

R + ggplot2 for Geoscience



Dewey Dunnington

Ph.D. Student

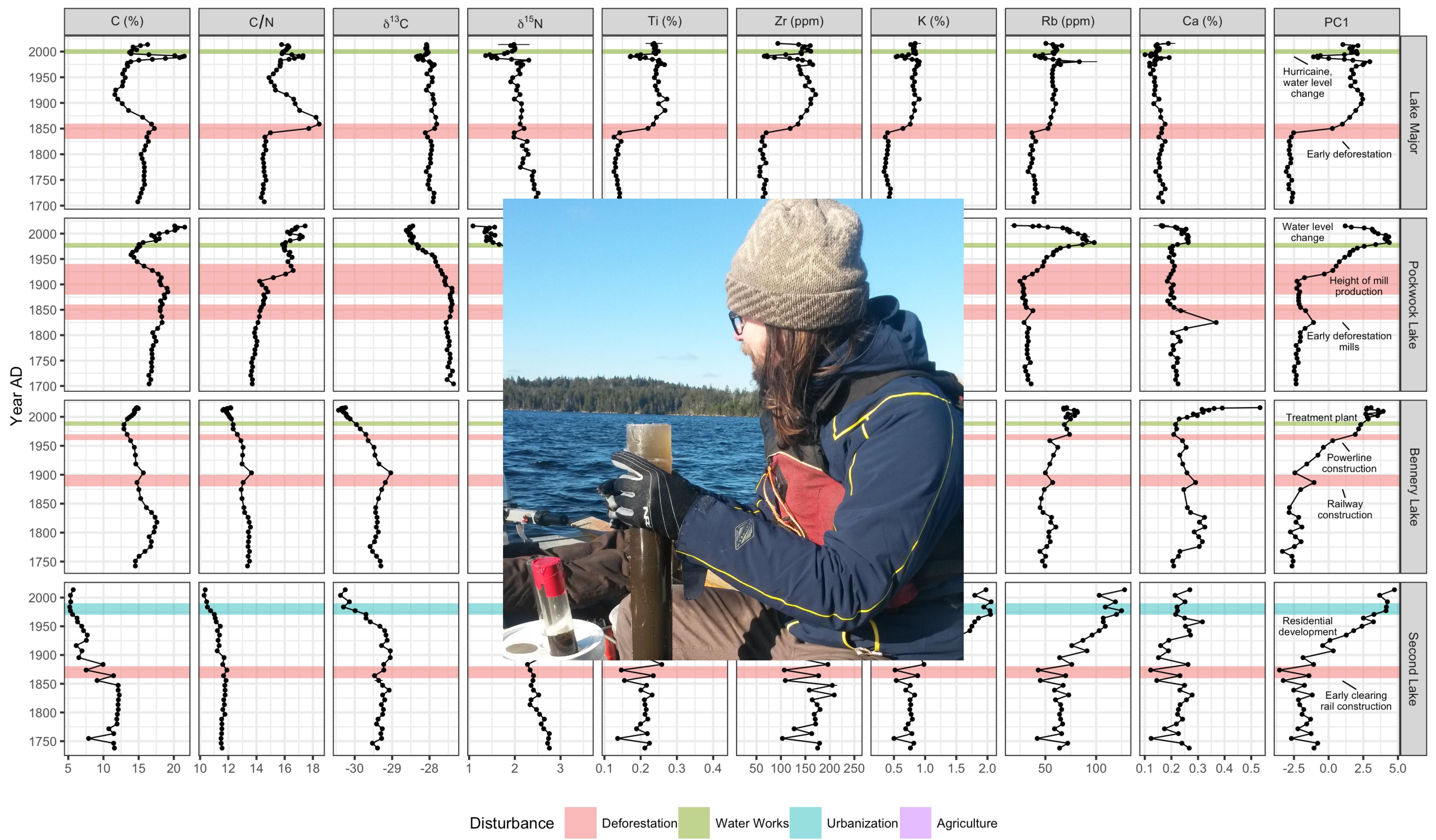
January 2019

Atlantic Geosciences Society AGM

HELLO
my name is

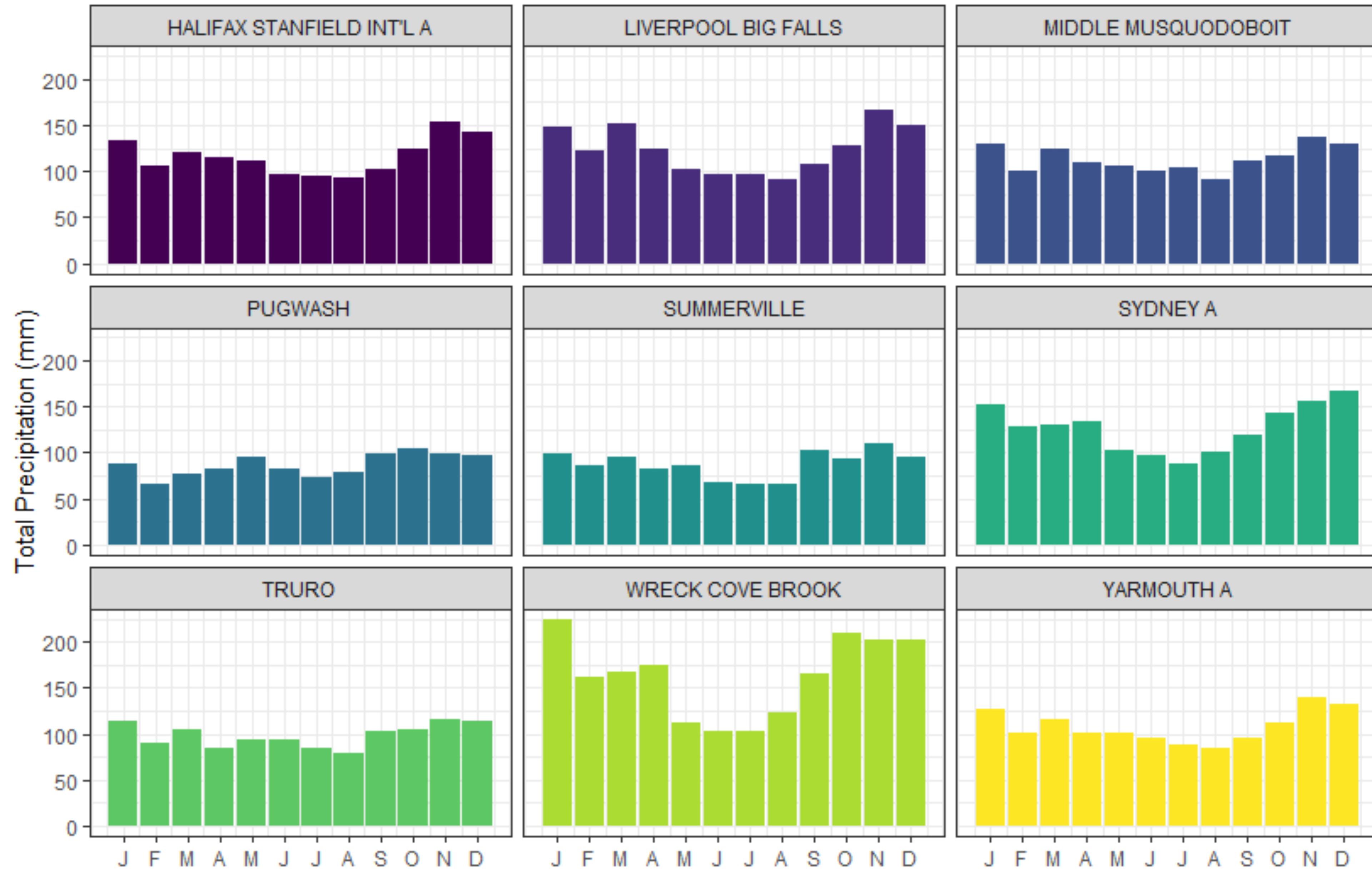
Dewey

@paleolimbot



HELLO
my name is

Lindsay



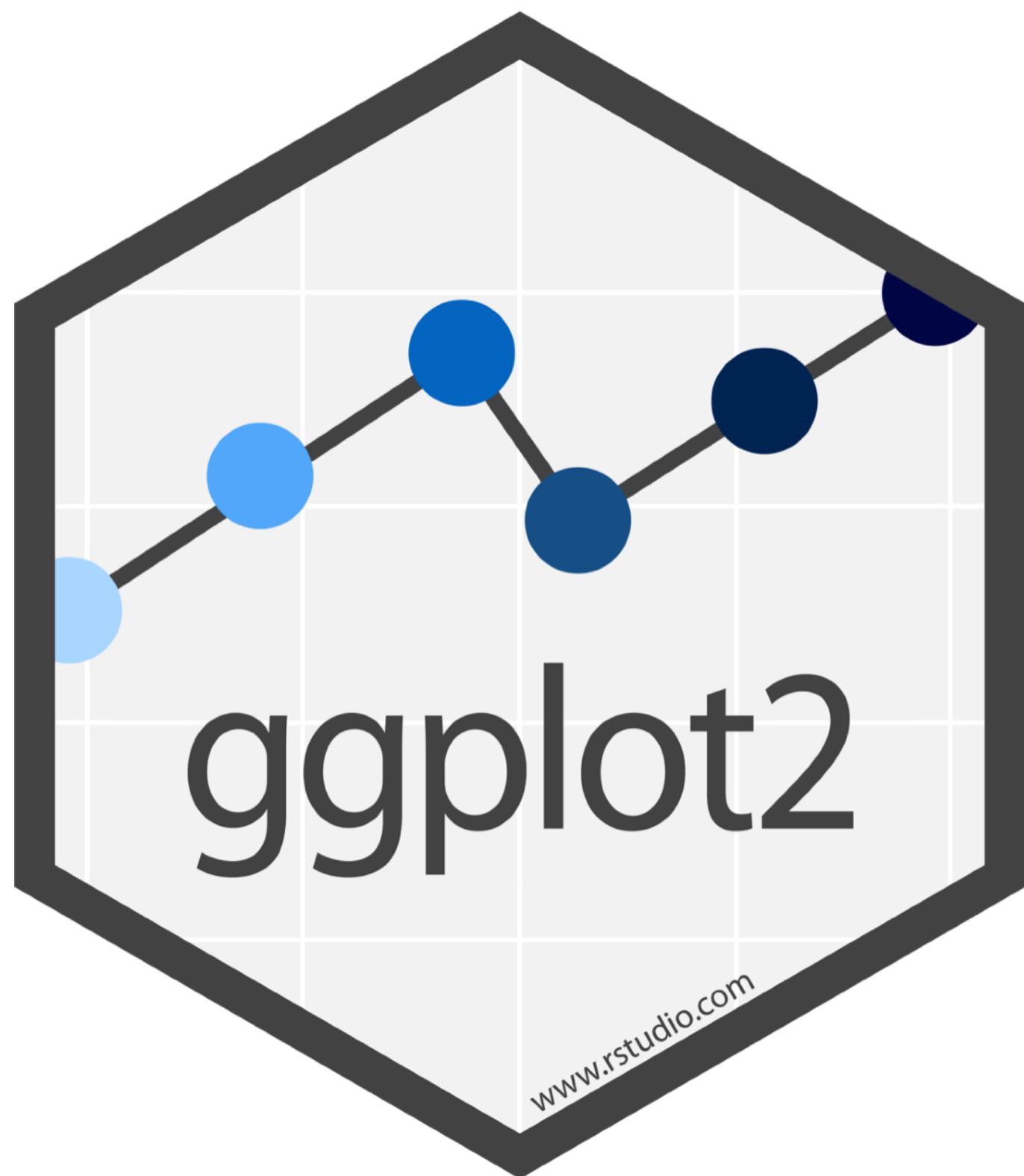
Your Turn

Form groups of 2-4 people. Introduce yourself to your group members. Tell them:

