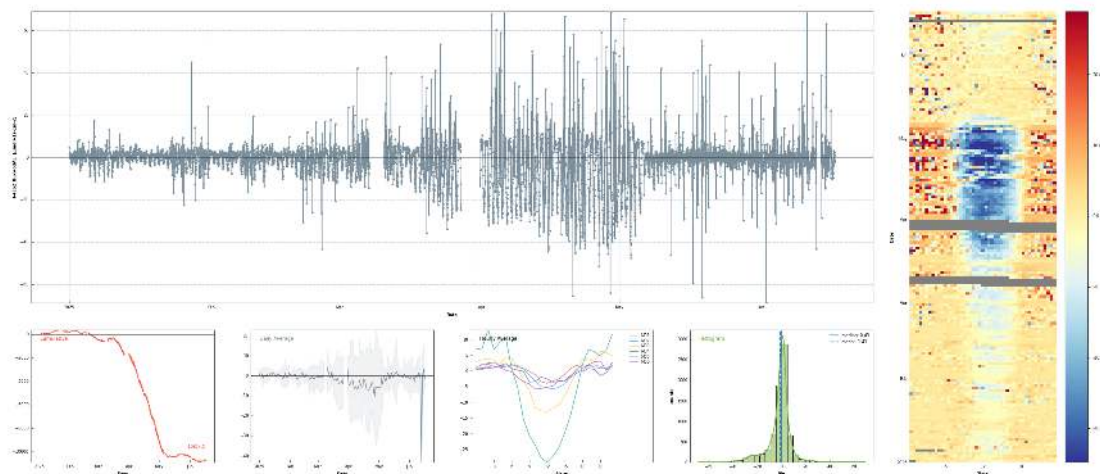


H

Abs limits: -100+450

H₂O flux

Abs limits: -2+20



