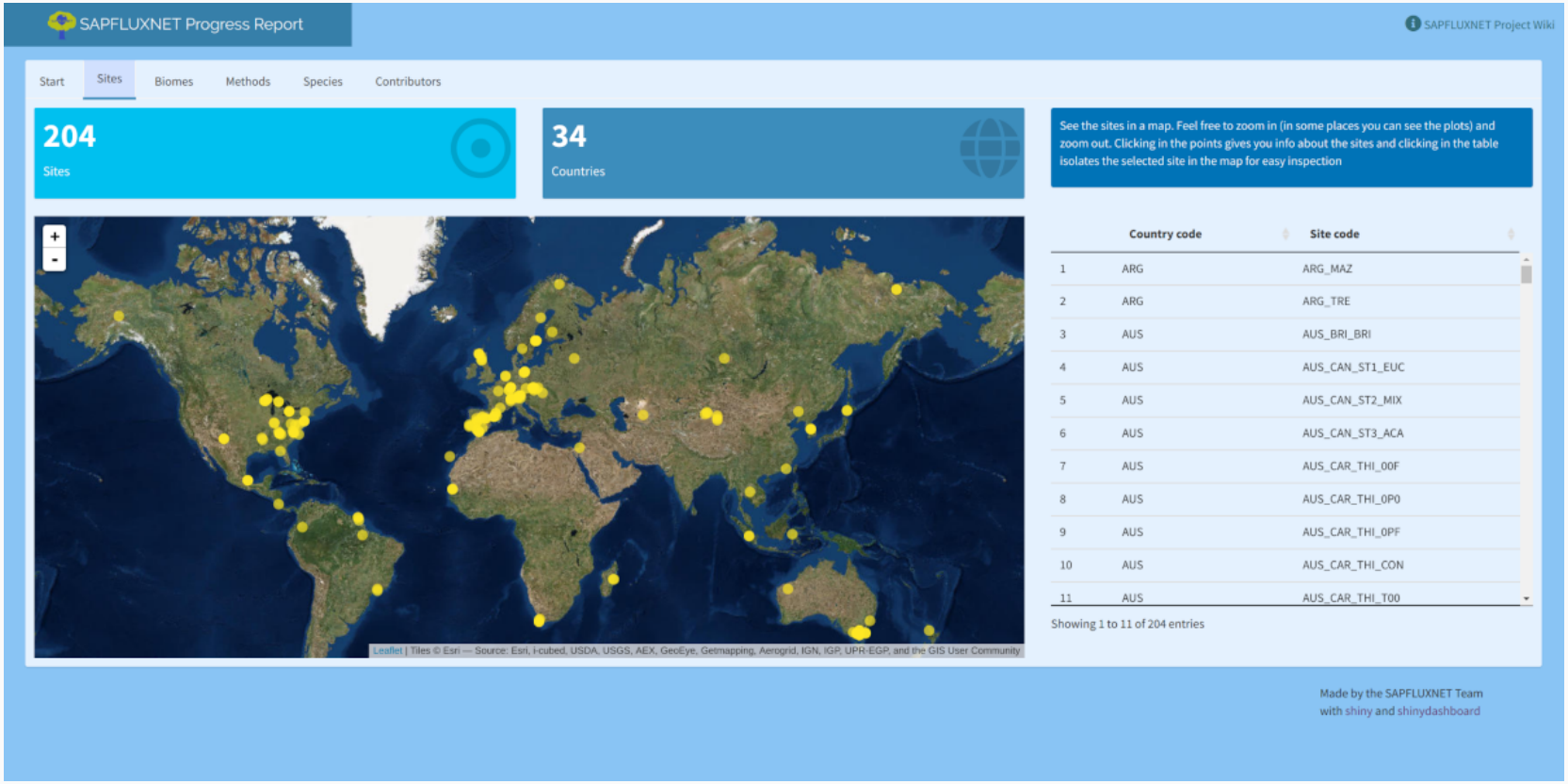
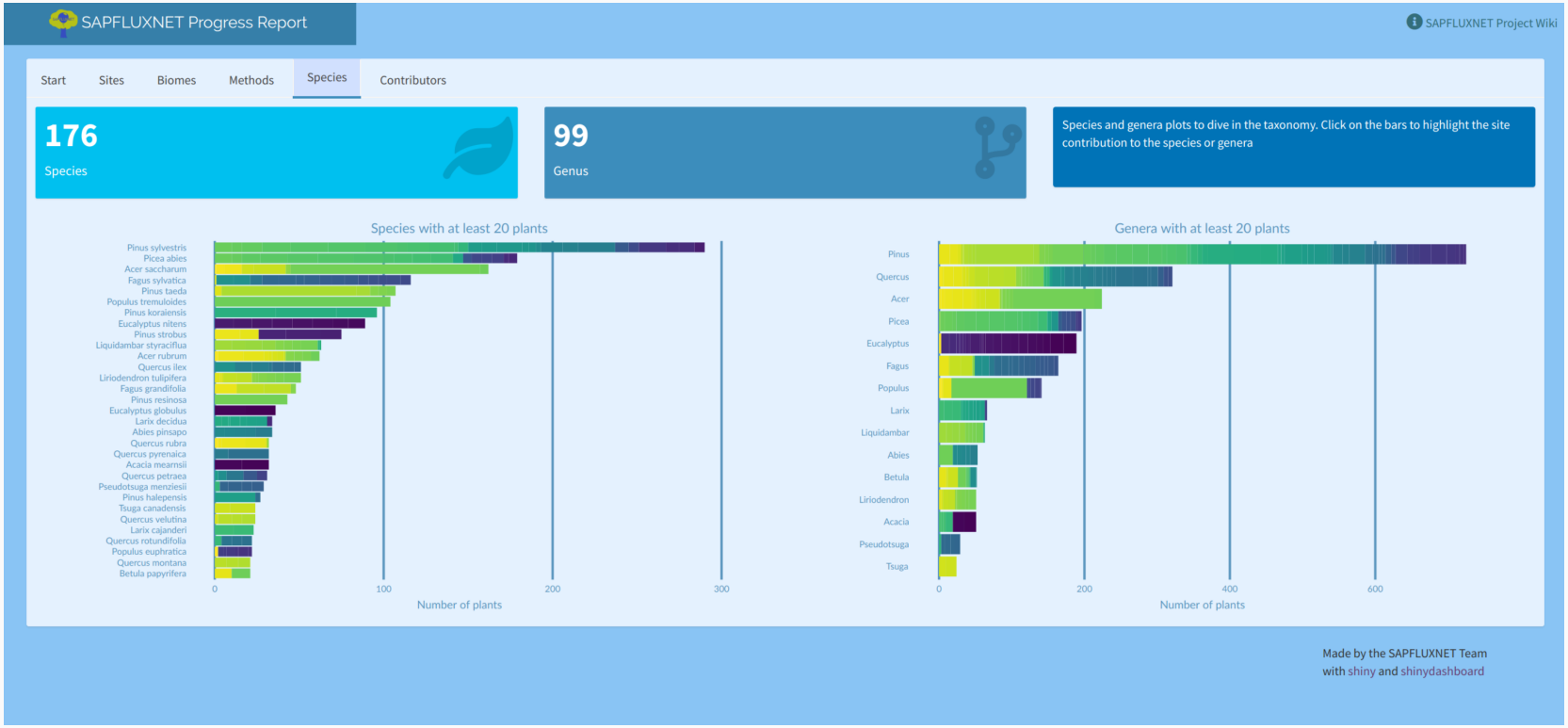
Compiling a global database of sapflow measurements with R