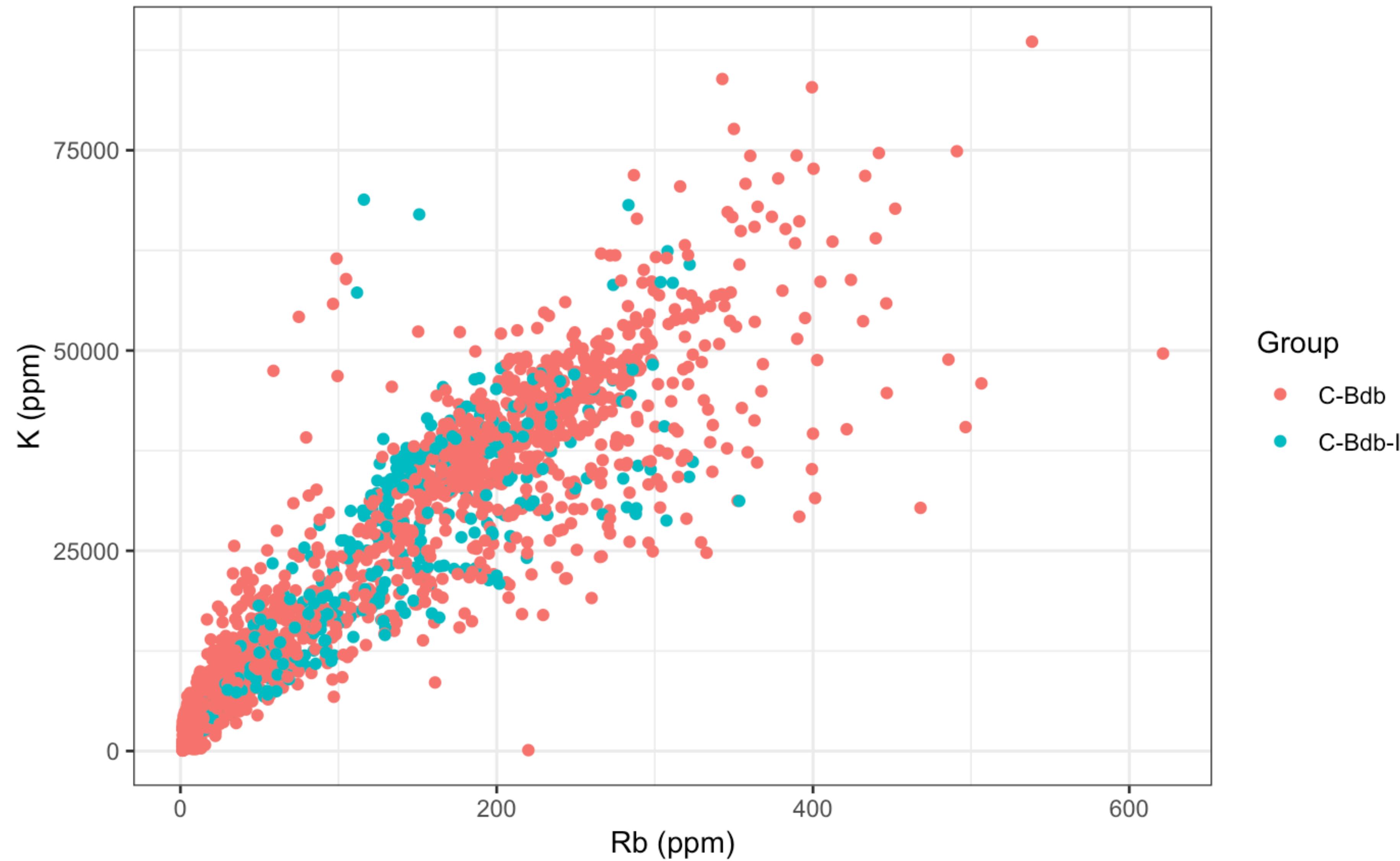
1. Who you are
2. What you do with data
3. How long you have been using R