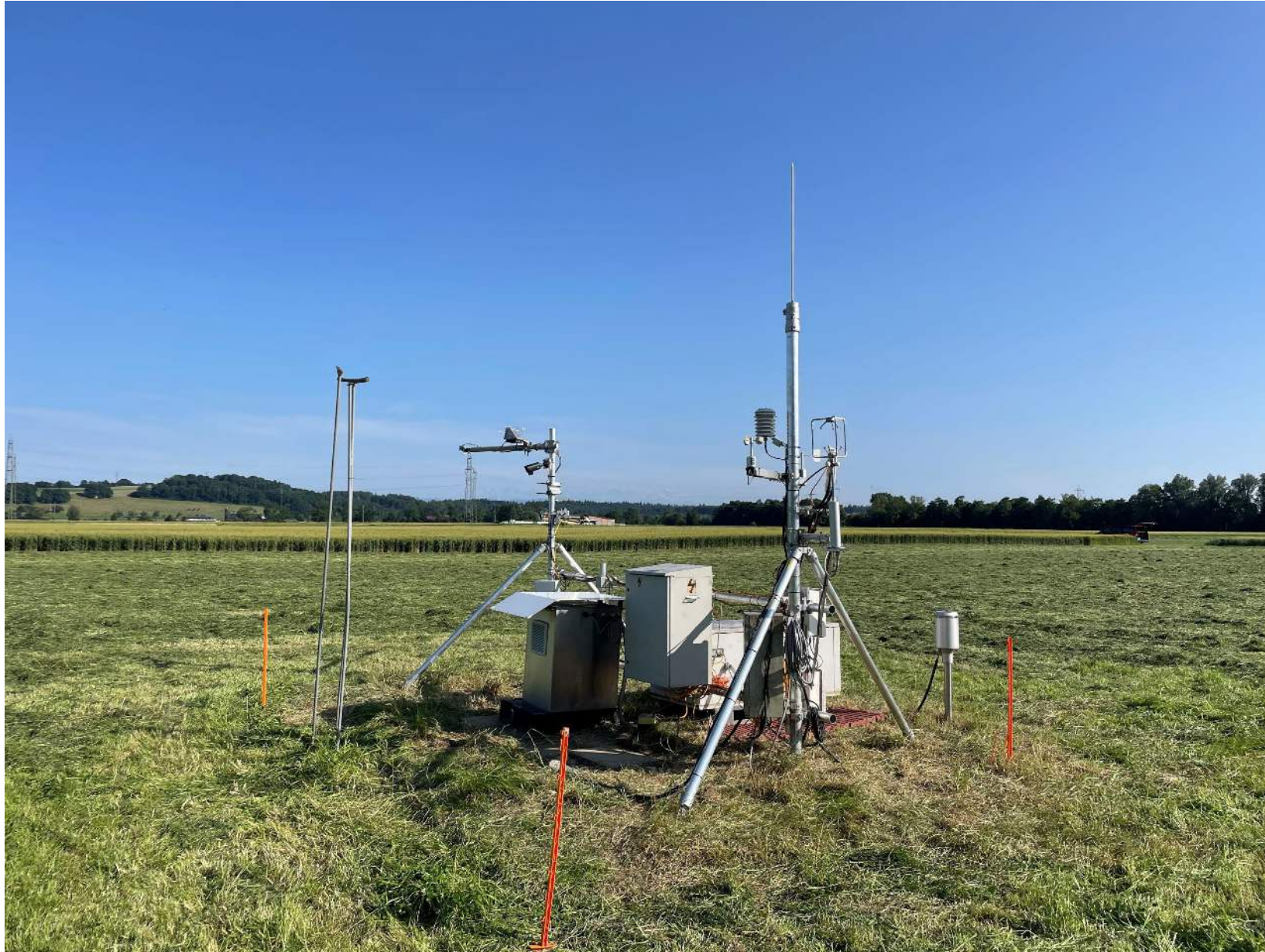
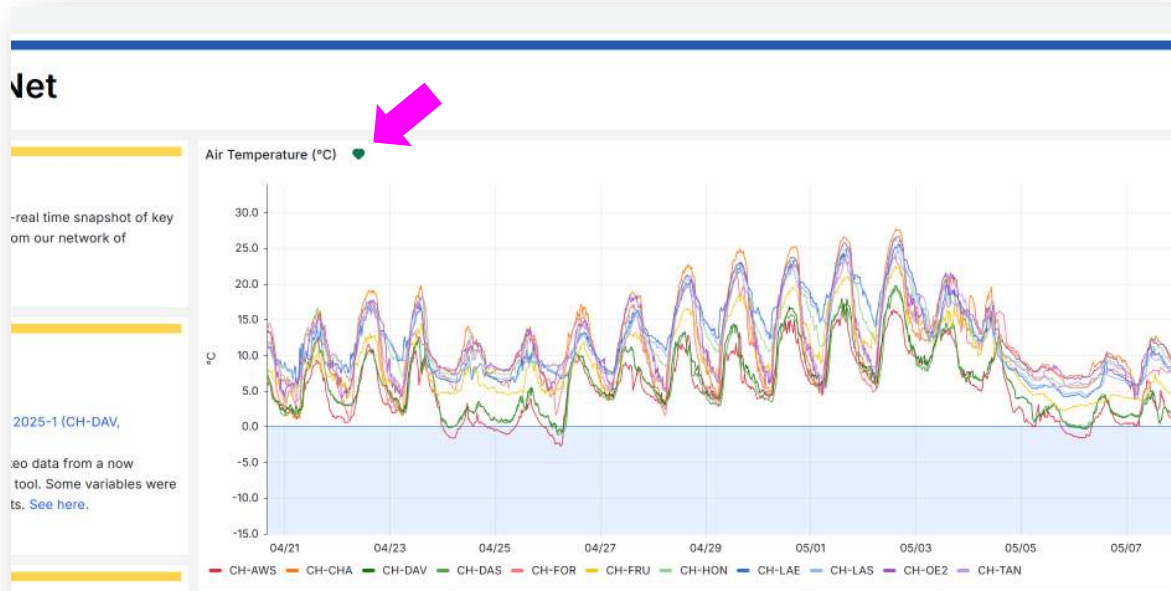