Víctor Granda, Víctor Flo, Mauricio Mencuccini, Jordi Martínez-Vilalta & Rafa Poyatos http://sapfluxnet.creaf.cat/



Workflow and tools for the SAPFLUXNET database

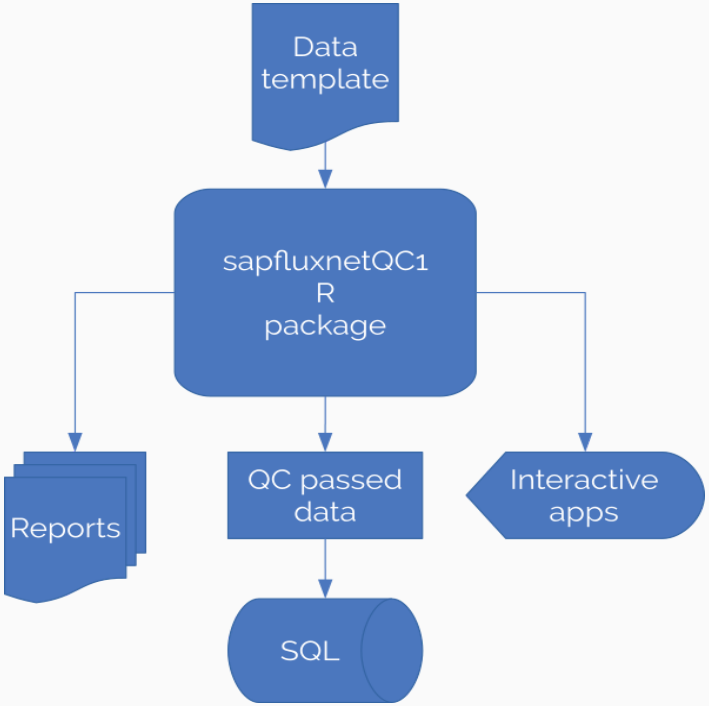
Data and tools for scientists and modellers to help them unravel the **global** patterns and drivers of plant transpiration.



Openess

- Open science
  - a collaborative effort
- Open source
  - mostly R, but other open source tools are also used
- Open data
  - all the data is available on Zenodo (https://zenodo.org/record/2530798)

Sapfluxnet infraestructure



All data flow and data quality checks are performed by the internal-use intended r package *sapfluxnetQC1* (https://github.com/sapfluxnet/sapfluxnetQC1):

- All steps implemented as functions
- Complete reproducibility
- Logs implemented

Manual data quality steps are performed in shiny apps that logs and store all action, again allowing for complete reproducibility.

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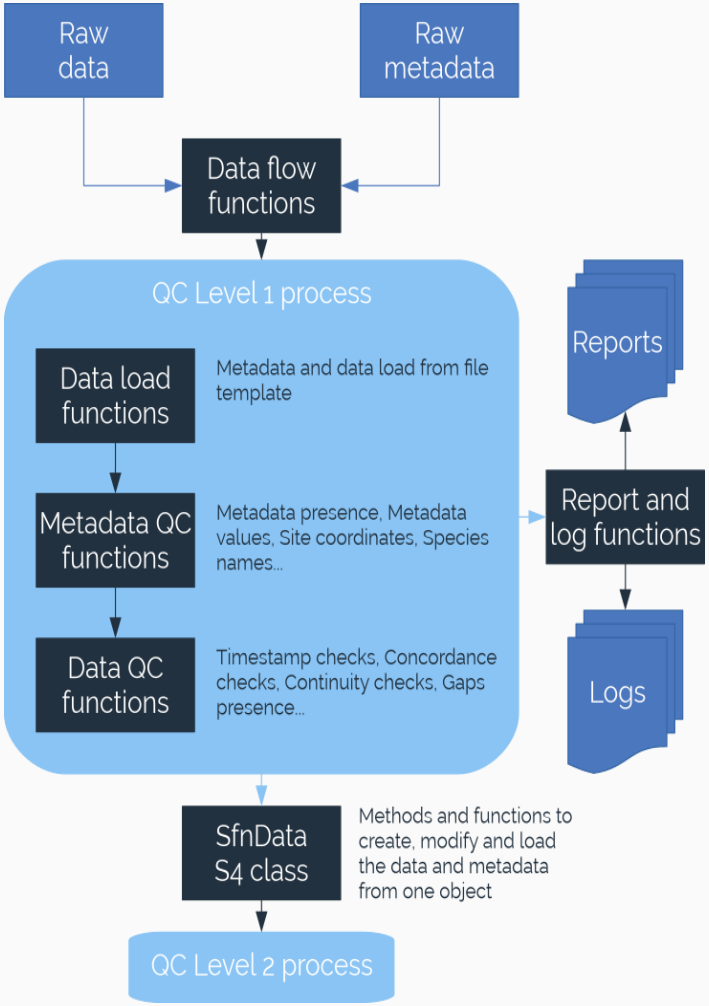