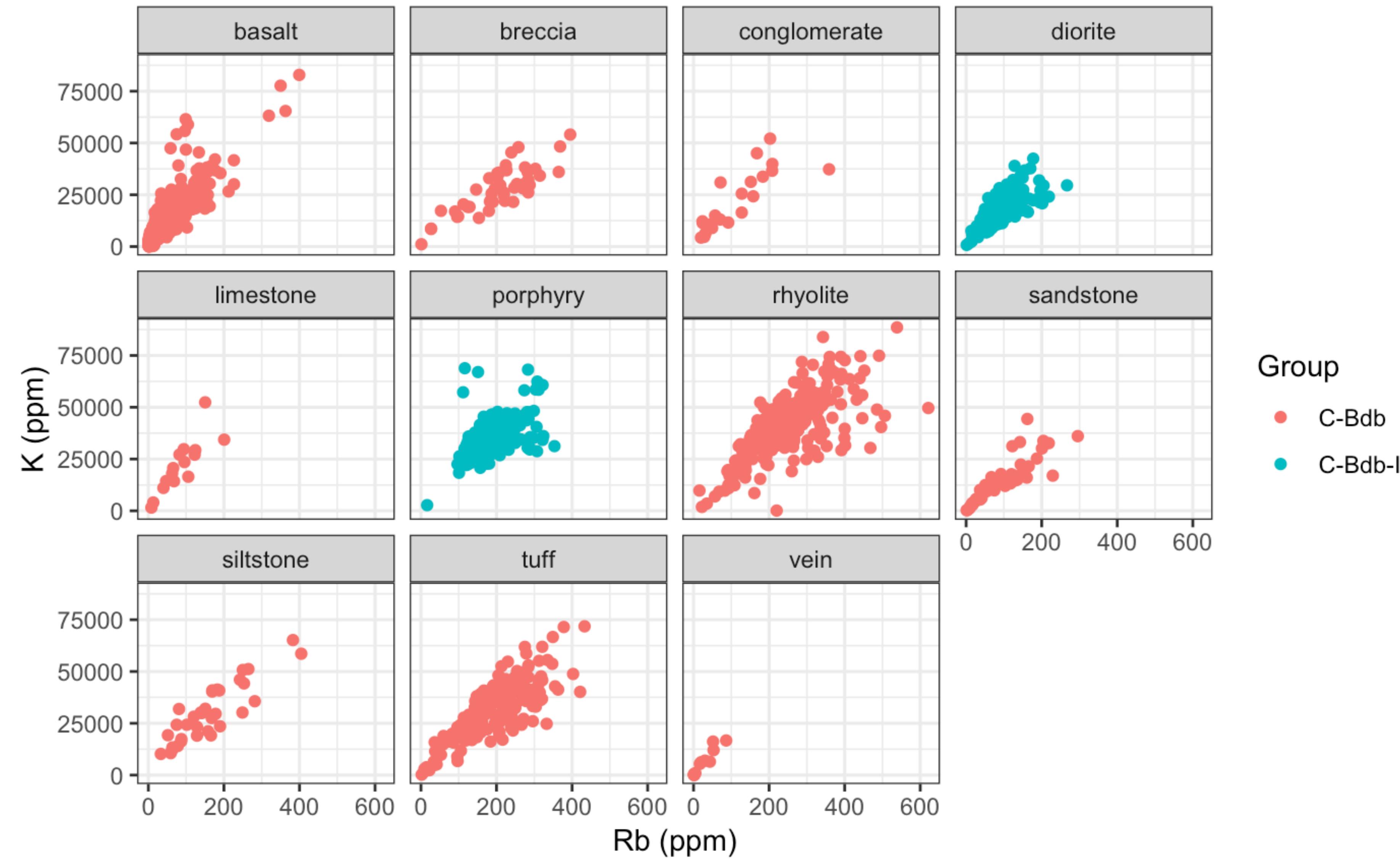


Visualize Data with



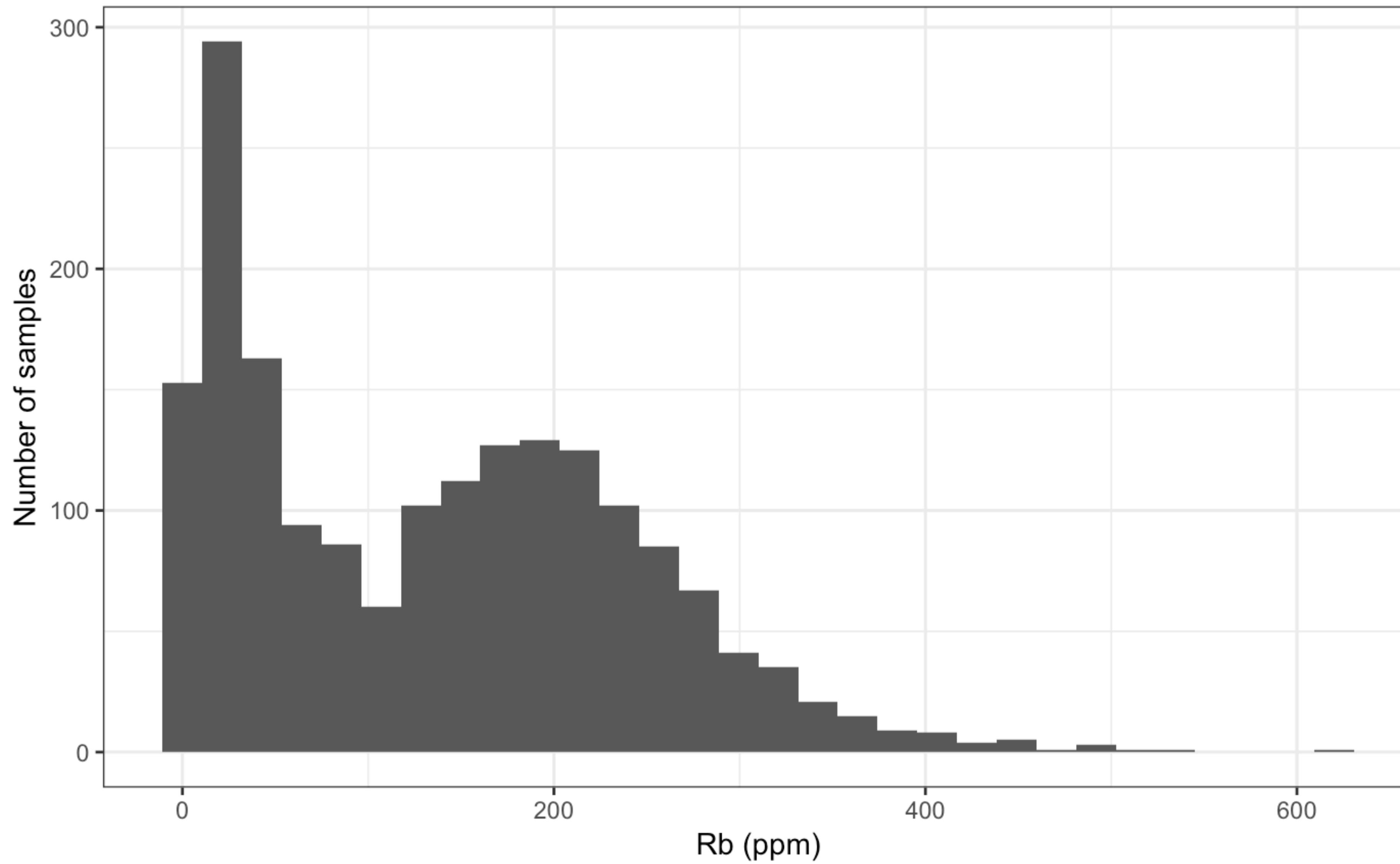
www.rstudio.com

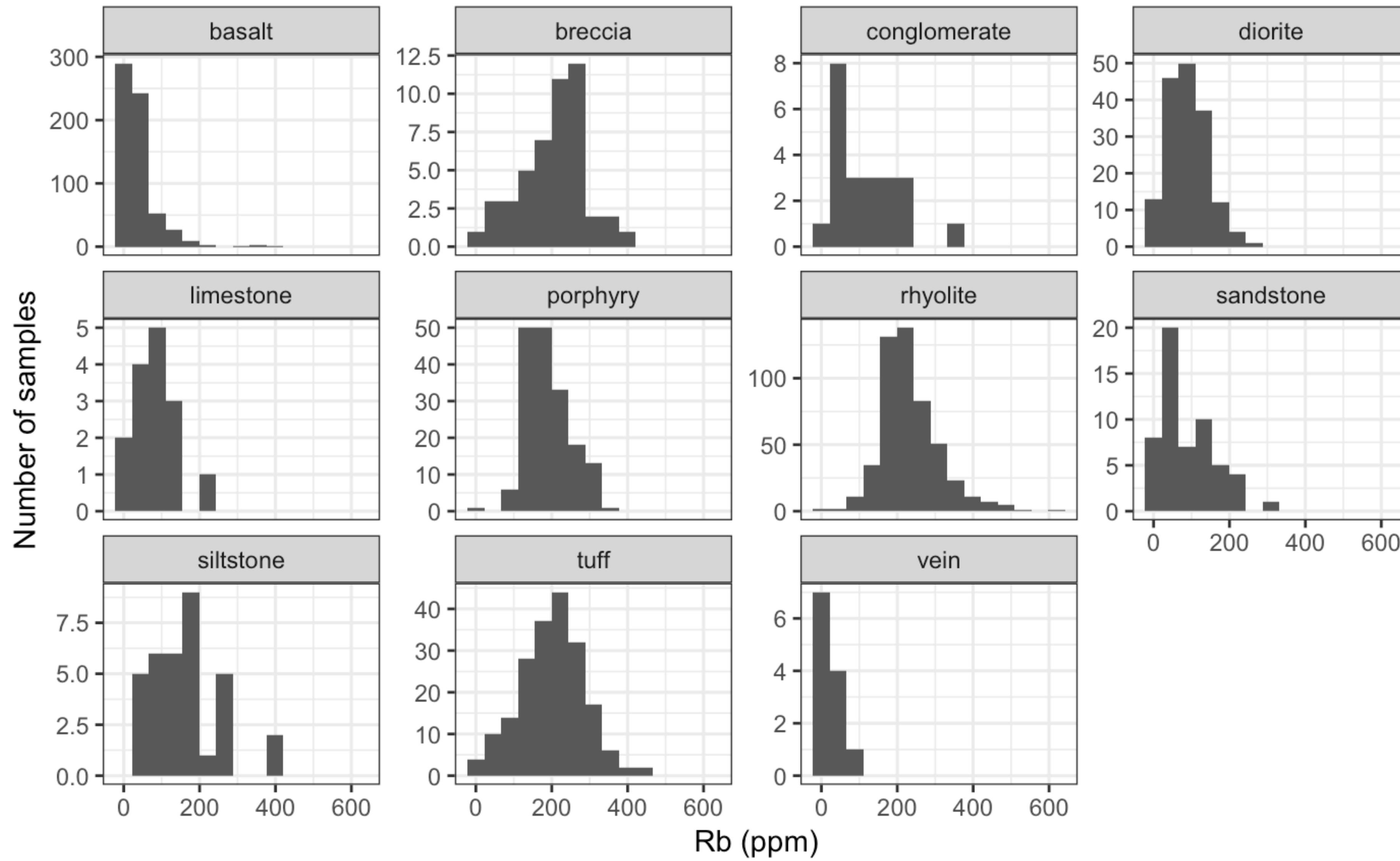


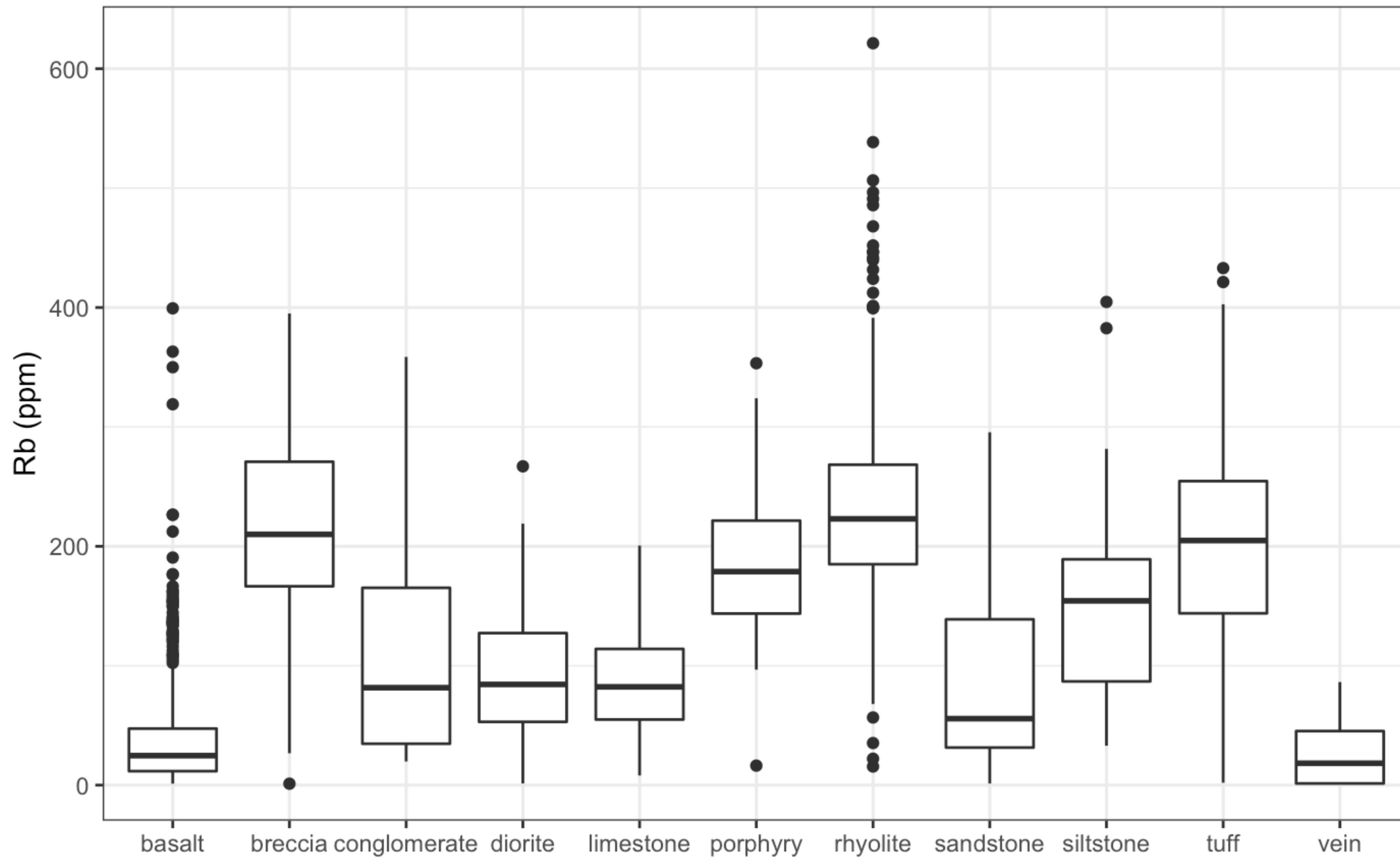


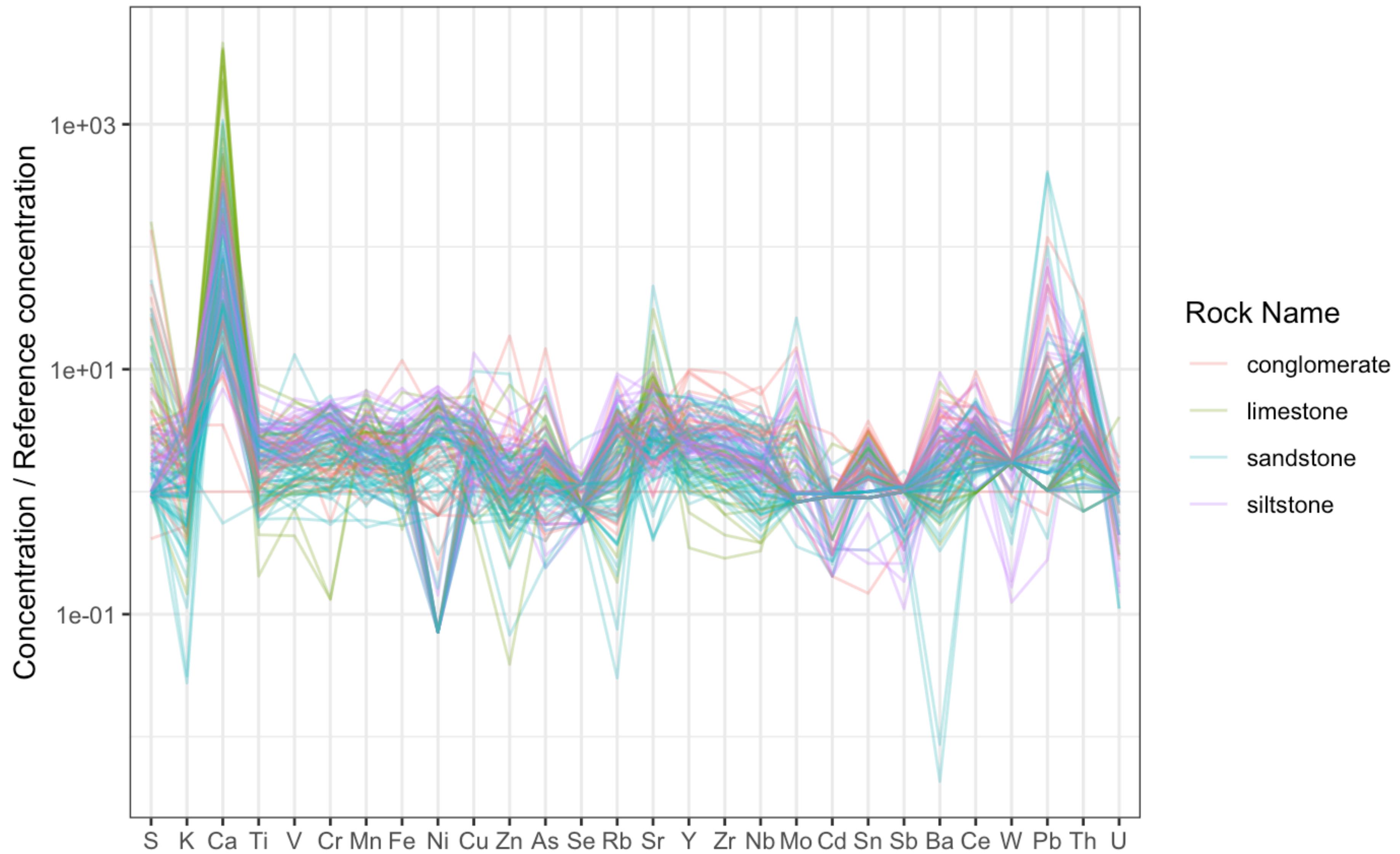
Group

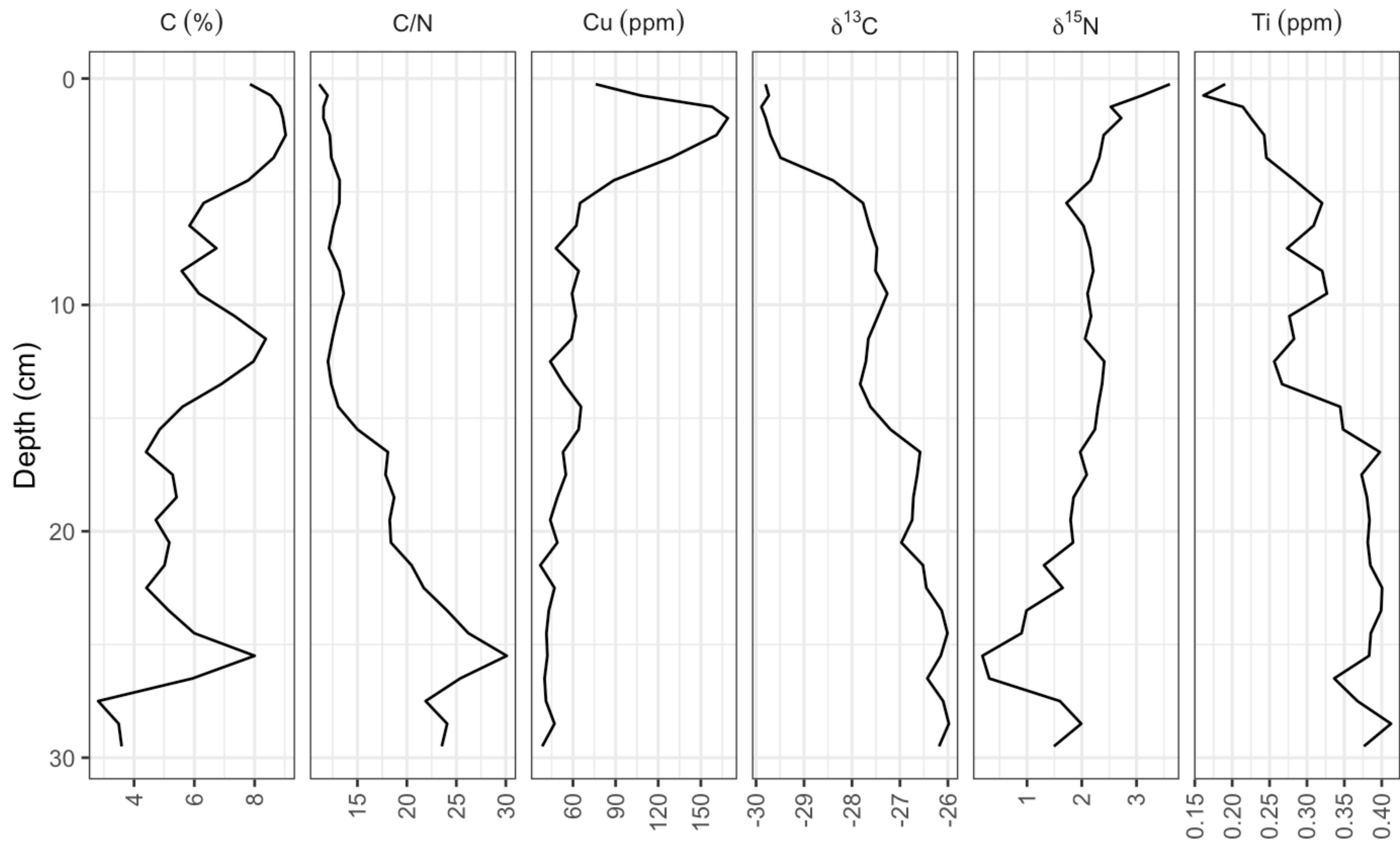
- C-Bdb
- C-Bdb-I