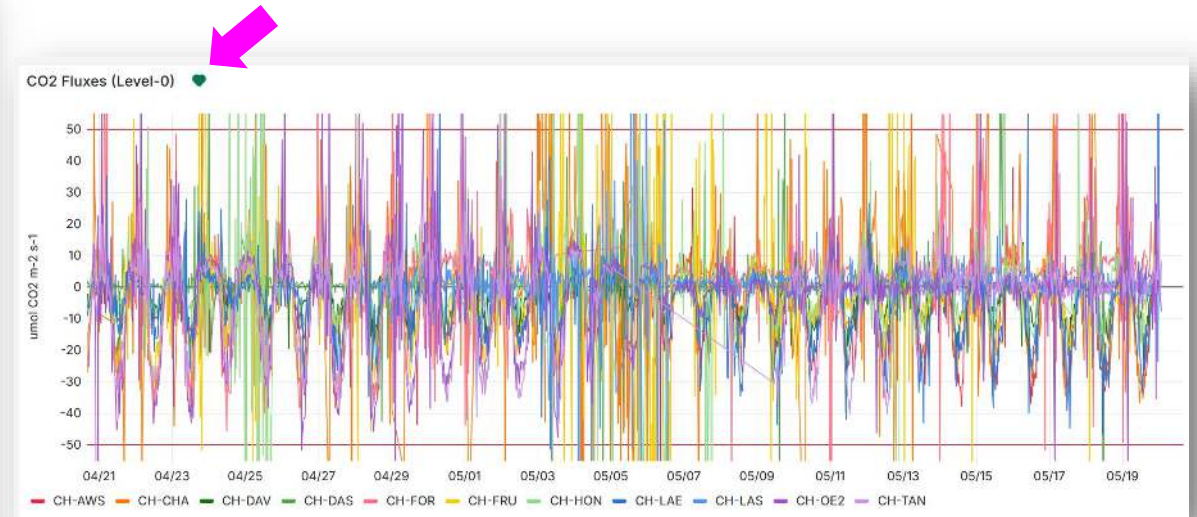
Photo by Martin

APPENDIX

UPDATED



Green heart means that all 11 sites have more than zero values for the shown air temperature variable over the last **48 hours**.



Green heart means that all 11 sites have more than 50% of potential FC fluxes available over the last **72 hours**. Alert is run once every 24 hours, approx. at noon 12:20.

The scripts [bico](#) and [fluxrun](#) are running automatically on the **GROUP-RDS**.

- bico converts sonicread binary files to ASCII
- fluxrun calculates fluxes
- execution times are defined in the Windows Task Scheduler
- **all times are CEST (UTC+2)**