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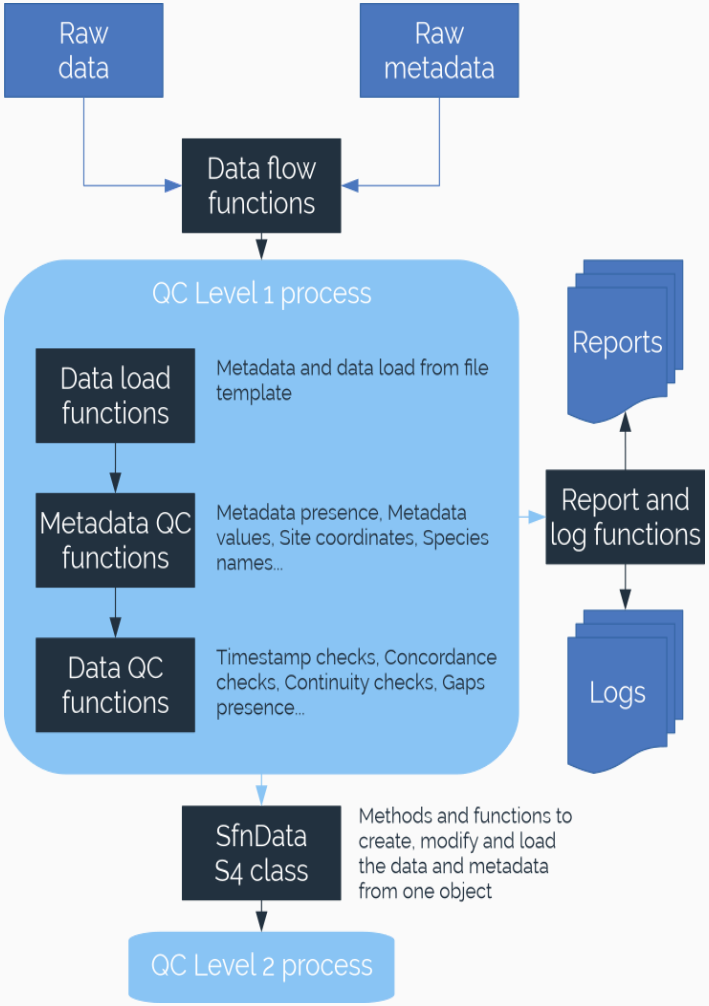

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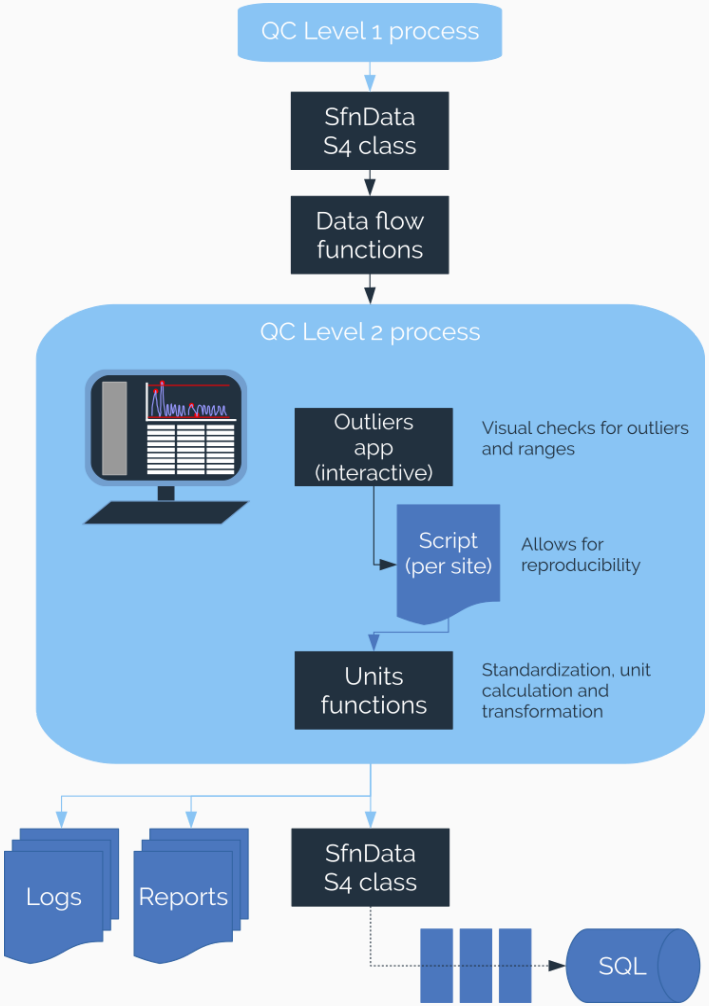