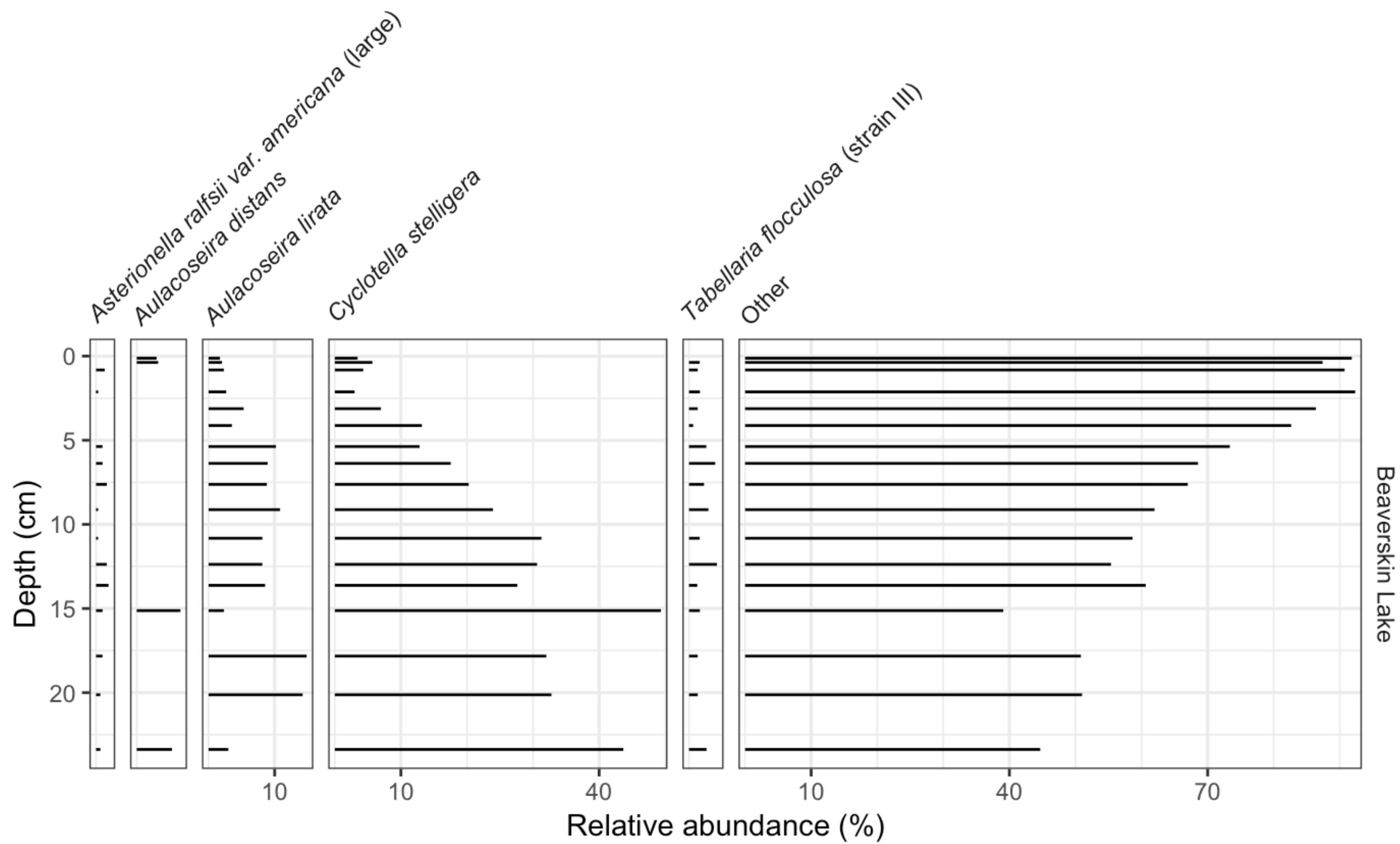


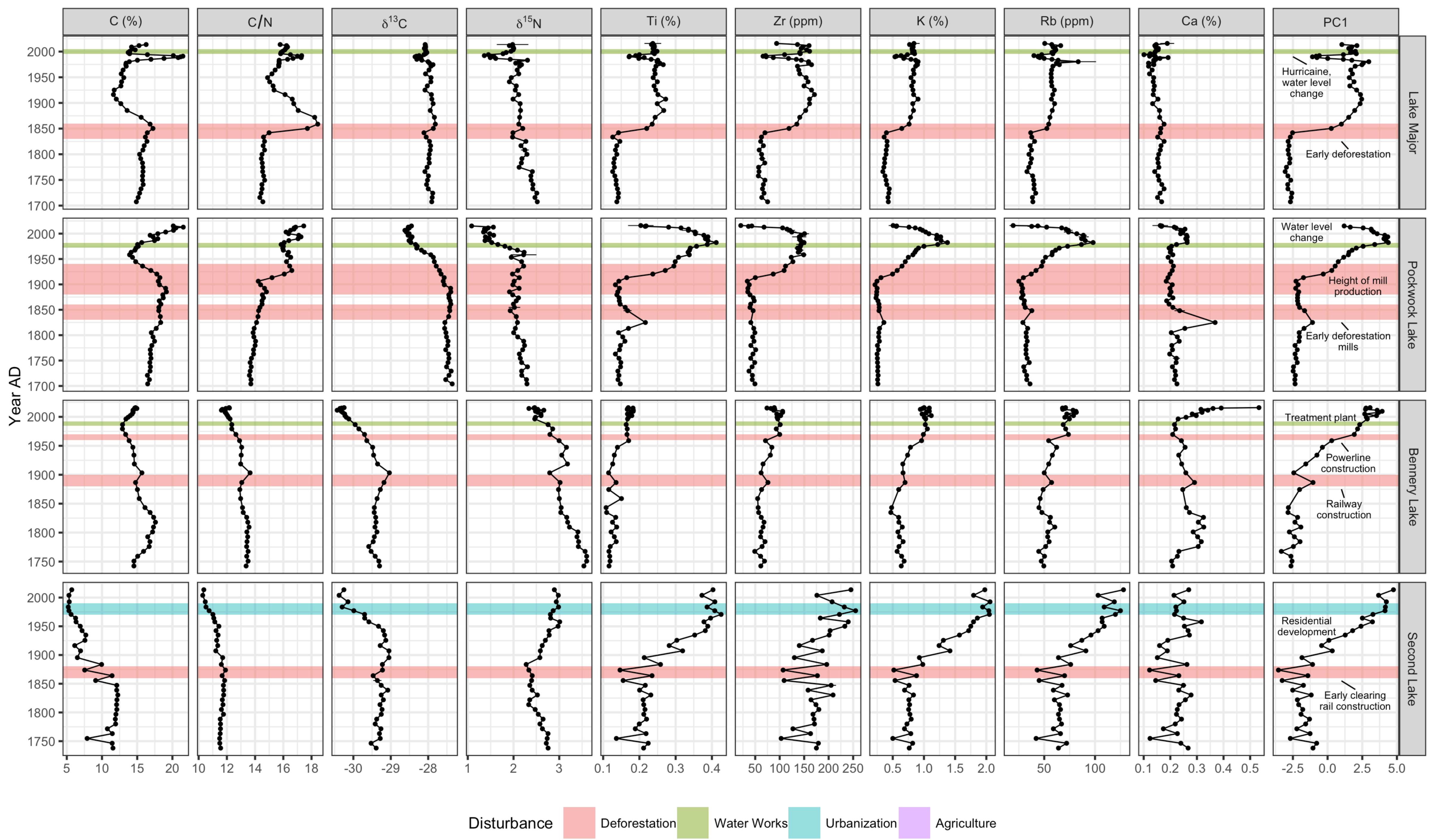


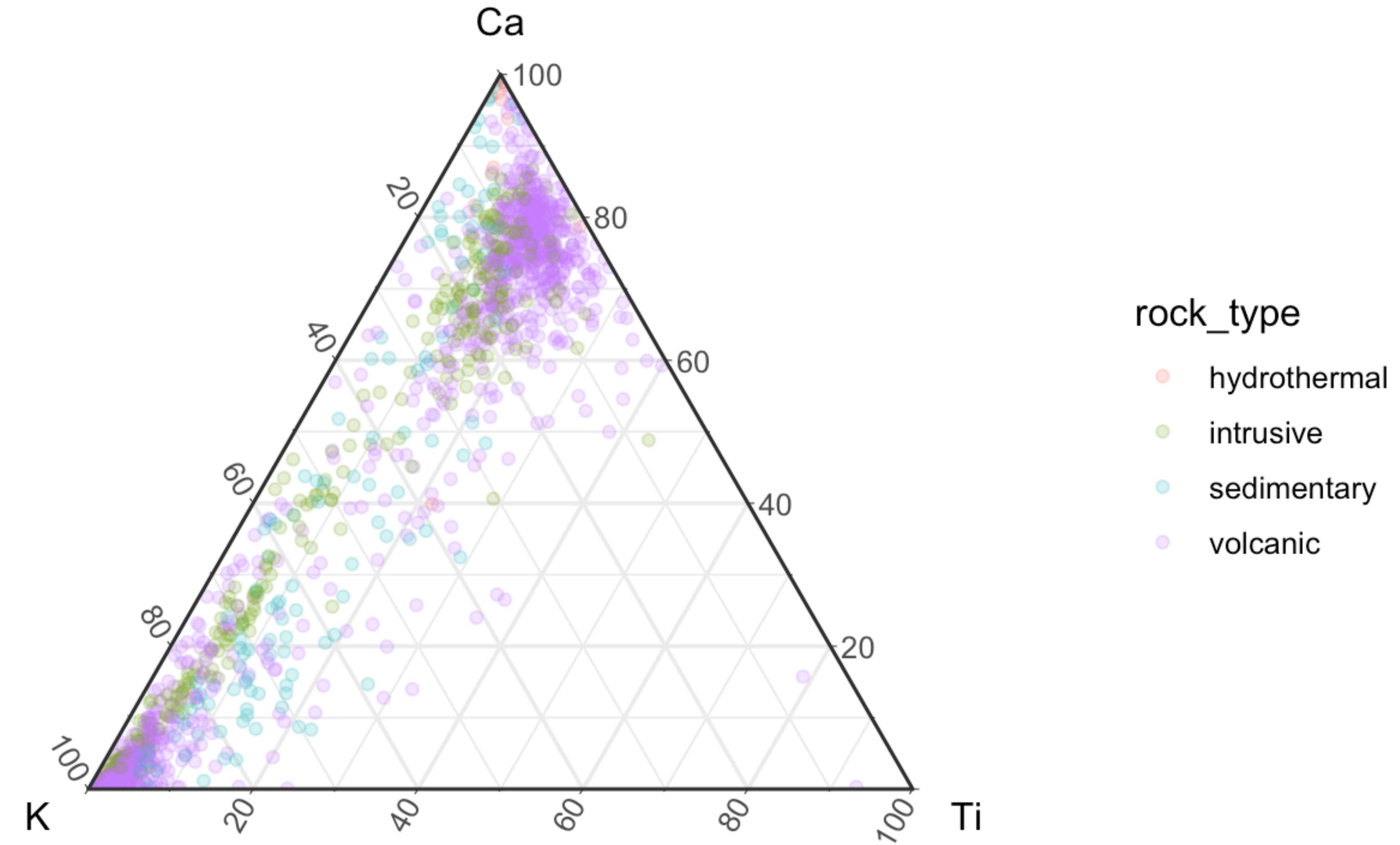


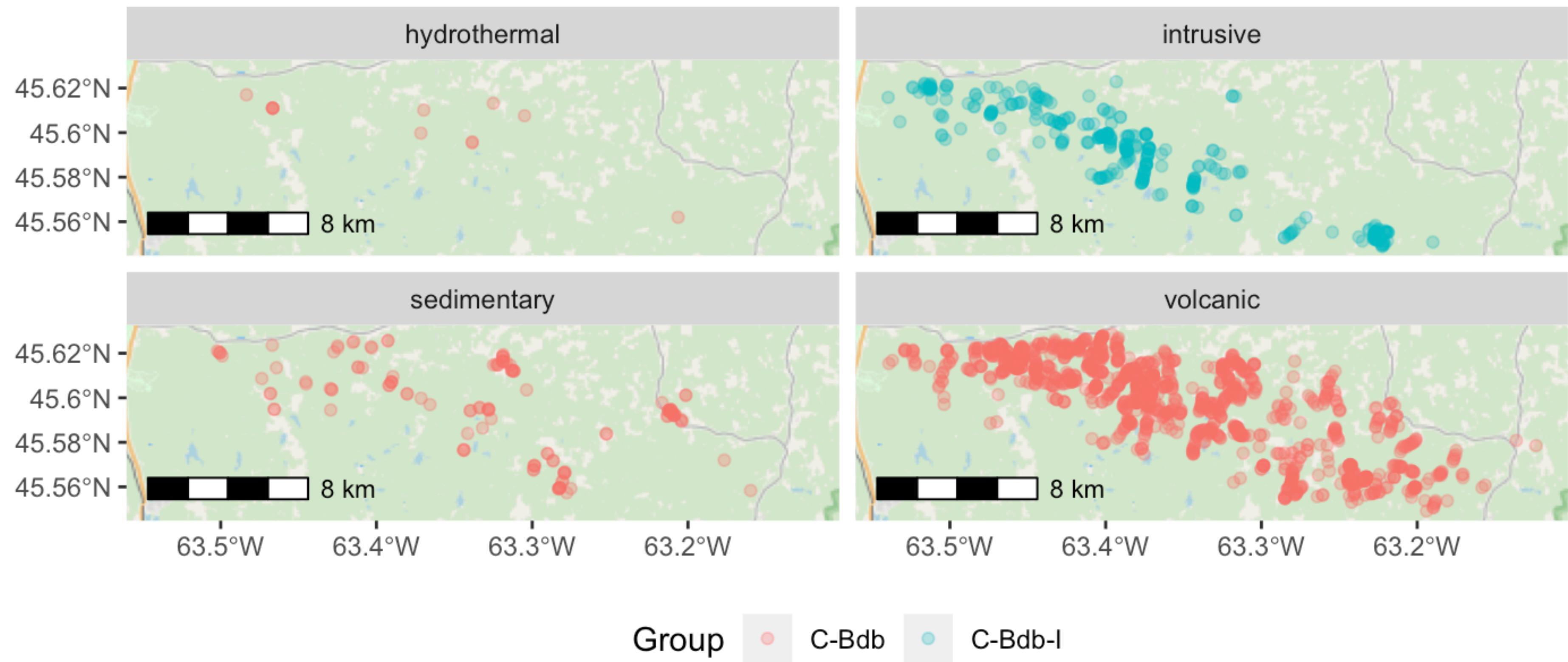












Schedule

Intro to Visualization,
Basic R

1:00 - 3:00

Break

3:00 - 3:15

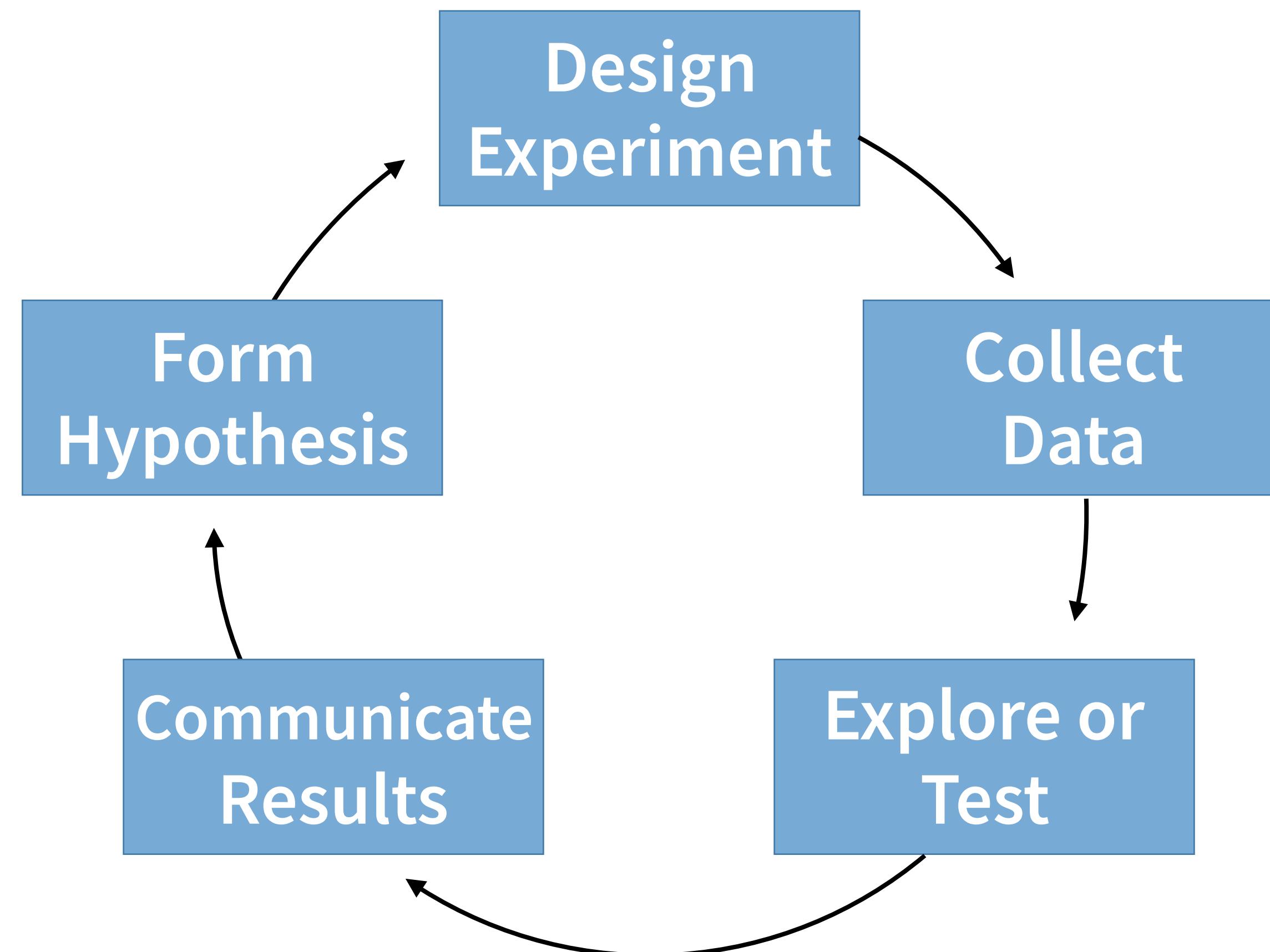