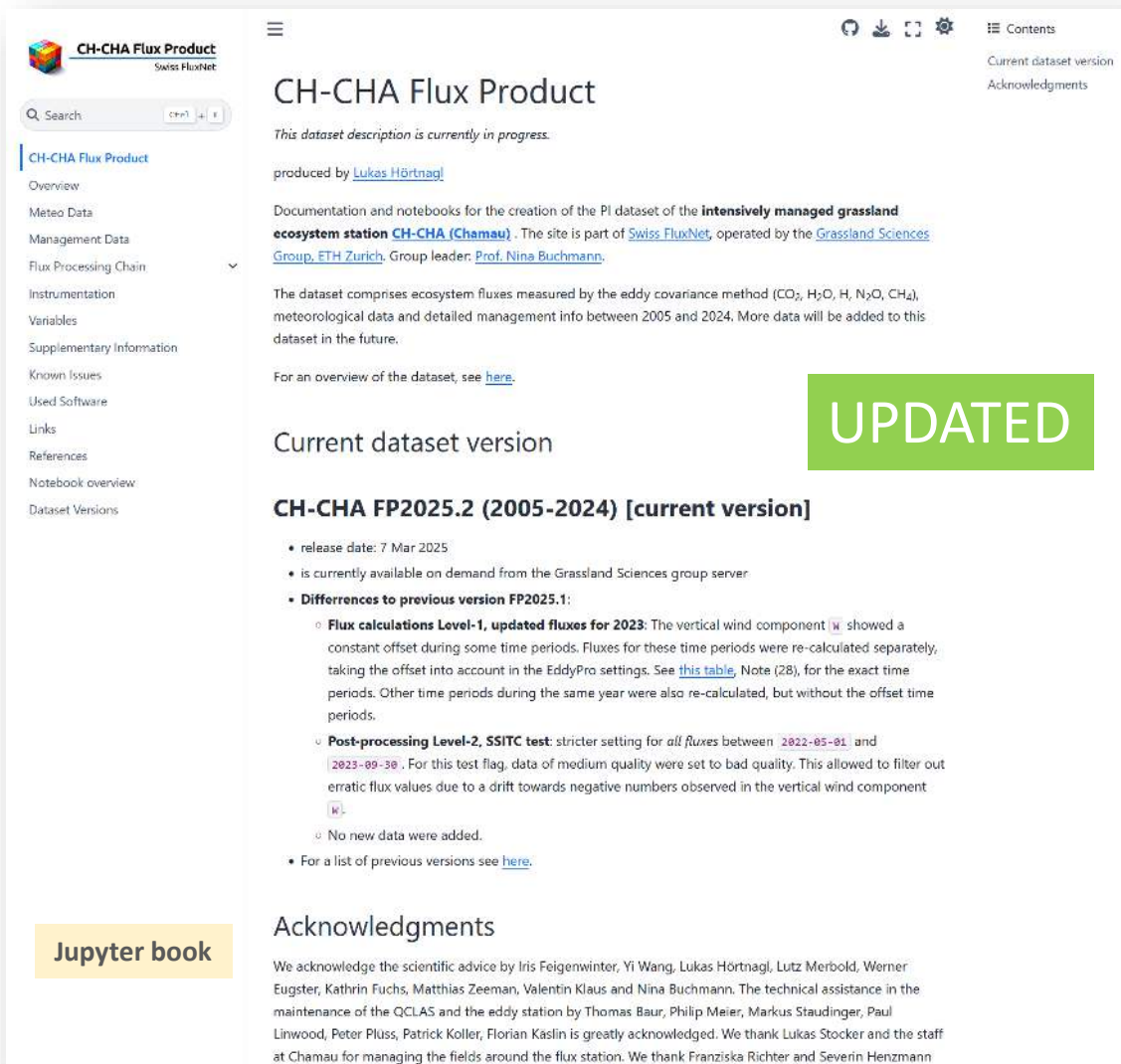
Name	Status	Triggers	Next Run Time
[bico] CH-AWS Convert EC raw data binaries		At 06:00 every day	28.05.2024 06:00:00
[bico] CH-CHA Convert EC raw data binaries		At 06:10 every day	28.05.2024 06:10:00
[bico] CH-DAS Convert EC raw data binaries		At 06:20 every day	28.05.2024 06:20:00
[bico] CH-DAV Convert EC raw data binaries		At 06:30 every day	28.05.2024 06:30:00
[bico] CH-FOR Convert EC raw data binaries		At 06:40 every day	28.05.2024 06:40:00
[bico] CH-FRU Convert EC raw data binaries		At 06:50 every day	28.05.2024 06:50:00
[bico] CH-HON Convert EC raw data binaries		At 07:00 every day	28.05.2024 07:00:00
[bico] CH-LAE Convert EC raw data binaries		At 07:10 every day	28.05.2024 07:10:00
[bico] CH-LAS Convert EC raw data binaries	Ready	At 07:20 every day	28.05.2024 07:20:00
[bico] CH-OE2 Convert EC raw data binaries	Ready	At 07:30 every day	28.05.2024 07:30:00
[bico] CH-TAN Convert EC raw data binaries	Ready	At 07:40 every day	28.05.2024 07:40:00
[fluxrun] CH-AWS Calculate fluxes	Ready	At 08:00 every day	28.05.2024 08:00:00
[fluxrun] CH-CHA Calculate fluxes	Ready	At 08:10 every day	28.05.2024 08:10:00
[fluxrun] CH-DAS Calculate fluxes	Ready	At 08:20 every day	28.05.2024 08:20:00
[fluxrun] CH-DAV Calculate fluxes	Ready	At 08:30 every day	28.05.2024 08:30:00
[fluxrun] CH-FOR Calculate fluxes	Ready	At 08:40 every day	28.05.2024 08:40:00
[fluxrun] CH-FRU Calculate fluxes	Ready	At 08:50 every day	28.05.2024 08:50:00
[fluxrun] CH-HON Calculate fluxes	Ready	At 09:00 every day	28.05.2024 09:00:00
[fluxrun] CH-LAE Calculate fluxes	Ready	At 09:10 every day	28.05.2024 09:10:00
[fluxrun] CH-LAS Calculate fluxes	Ready	At 09:20 every day	28.05.2024 09:20:00
[fluxrun] CH-OE2 Calculate fluxes	Ready	At 09:30 every day	28.05.2024 09:30:00
[fluxrun] CH-TAN Calculate fluxes	Ready	At 09:40 every day	28.05.2024 09:40:00
[ppicos] CH-DAV Convert to ICOS formats	Ready	At 03:35 every day	28.05.2024 03:35:00

