

Let's talk



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Based on a work at <https://github.com/hadley/data-science-in-tidyverse>

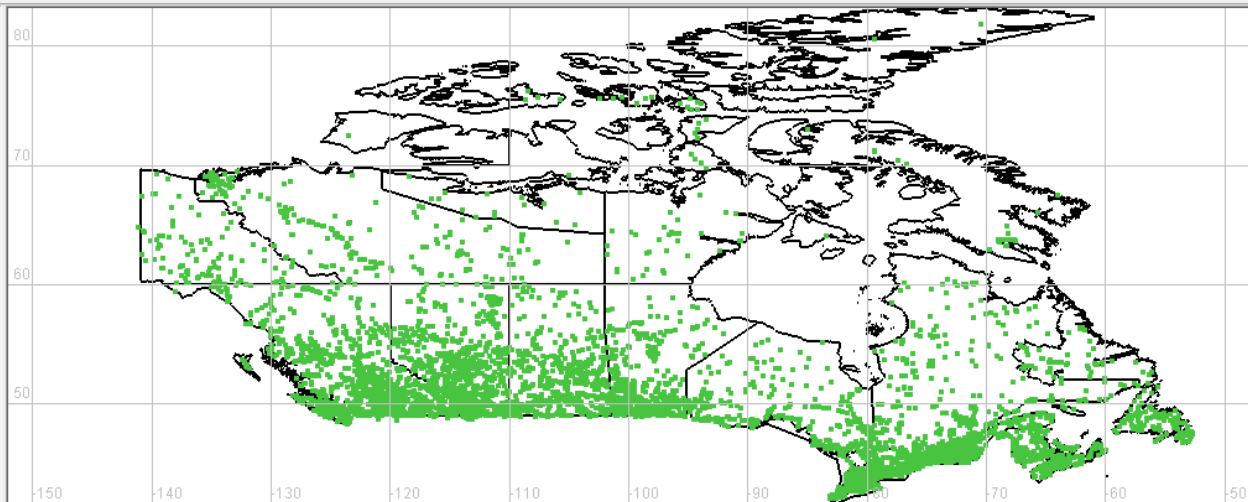
What you used to do



Stations

Base Maps

- ☒ PoliticalBoundaries
- ☐ RiversAndLakes_7.5m
- ☐ Cities_7.5m
- ☐ RiversAndLakes_1m
- ☐ Cities_1m
- ☐ Roads_1m
- ☐ MajorDrainageBasins
- ☐ SubDrainageBasins
- ☐ SubSubDrainageBasins



Station Number Hyd Status Data Period 1850 to 2016 ☐ Has Flow ☐ Favourites
☐ Has Level ☐ Apply Filter
 Station Name Regulation Total Years 0 ☐ Has Sed ☐ Reset Filter
 Province Oper Sched Drainage Area 0 ☐ Is Real Time ☐ Is RHBN 7791/7791

| Station | Fav | StationName | HydStatus | Prov | Latitude | Longitude | DrainageArea | Years | From | To | Reg. | Flow | Level | Sed | OperSched | RealTime |
|---------|-----|---|--------------|------|----------|-----------|--------------|-------|------|------|------|------|-------|-----|------------|----------|
| 01AA002 | | DAAQUAM (RIVIERE) EN AVAL DE LA RIVIERE SHIDGEL | Discontinued | QC | 46.5575 | -70.08111 | 598 | 11 | 1967 | 1977 | | Yes | | | Continuous | |
| 01AD001 | | MADAWASKA (RIVIER) EN AVAL DU BARRAGE TEMISC... | Discontinued | QC | 47.54833 | -68.63639 | 2690 | 80 | 1918 | 1997 | Yes | Yes | | | Continuous | |
| 01AD002 | | SAINT JOHN RIVER AT FORT KENT | Active | ME | 47.25806 | -68.59583 | 14700 | 89 | 1926 | 2014 | | Yes | | | Continuous | Yes |
| 01AD003 | | ST. FRANCIS RIVER AT OUTLET OF GLASIER LAKE | Active | NB | 47.20661 | -68.95694 | 1350 | 65 | 1951 | 2015 | | Yes | Yes | | Continuous | Yes |
| 01AD004 | | SAINT JOHN RIVER AT EDMUNDSTON | Active | NB | 47.36078 | -68.32489 | 15500 | 30 | 1968 | 2014 | | Yes | Yes | | Continuous | Yes |
| 01AD005 | | MADAWASKA (RIVIERE) AU RESERVOIR TEMISCOUATA | Discontinued | QC | 47.57056 | -68.64306 | 2590 | 9 | 1966 | 1974 | Yes | | Yes | | Continuous | |
| 01AD008 | | LONG (LAC) PRES DE LES ETROITS | Discontinued | QC | 47.39083 | -68.89833 | 108 | 3 | 1972 | 1974 | | | Yes | | Continuous | |