Wrangling Data, More
Visualization

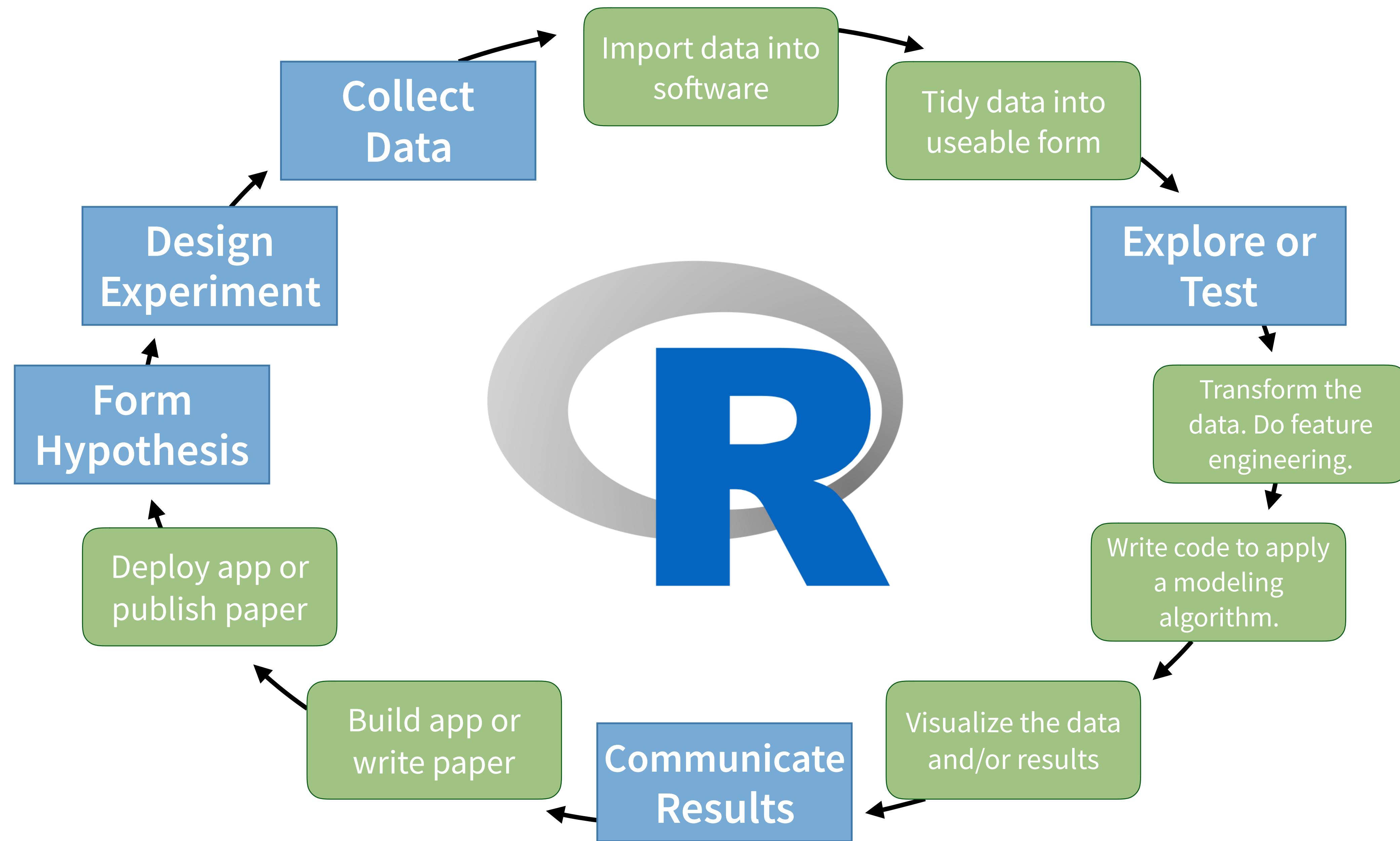
3:15 - 4:30

Help with your projects!

4:30 - 5:00

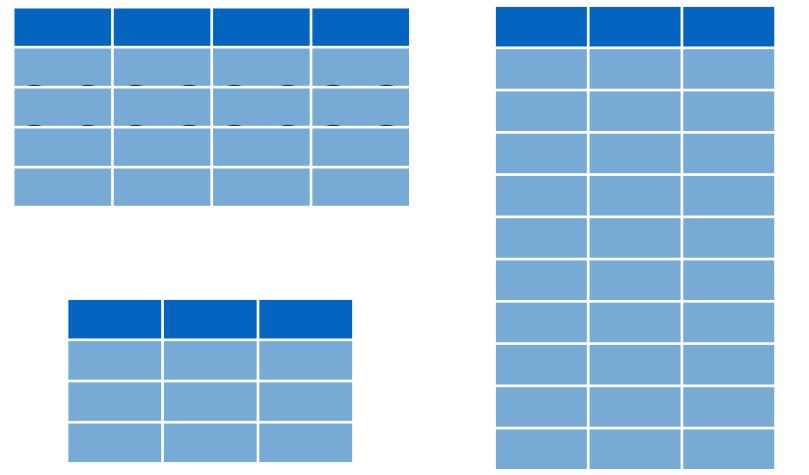
"Science"



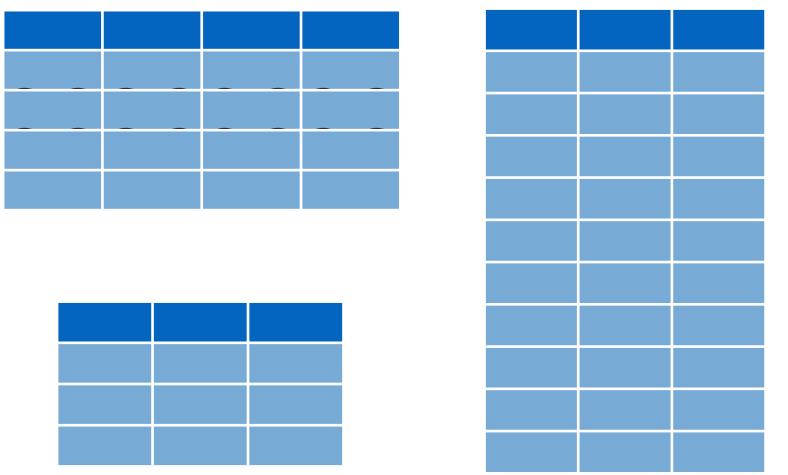


R Packages

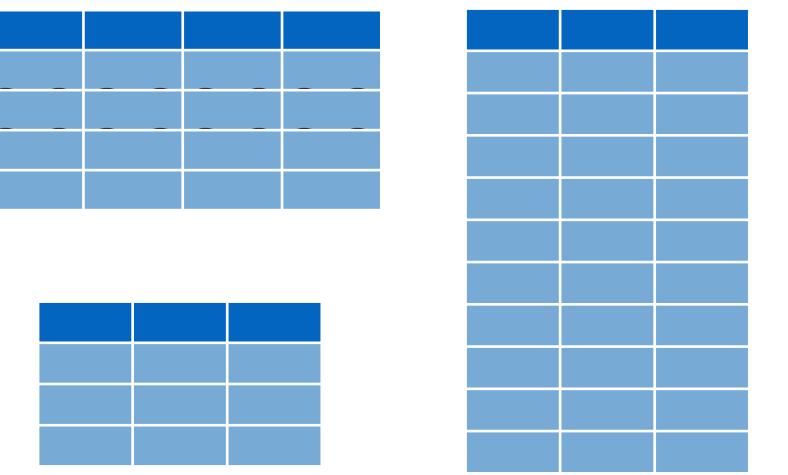
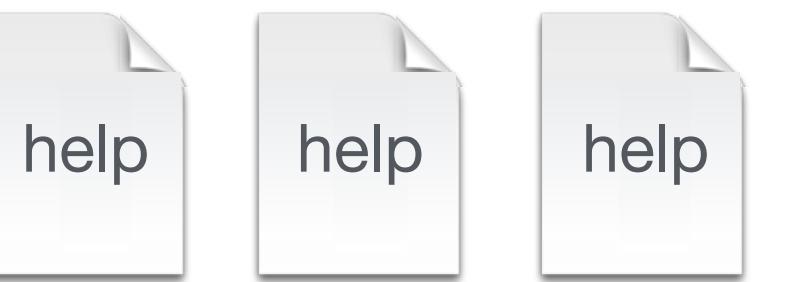