The script [dataflow](#) is running automatically on **GL-CALCS**.

- dataflow uploads data to the database
- Meteo data upload starts between 7:00 (AWS) and 7:46 (TAN)
- Flux data upload starts between 11:00 (first site, AWS) and 11:20 (last site, TAN)
- execution times are defined in the *crontab* file
- after upload, data are immediately available in Grafana
- **all times are CET (UTC+1): this means that during summer data uploads start one hour later**

Example AWS during **summer**/**winter** local time:

- bico starts **6:00** / **6:00**
- dataflow 10_meteo upload starts **8:00** / **7:00**
- dataflow 11_meteo_valley upload starts **8:02** / **7:02**
- dataflow 12_meteo_rainfall upload starts **8:04** / **7:04**
- dataflow 13_meteo_pressure upload starts **8:06** / **7:06**
- dataflow 15_meteo_snowheight upload starts **8:08** / **7:08**
- fluxrun starts **8:00** / **8:00**
- dataflow flux upload starts **12:00** / **11:00**



CH-CHA Flux Product

This dataset description is currently in progress.

produced by [Lukas Hörtnagl](#)

Documentation and notebooks for the creation of the PI dataset of the **intensively managed grassland ecosystem station CH-CHA (Chamau)**. The site is part of [Swiss FluxNet](#), operated by the [Grassland Sciences Group, ETH Zurich](#). Group leader: [Prof. Nina Buchmann](#).

The dataset comprises ecosystem fluxes measured by the eddy covariance method (CO_2 , H_2O , H , N_2O , CH_4), meteorological data and detailed management info between 2005 and 2024. More data will be added to this dataset in the future.

For an overview of the dataset, see [here](#).

Current dataset version

CH-CHA FP2025.2 (2005-2024) [current version]