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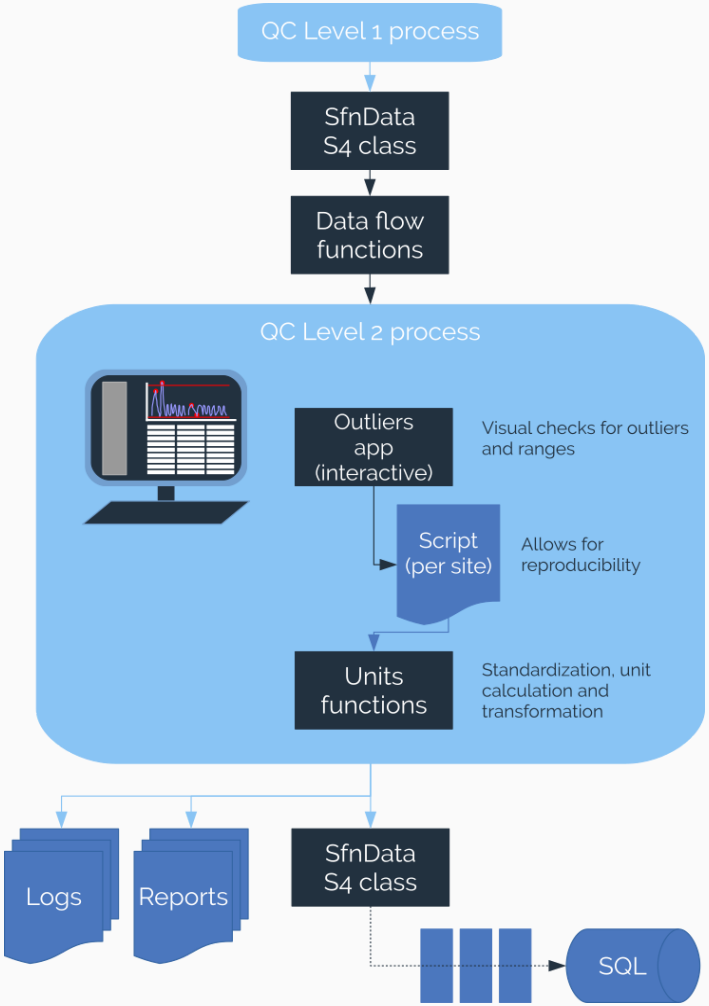

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Inspection, analysis and visualization of the data

```
install.packages('sapfluxnetr')
library(sapfluxnetr)

folder ← 'sapfluxnet_db/0.1.3/plant'
sfn_metadata ← read_sfn_metadata(folder)

raw_data ← sfn_sites_in_folder(folder) %>%
  filter_sites_by_md(
    si_biome %in% c('Mediterranean', 'Temperate forest'),
    pl_sens_meth == 'HR',
    metadata = sfn_metadata
  ) %>%
  read_sfn_data()

raw_data %>%
  daily_metrics(tidy = TRUE)
```

sapfluxnetr package:

- Data objects -> *snf_data* S4 class
- Metadata inspection (sites information, individual plant characteristics...)
- Subdaily measures aggregation (to daily, monthly, midday, predawn, custom aggregates)
- Data modification tidyverse-style (filtering, mutating...)
- Data visualization (ggplot2)

https://github.com/sapfluxnet/sapfluxnetr

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raw_data %>%
  predawn_metrics(tidy = TRUE)
```

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Inspection, analysis and visualization of the data

```
custom_funs ← list(mean = ~ mean(., na.rm = TRUE), std_dev

# metrics
raw_data %>%
  sfn_metrics(
    period = '7 days',
    .funs = custom_funs,
    solar = TRUE,
    interval = 'daylight'
  )
```

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https://github.com/sapfluxnet/sapfluxnetr

Inspection, analysis and visualization of the data

```
all_plots ← raw_data %>%
  sfn_filter(month(TIMESTAMP) %in% 4:9) %>%
  sfn_mutate(ws = ws * 3600/1000) %>%
  sfn_plot(formula = ~ vpd)

all_plots[[1]]
```

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Aknowledgements

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http://sapfluxnet.creaf.cat/
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