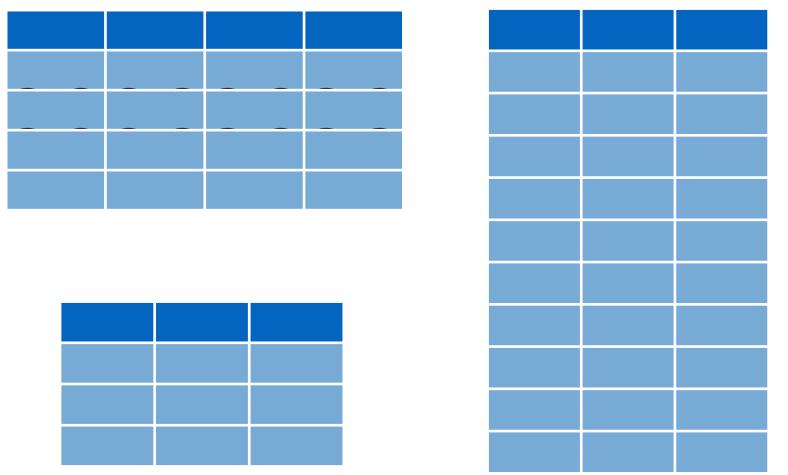
function1()
function2()
function3()
function4()



function1()
function2()
function3()
function4()



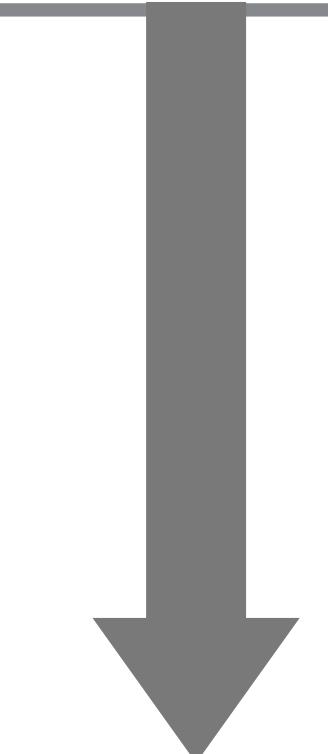
function5()
function6()
function7()
function8()



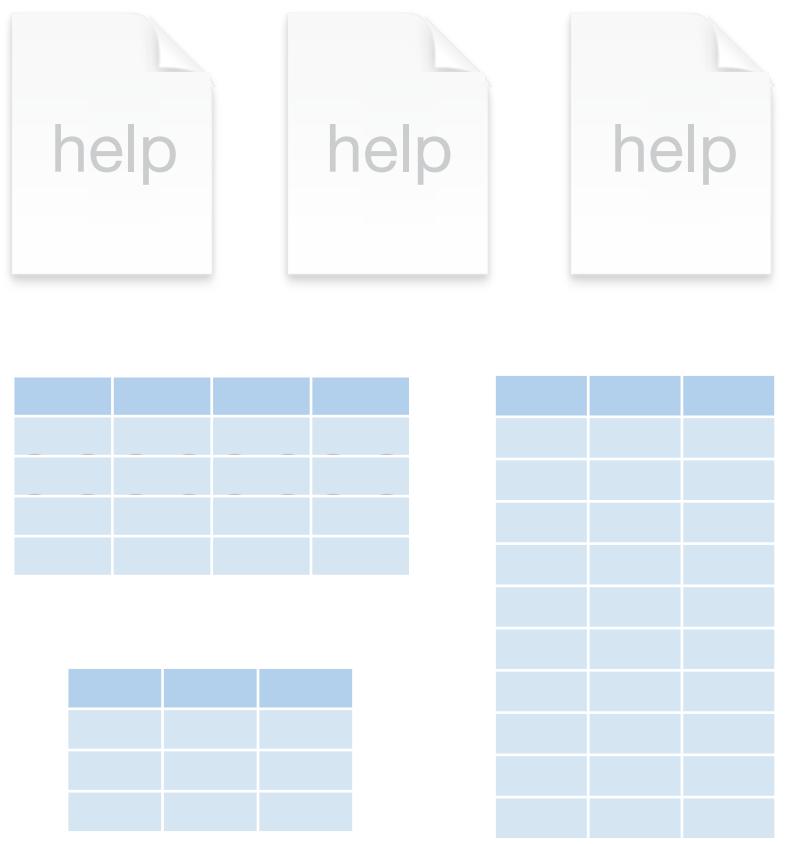
function9()
functionA()
functionB()
functionC()



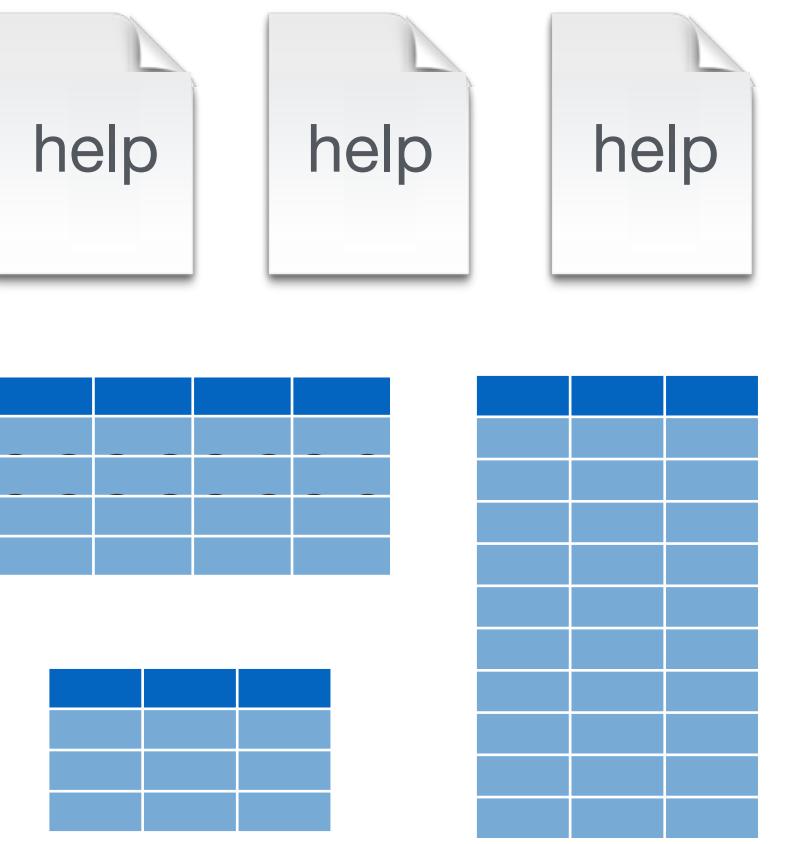
functionD()
functionE()
functionF()
functionG()



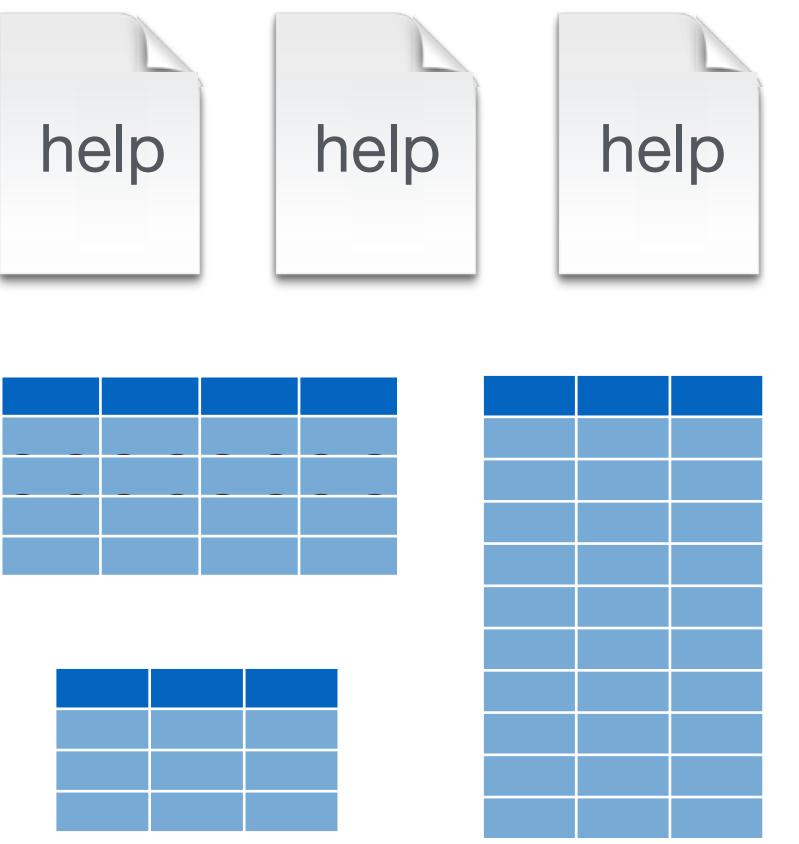
Base R



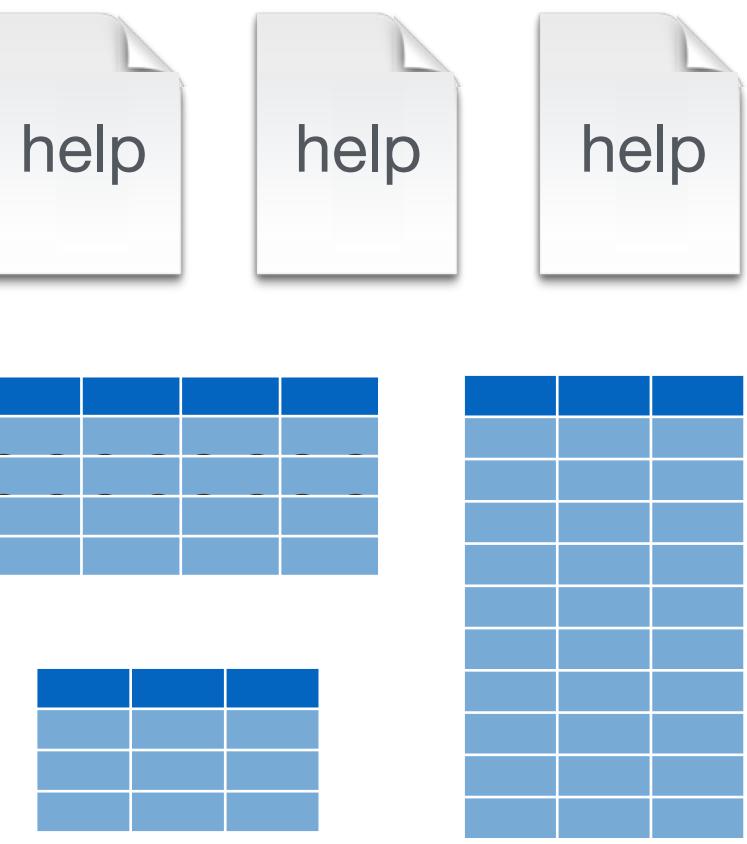
function1()
function2()
function3()
function4()



function5()
function6()
function7()
function8()



function9()
functionA()
functionB()
functionC()



functionD()
functionE()
functionF()
functionG()

Base R

R Packages

The screenshot shows a web browser window with the title "The Comprehensive R Archive". The address bar indicates a secure connection to "https://cran.r-project.org". The page content includes the CRAN logo, navigation links for mirrors, what's new, task views, search, about R, software, documentation, and contributed packages. A large section on the right lists available CRAN packages by name, with a link to the full list of packages from A to Z.