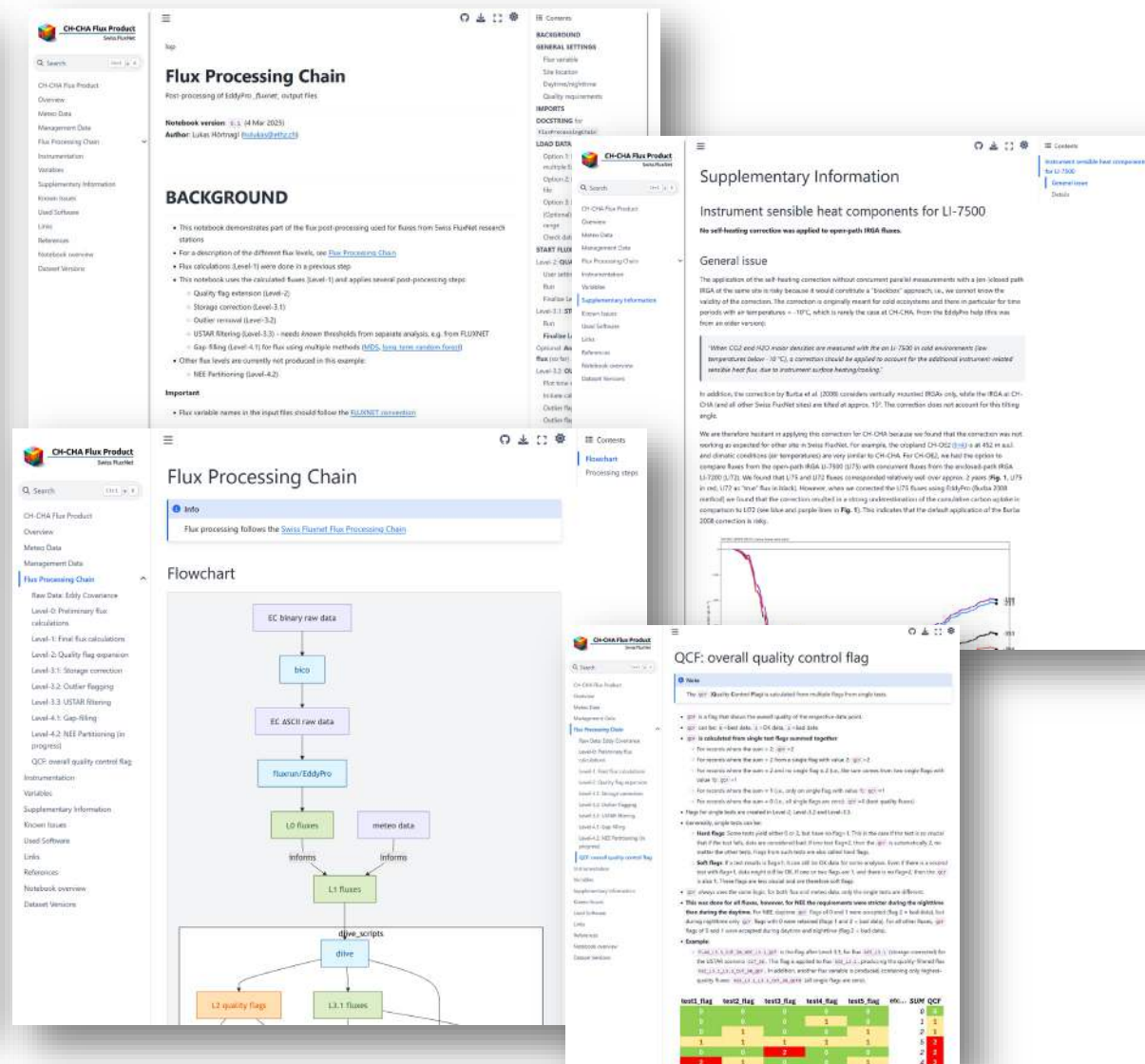
- release date: 7 Mar 2025
- is currently available on demand from the Grassland Sciences group server
- Differences to previous version FP2025.1:
 - Flux calculations Level-1, updated fluxes for 2023:** The vertical wind component w showed a constant offset during some time periods. Fluxes for these time periods were re-calculated separately, taking the offset into account in the EddyPro settings. See [this table](#), Note (28), for the exact time periods. Other time periods during the same year were also re-calculated, but without the offset time periods.
 - Post-processing Level-2, SSITC test:** stricter setting for *all* fluxes between **2022-05-01** and **2023-09-30**. For this test flag, data of medium quality were set to bad quality. This allowed to filter out erratic flux values due to a drift towards negative numbers observed in the vertical wind component w .
 - No new data were added.
- For a list of previous versions see [here](#).

Acknowledgments

We acknowledge the scientific advice by Iris Feigenwinter, Yi Wang, Lukas Hörtnagl, Lutz Merbold, Werner Eugster, Kathrin Fuchs, Matthias Zeeman, Valentin Klaus and Nina Buchmann. The technical assistance in the maintenance of the QCLAS and the eddy station by Thomas Baur, Philip Meier, Markus Staudinger, Paul Linwood, Peter Pluss, Patrick Koller, Florian Kaslin is greatly acknowledged. We thank Lukas Stocker and the staff at Chamau for managing the fields around the flux station. We thank Franziska Richter and Severin Henzmann

Jupyter book

UPDATED



Flux Processing Chain

Post processing of eddypro, fluxnet, output files

Handbook version: 1.1 (4 Mar 2023)
Author: Lukas Hörtnagl [lukas@ethz.ch](#)

BACKGROUND

- This notebook demonstrates part of the flux post-processing used for fluxes from Swiss FluxNet research stations
- For a description of the different flux levels, see [the Processing Chain](#)
- Flux calculations (Level-1) were done in a previous step
- This notebook uses the calculated fluxes (Level-1) and applies several post-processing steps:
 - Quality flag extension (Level-2)
 - Storage correction (Level-3.1)
 - Outlier removal (Level-3.2)
 - USTAR filtering (Level-3.3) - needs known thresholds from separate analysis, e.g. from FLUXNET
 - Gap-filling (Level-4.1) for flux using multiple methods ([AIFS - long time window forecast](#))
 - Other flux levels are currently not produced in this example:
 - NEE Partitioning (Level-4.2)
- Important:
 - Flux variable names in the input files should follow the [FLUXNET convention](#)

Supplementary Information

Instrument sensible heat components for LI-7500

No self-heating correction was applied to open-path IRGA fluxes.