Station: 08MF005 ▾

Data Type: Real-Time ▾

Apply

Filter items

Showing 1 to 20 of 2,103 entries | Show 20 ▾ entries

This table provides real-time data in tabular format.























| Date (PST) ↑↓ | Primary water level (m) ↑↓ | Discharge (m ³ /s) ↑↓ |
|---------------------|----------------------------|----------------------------------|
| 2018-05-03 07:10:00 | 7.097 | 6.070 |
| 2018-05-03 07:05:00 | 7.094 | 6.060 |
| 2018-05-03 07:00:00 | 7.086 | 6.040 |
| 2018-05-03 06:55:00 | 7.086 | 6.040 |
| 2018-05-03 06:50:00 | 7.079 | 6.030 |
| 2018-05-03 06:45:00 | 7.099 | 6.070 |
| 2018-05-03 06:40:00 | 7.098 | 6.070 |
| 2018-05-03 06:35:00 | 7.075 | 6.020 |
| 2018-05-03 06:30:00 | 7.066 | 6.010 |
| 2018-05-03 06:25:00 | 7.115 | 6.100 |
| 2018-05-03 06:20:00 | 7.099 | 6.070 |
| 2018-05-03 06:15:00 | 7.090 | 6.050 |
| 2018-05-03 06:10:00 | 7.060 | 6.000 |
| 2018-05-03 06:05:00 | 7.044 | 5.970 |
| 2018-05-03 06:00:00 | 7.114 | 6.100 |
| 2018-05-03 05:55:00 | 7.080 | 6.030 |
| 2018-05-03 05:50:00 | 7.097 | 6.070 |
| 2018-05-03 05:45:00 | 7.091 | 6.050 |