[CRAN
Mirrors](#)
[What's new?](#)
[Task Views](#)
[Search](#)

[About R](#)
[R Homepage](#)
[The R Journal](#)

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[Documentation](#)
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[A3](#)
[abyyR](#)
[abc](#)
[ABCAnalysis](#)
[abc.data](#)
[abcdeFBA](#)

[ABCOptim](#)
[ABCp2](#)
[ABC.RAP](#)
[abcrf](#)
[abctools](#)
[abd](#)
[abf2](#)
[ABHgenotypeR](#)
[abind](#)
[abjutils](#)
[abn](#)
[abodOutlier](#)

Available CRAN Packages By Name

[A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#) [L](#) [M](#) [N](#) [O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [X](#) [Y](#) [Z](#)

[Accurate, Adaptable, and Accessible Error Metrics for Predictive Models](#)

[Access to Abbyy Optical Character Recognition \(OCR\) API](#)

[Tools for Approximate Bayesian Computation \(ABC\)](#)

[Computed ABC Analysis](#)

[Data Only: Tools for Approximate Bayesian Computation \(ABC\)](#)

[ABCDE_FBA: A-Biologist-Can-Do-Everything of Flux Balance Analysis with this package](#)

[Implementation of Artificial Bee Colony \(ABC\) Optimization](#)

[Approximate Bayesian Computational Model for Estimating P2](#)

[Array Based CpG Region Analysis Pipeline](#)

[Approximate Bayesian Computation via Random Forests](#)

[Tools for ABC Analyses](#)

[The Analysis of Biological Data](#)

[Load Gap-Free Axon ABF2 Files](#)

[Easy Visualization of ABH Genotypes](#)

[Combine Multidimensional Arrays](#)

[Useful Tools for Jurimetrical Analysis Used by the Brazilian Jurimetrics Association](#)

[Modelling Multivariate Data with Additive Bayesian Networks](#)

[Angle-Based Outlier Detection](#)

Using packages

1

```
install.packages("foo")
```

Downloads files to computer

1 x per computer

2

```
library("foo")
```

Loads package

1 x per R Session

The Tidyverse



tidyverse.org

The screenshot shows the homepage of tidyverse.org. At the top, there's a navigation bar with links for Packages, Articles, Learn, Help, and Contribute. Below the navigation, there's a large heading "Tidyverse". To the right of the heading, there's a brief description: "R packages for data science. The tidyverse is an opinionated collection of R packages designed for data science. All packages share an underlying philosophy and common APIs." Below this text, there's a code block with the command "install.packages("tidyverse")". On the left side of the page, there's a graphic featuring six hexagonal icons representing different tidyverse packages: dplyr (orange, with a pliers icon), ggplot2 (grey, with a line plot icon), readr (blue, with a document icon), purrr (white with a cat icon), tibble (dark blue, with a grid icon), and tidyr (orange, with a circular arrow icon).

Tidyverse

Packages Articles Learn Help Contribute

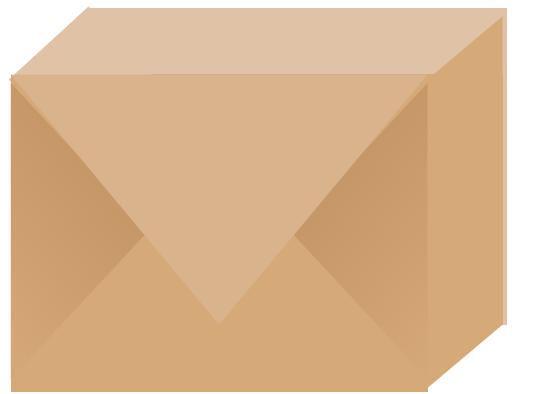
R packages for data science

The tidyverse is an opinionated **collection of R packages** designed for data science. All packages share an underlying philosophy and common APIs.

Install the complete tidyverse with:

```
install.packages("tidyverse")
```

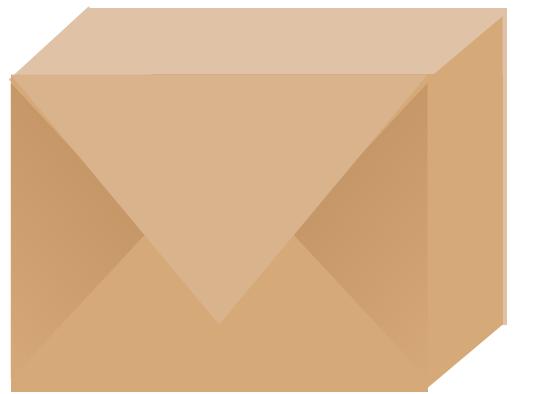
tidyverse



An R package that serves as a short cut for installing and loading the components of the tidyverse.

```
install.packages("tidyverse")
```

tidyverse



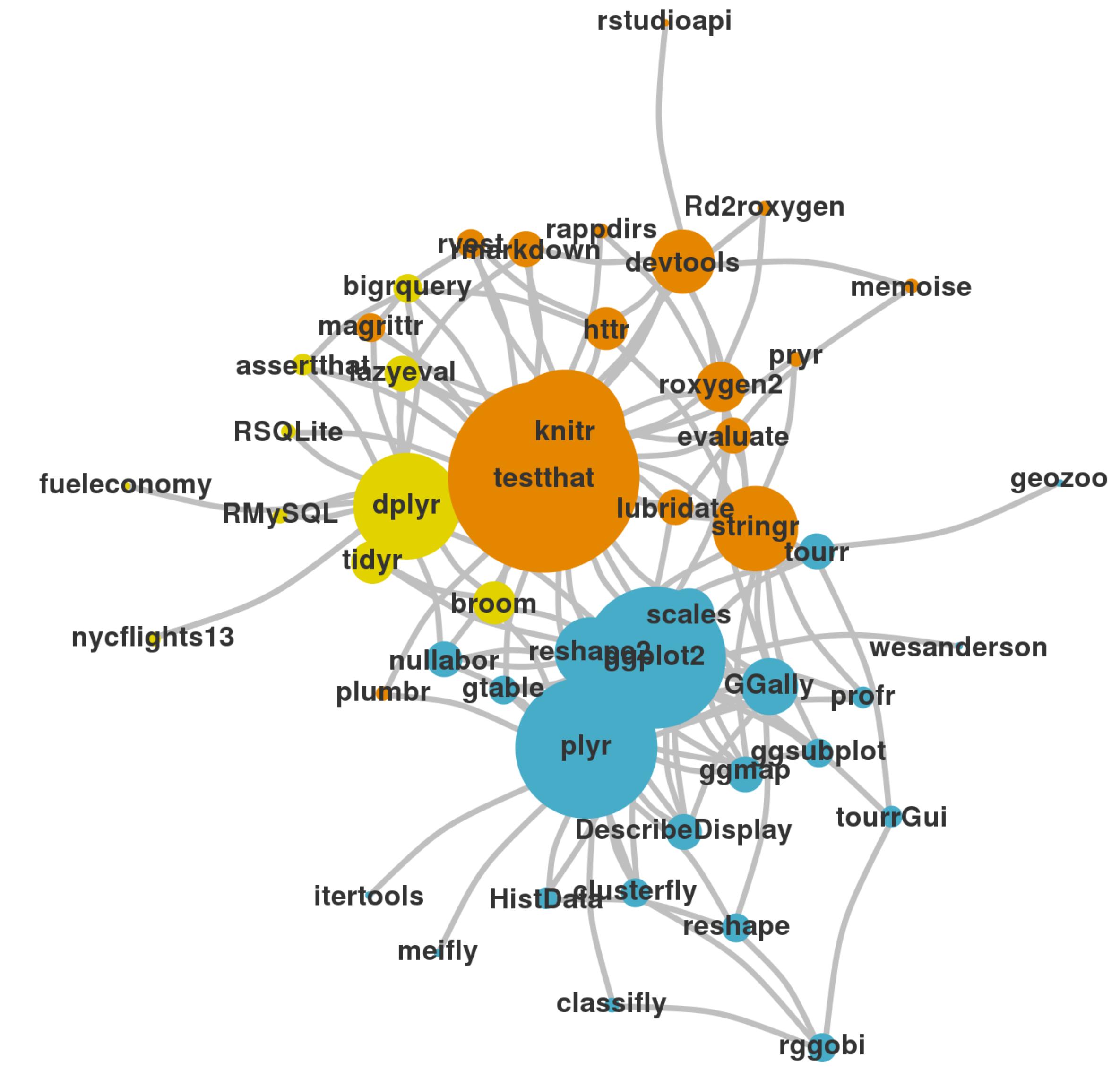
An R package that serves as a short cut for installing and loading the components of the tidyverse.

```
library(tidyverse)
```

```
install.packages("tidyverse")
```

does the equivalent of

```
install.packages("ggplot2")
install.packages("dplyr")
install.packages("tidyr")
install.packages("readr")
install.packages("purrr")
install.packages("tibble")
install.packages("hms")
install.packages("stringr")
install.packages("lubridate")
install.packages("forcats")
install.packages("DBI")
install.packages("haven")
install.packages("httr")
install.packages("jsonlite")
install.packages("readxl")
install.packages("rvest")
install.packages("xml2")
install.packages("modelr")
install.packages("broom")
```



```
install.packages("tidyverse")
```

does the equivalent of

```
install.packages("ggplot2")
install.packages("dplyr")
install.packages("tidyr")
install.packages("readr")
install.packages("purrr")
install.packages("tibble")
install.packages("hms")
install.packages("stringr")
install.packages("lubridate")
install.packages("forcats")
install.packages("DBI")
install.packages("haven")
install.packages("httr")
install.packages("jsonlite")
install.packages("readxl")
install.packages("rvest")
install.packages("xml2")
install.packages("modelr")
install.packages("broom")
```

```
library(tidyverse)
```

does the equivalent of

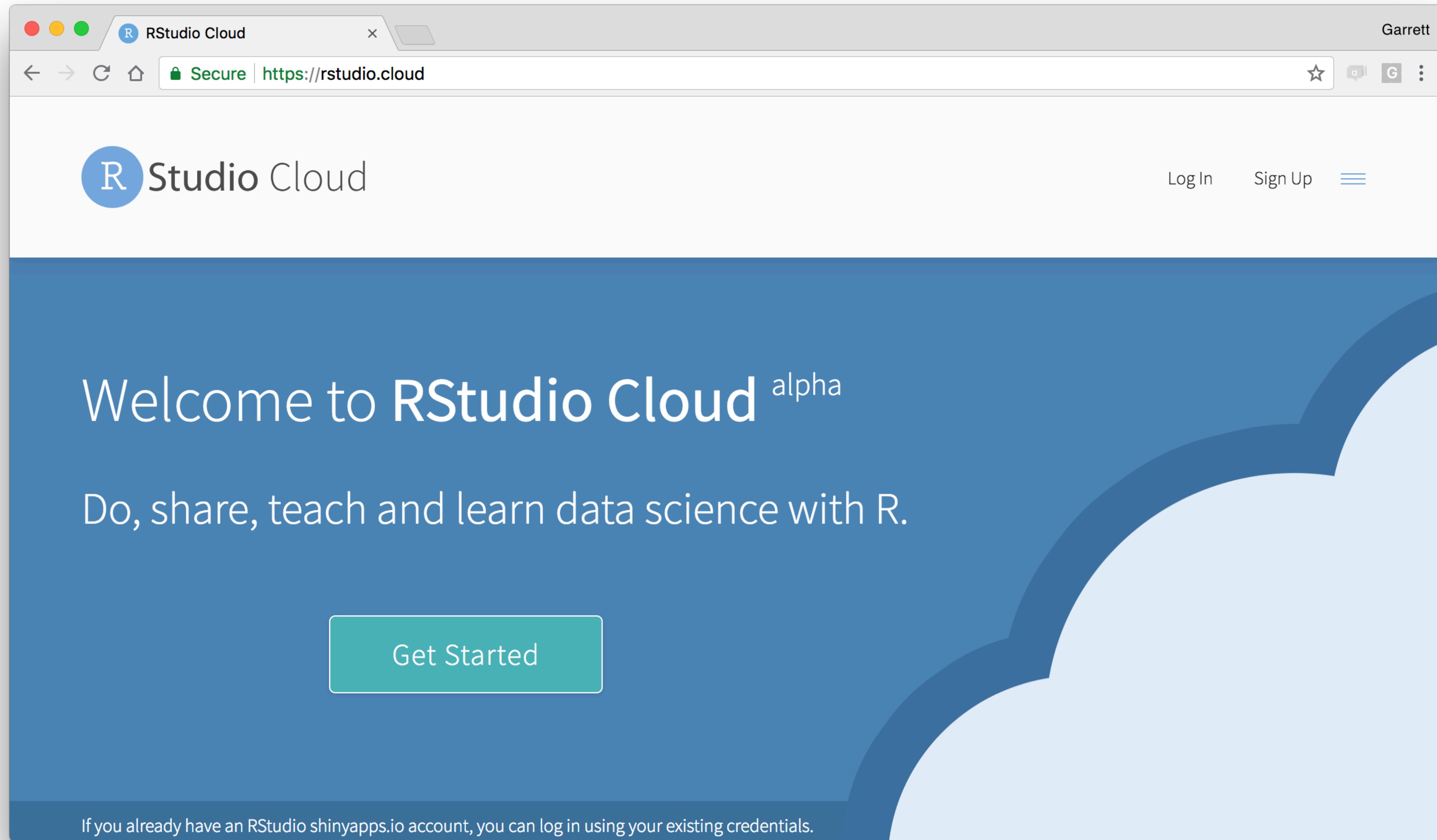
```
library(ggplot2)
library(dplyr)
library(tidyr)
library(readr)
library(purrr)
library(tibble)
library(stringr)
library(forcats)
```

R Notebooks

(Let's start!)