General issue

The application of the self-heating correction without concurrent parallel measurements with a pin closed path IRGA at the same site is risky because it would constitute a "blockade" approach, as we cannot assess the validity of the correction. This correction is originally meant for solid ecosystems and there is particular for time periods with an temperature $< -10^\circ\text{C}$, which is rarely the case at CH-CHA. From the eddypro help this was from an older version:

When CO_2 and H_2O molar densities are measured with the an LI-7500 in cold environments (low temperatures below -10°C), a correction should be applied to account for the additional instrument-related sensible heat flux, due to instrument surface heating/cooling.

In addition, the correction by Burba et al. (2008) considers vertically mounted IRGAs only, while the IRGA at CH-CHA (and all other Swiss FluxNet sites) are tilted at approx. 10° . This correction does not account for this tilting angle.

We are therefore hesitant in applying this correction for CH-CHA because we found that the correction was not working as expected for other sites in Swiss FluxNet. For example, the original CH-QC2 (2012) is an IRGA in soil and climatic conditions (low temperatures) are very similar to CH-CHA. For CH-QC2, we had the option to compare fluxes from the open-path IRGA (LI-7500 (175)) with concurrent fluxes from the closed-path IRGA (LI-7200 (372)). We found that LI-75 and LI-72 fluxes corresponded relatively well over approx. 2 years (Fig. 1, LI-75 in red, LI-72 in blue). However, when we converted the LI-75 fluxes using EddyPro (Burba 2008 method), we found that the conversion resulted in a strong underestimation of the correlation coefficient in comparison to LI-72 (see blue and purple lines in Fig. 1). This indicates that the default application of the Burba 2008 correction is risky.

Flowchart

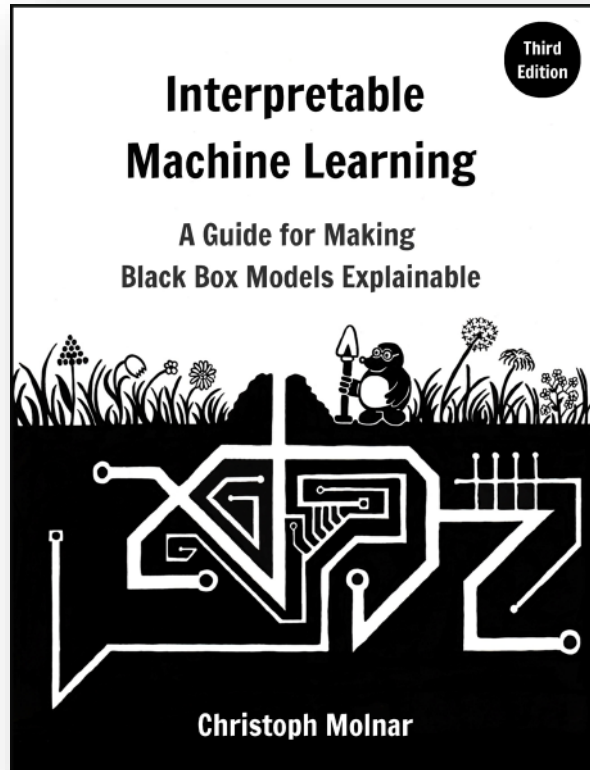
```

graph TD
    A[EC binary raw data] --> B[bcio]
    B --> C[EC ASCII raw data]
    C --> D[fluxnet/EddyPro]
    D --> E[L0 fluxes]
    D --> F[meteo data]
    E --> G[L1 fluxes]
    F --> G
    G --> H[drive_scripts]
    H --> I[L2 quality flag]
    H --> J[L3 fluxes]
  