Results

Becomes a file storage issue

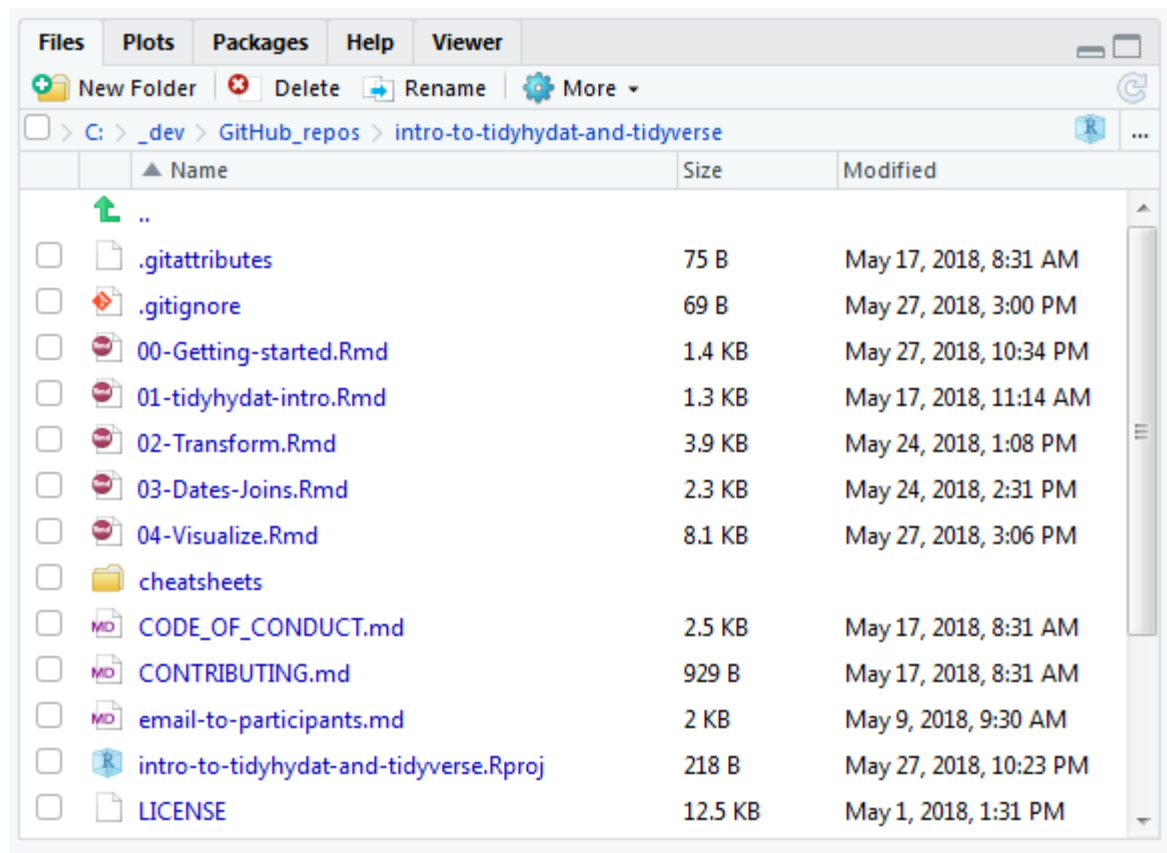
Not reproducible

Too many clicks!

| | |
|--|----------------------|
|  08hb048_1972_15min.xls | 2018-02-22 10:41 ... |
|  08HB048_1973_15MIN.xls | 2018-02-22 10:41 ... |
|  08hb048_1974_15min.xls | 2018-02-22 10:41 ... |
|  08hb048_1975_15min.xls | 2018-02-22 10:41 ... |
|  08hb048_1976_15min.xls | 2018-02-22 10:41 ... |
|  08hb048_1977_15min.xls | 2018-02-22 11:02 ... |
|  08hb048_1978_15min.xls | 2018-02-22 11:02 ... |
|  08hb048_1979_15min.xls | 2018-02-22 11:02 ... |
|  08hb048_1980_15min.xls | 2018-02-22 11:02 ... |
|  08hb048_1981_15min.xls | 2018-02-22 1:47 PM |
|  08hb048_1982_15min.xls | 2018-02-22 1:47 PM |
|  08hb048_1983_15min.xls | 2018-02-22 1:47 PM |
|  08hb048_1984_15min.xls | 2018-02-22 1:47 PM |
|  08hb048_1986_15min.xls | 2018-02-22 2:19 PM |
|  08hb048_1987_15min.xls | 2018-02-22 2:19 PM |
|  08hb048_1988_15min.xls | 2018-02-22 2:19 PM |
|  08hb048_1989_15min.xls | 2018-02-22 2:19 PM |
|  08hb048_1990_15min.xls | 2018-02-22 2:22 PM |
|  08hb048_1991_15min.xls | 2018-02-22 2:22 PM |
|  08hb048_1992_15min.xls | 2018-02-22 2:22 PM |
|  08hb048_1993_15min.xls | 2018-02-22 2:22 PM |
|  08HB048_1994_15MIN.xls | 2018-02-22 2:33 PM |