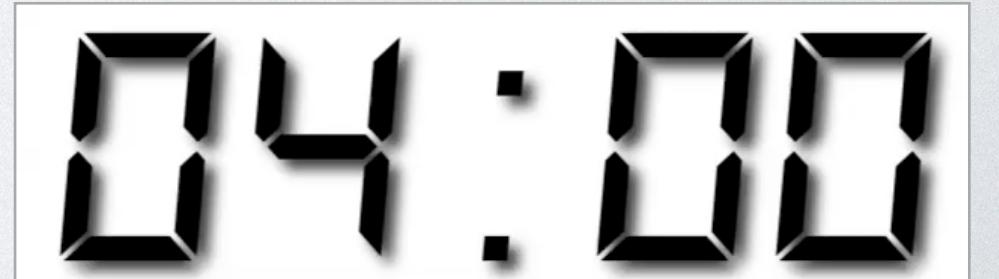


<https://github.com/paleolimbot/r4ags>



Your Turn

Go to **0-Introduction.Rmd**. Read through the notebook and do everything it tells you to do.



R Notebooks

An authoring format for Data Science.

The screenshot shows the RStudio interface with an R Notebook open. The notebook file is titled "R-Notebook.Rmd". The code editor pane contains the following R Markdown code:

```
1 ---  
2 title: "R Notebook"  
3 output: html_notebook  
4 ---  
5  
6 Text written in **markdown**  
7  
8 ```{r}  
9 # code written in R  
10 (x <- rnorm(7))  
11 ````  
12  
13 Text written in _markdown_  
14  
15 ```{r}  
16 # code written in R  
17 hist(x)  
18 ````  
19  
20 (Top Level) ◊
```

The R console pane shows the output of the R code:

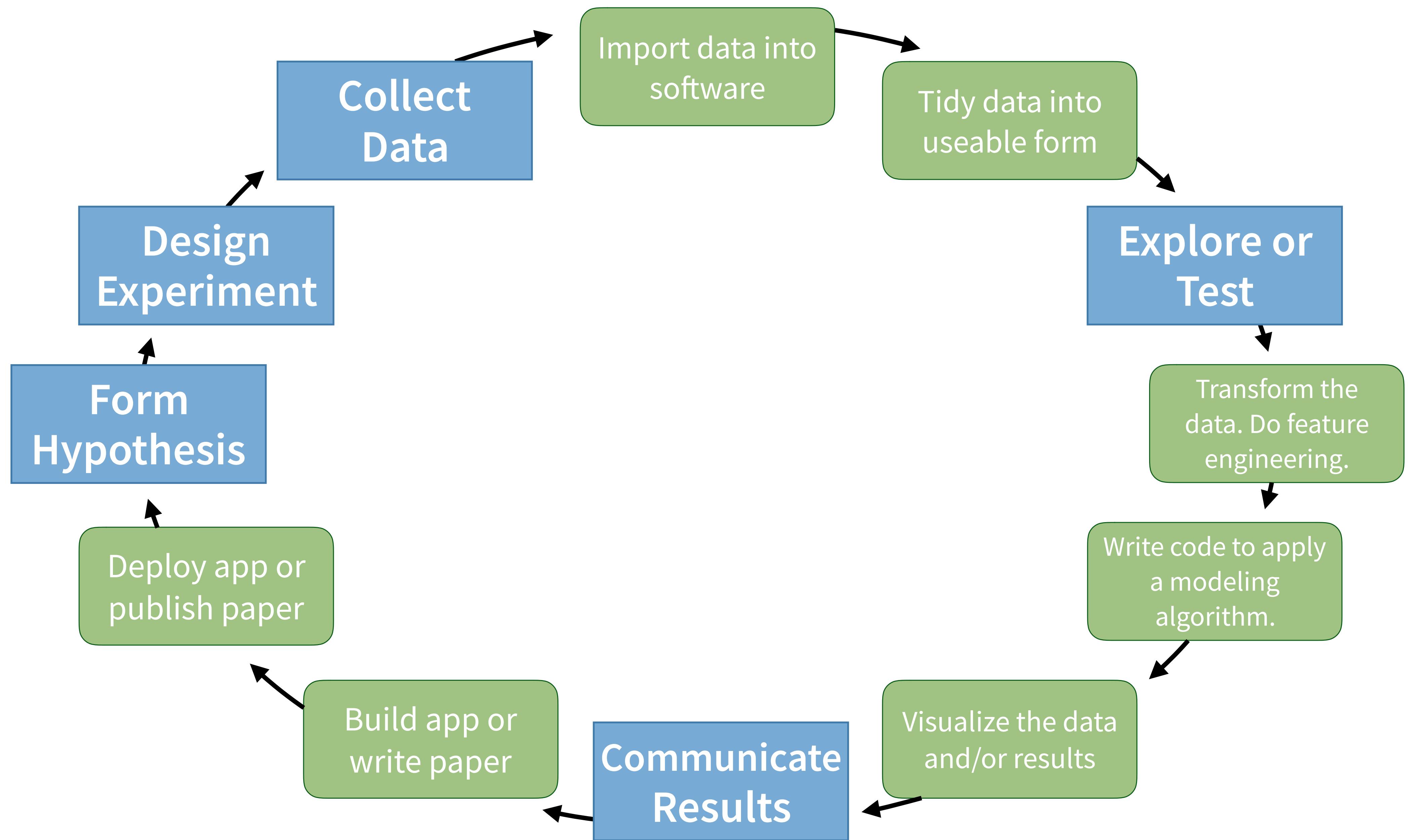
```
[1] -1.2  1.0 -0.5  0.9 -0.6 -1.1 -1.5
```

Annotations with arrows point to specific elements:

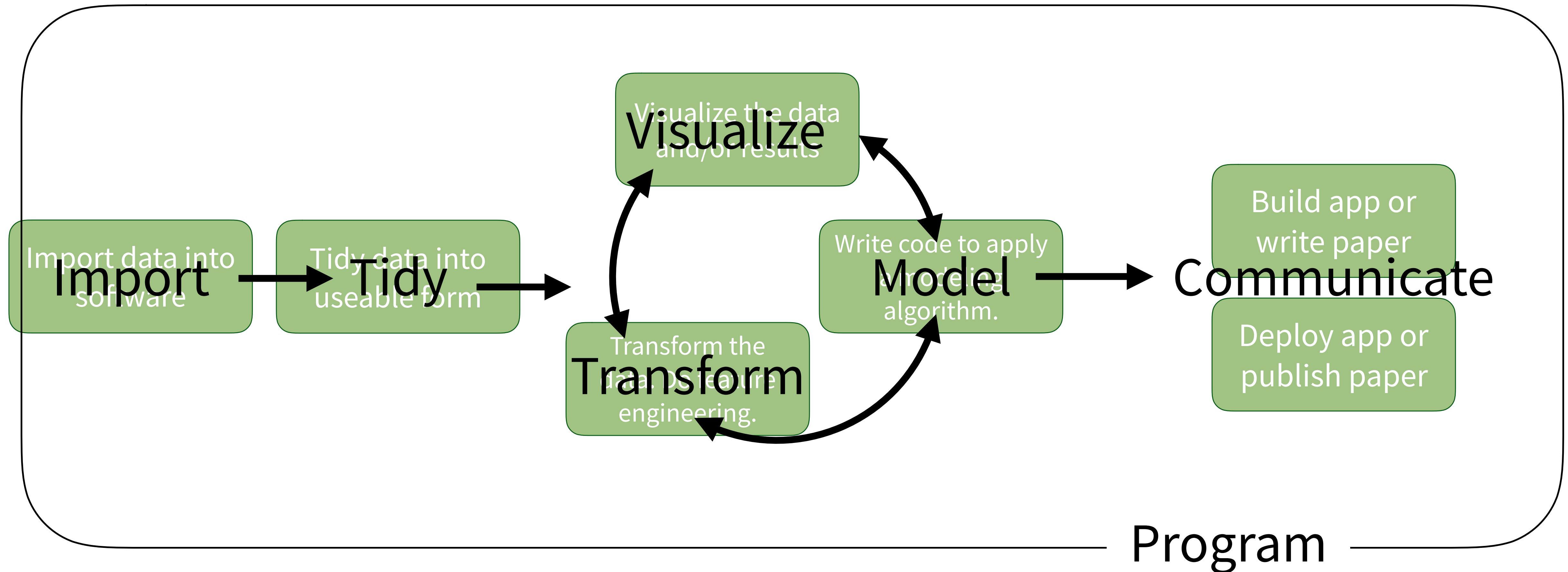
- A grey callout bubble points to the green "Run All" button in the toolbar above the code editor, with the text: "Click to run all code chunks above".
- A grey callout bubble points to the green "Run Current Chunk" button in the toolbar above the code editor, with the text: "Click to run code in chunk".
- A dark grey callout bubble points to the R console pane, with the text: "Code result".

Outro

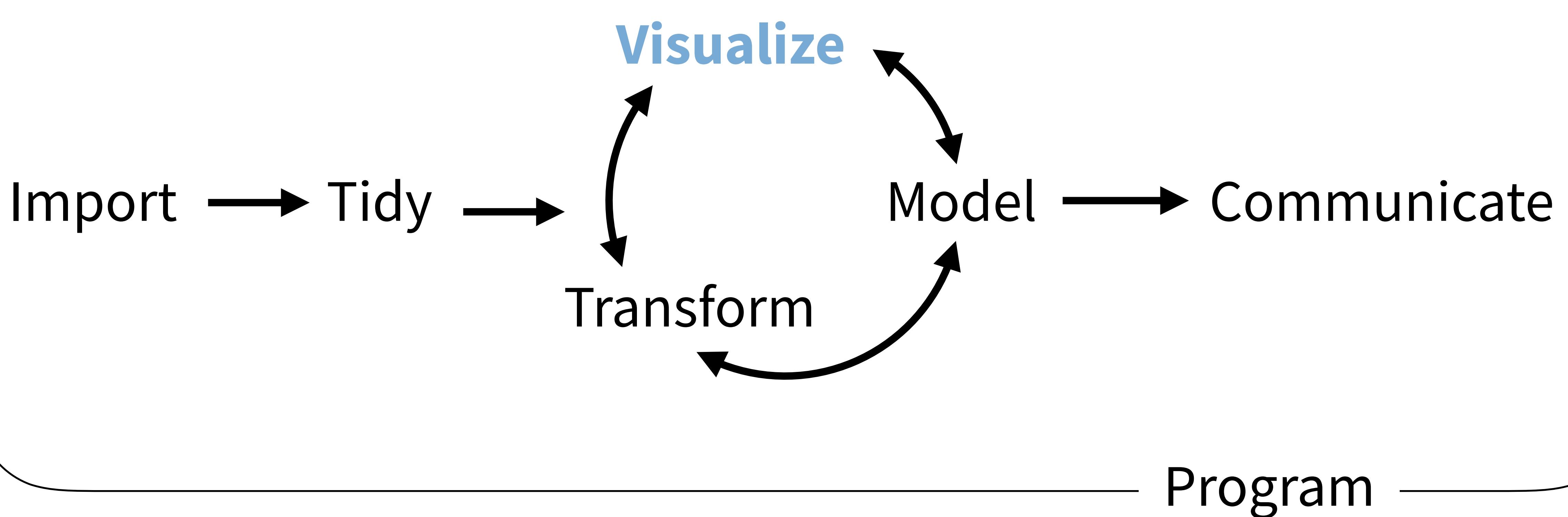




(Applied) Data Science



(Applied) (data) Science



O'REILLY®



R for Data Science

VISUALIZE, MODEL, TRANSFORM, TIDY, AND IMPORT DATA

Hadley Wickham &
Garrett Grolemund

Free online at
<http://r4ds.had.co.nz>

Your Turn

In RStudio Cloud, Click on
1-Visualize-Data.Rmd



R + ggplot2 for Geoscience



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Ph.D. Student

January 2019

Atlantic Geosciences Society AGM