```

QCQ: overall quality control flag

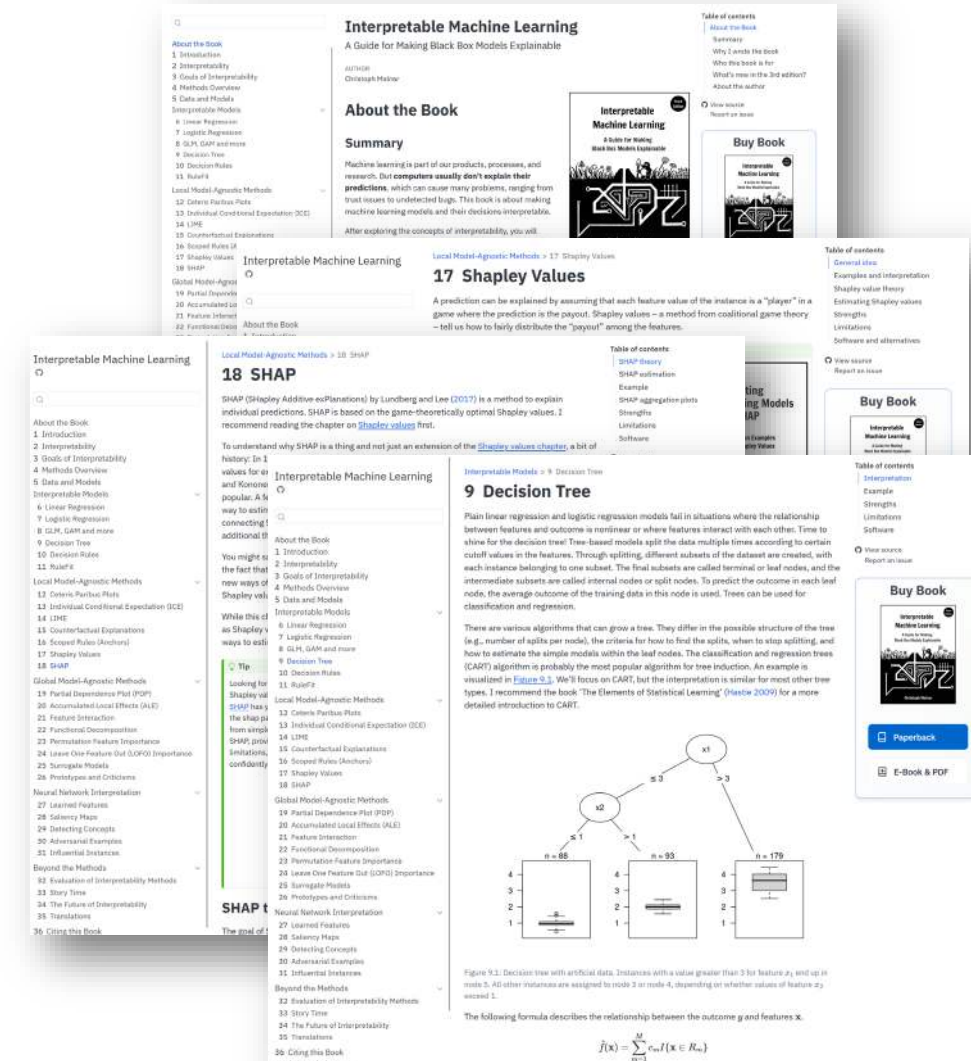
The QCQ (Quality Control Flag) is calculated from multiple flags from single tests.

- QCQ is a flag that shows the overall quality of the respective data point.
- QCQ can be 0 - Good data, 1 - OK data, 2 - Bad data.
- QCQ is calculated from single test flags summed together:
 - No records where the sum is 0: QCQ = 0
 - No records where the sum is 1: QCQ = 1
 - No records where the sum is 2 and no single flag is 2: QCQ = 2
 - No records where the sum is 2 and no single flag is 2: QCQ = 2
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 - No records where the sum is 100: QCQ = 100



- Free online version
- Good chapters e.g. about SHAP

- Also: there is an extra book (not free) about [Interpreting Machine Learning Models With SHAP](https://christophm.github.io/interpreting-machine-learning-models-with-shap/)



<https://christophm.github.io/interpretable-ml-book/>