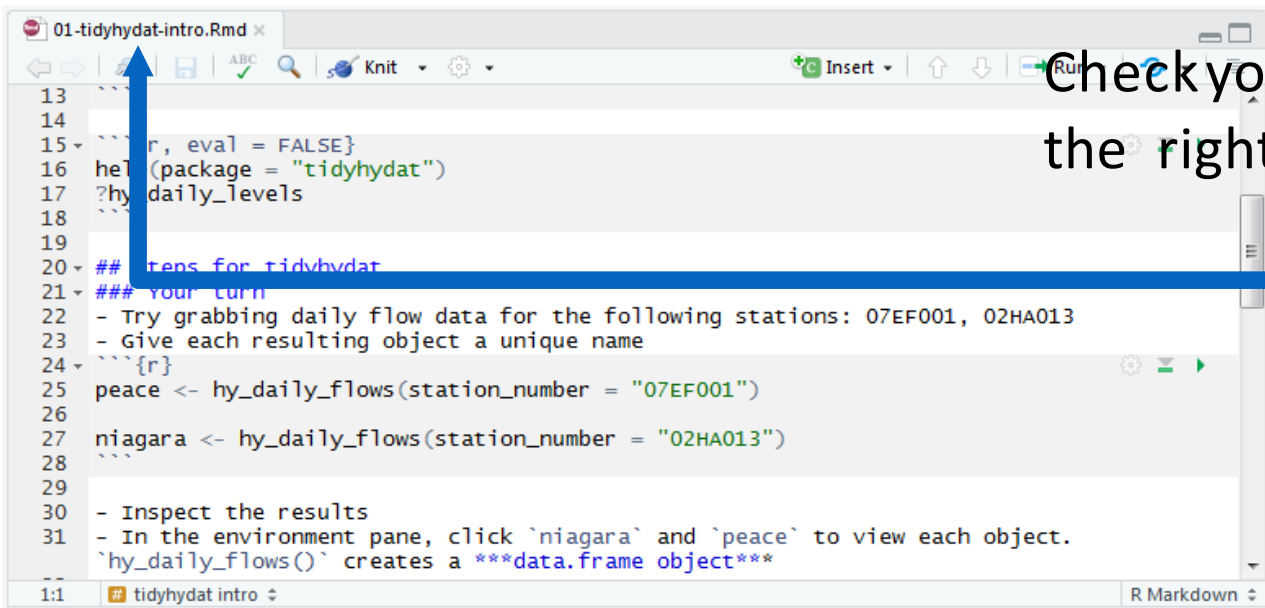
Your turn

Open up 01-tidyhydat-intro.Rmd



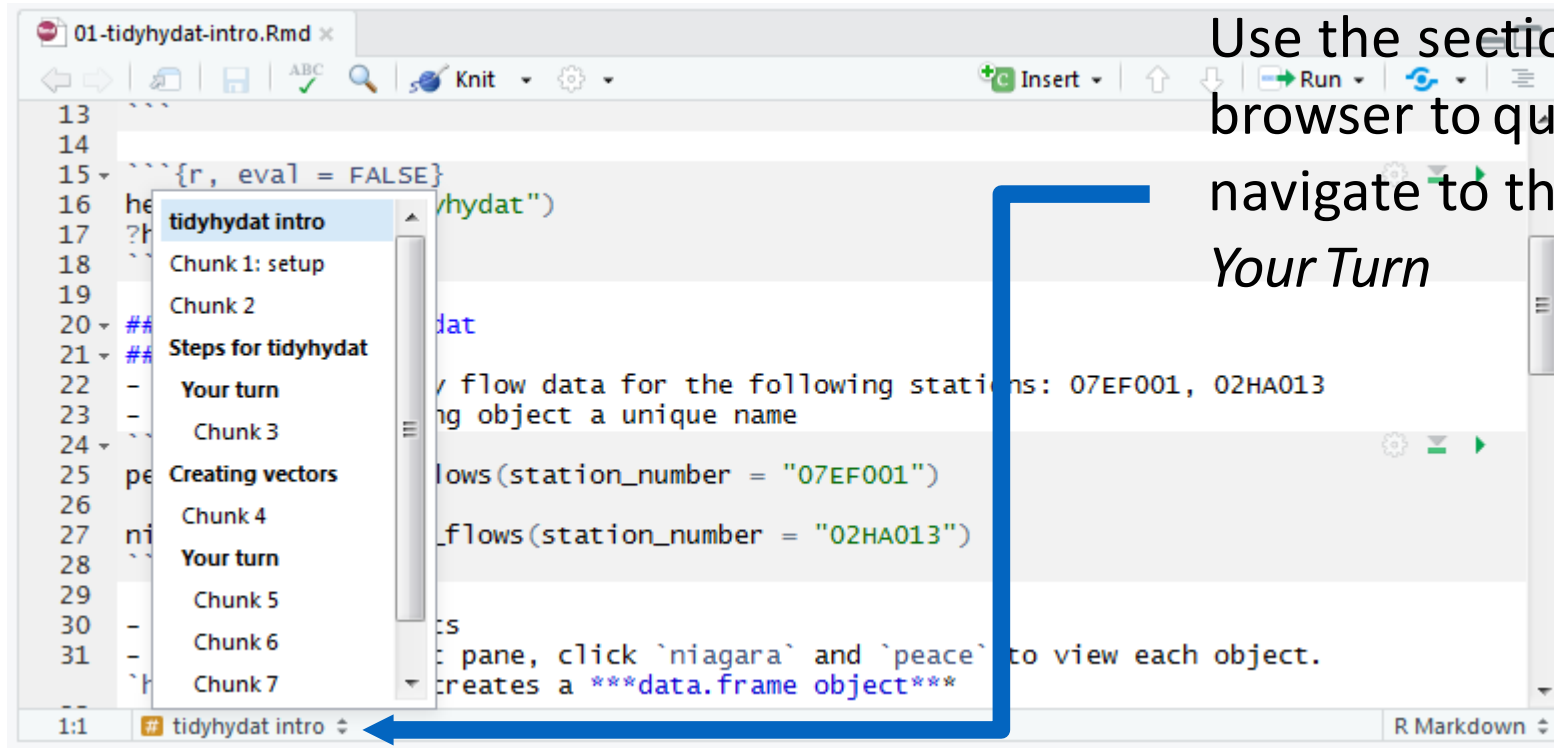
If you get lost or need to restart

Check you are in
the right file



```
01-tidyhydat-intro.Rmd
13
14
15 <`r, eval = FALSE`>
16 hel(package = "tidyhydat")
17 ?hy_daily_levels
18
19
20 ## steps for tidyhydat
21 ### Your turn
22 - Try grabbing daily flow data for the following stations: 07EF001, 02HA013
23 - Give each resulting object a unique name
24 <`r`>
25 peace <- hy_daily_flows(station_number = "07EF001")
26
27 niagara <- hy_daily_flows(station_number = "02HA013")
28
29
30 - Inspect the results
31 - In the environment pane, click `niagara` and `peace` to view each object.
   `hy_daily_flows()` creates a data.frame object
1:1 tidyhydat intro R Markdown
```


If you get lost or need to restart



The screenshot shows the RStudio interface with an R Markdown file named "01-tidyhydat-intro.Rmd". On the left, a sidebar displays a table of contents with sections like "tidyhydat intro", "Chunk 1: setup", "Chunk 2", "Steps for tidyhydat", "Your turn", "Chunk 3", "Creating vectors", "Chunk 4", "Your turn", "Chunk 5", "Chunk 6", and "Chunk 7". The main editor area shows R code for a chunk named "tidyhydat intro", including comments and code for creating a data frame with station numbers. A blue arrow points from the "tidyhydat intro" section in the sidebar to the corresponding code chunk in the editor.

01-tidyhydat-intro.Rmd

Knit

Insert

Run

tidyhydat intro

Chunk 1: setup

Chunk 2

Steps for tidyhydat

Your turn

Chunk 3

Creating vectors

Chunk 4

Your turn

Chunk 5

Chunk 6

Chunk 7

```
13 ...
14 ...
15 ```{r, eval = FALSE}
16 he tidyhydat intro
17 ?h tidyhydat")
18 ...
19 ...
20 ##
21 ## Steps for tidyhydat
22 - Your turn
23 - ng object a unique name
24 ...
25 pe Creating vectors
26 ...
27 ni Chunk 4
28 ...
29 Your turn
30 ...
31 Chunk 5
32 ...
33 Chunk 6
34 ...
35 Chunk 7
36 ...
```

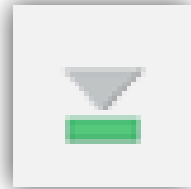
tidyhydat intro

R Markdown

Use the section
browser to quickly
navigate to the right
Your Turn

If you get lost or need to restart

Click to run all
chunks before
this one.



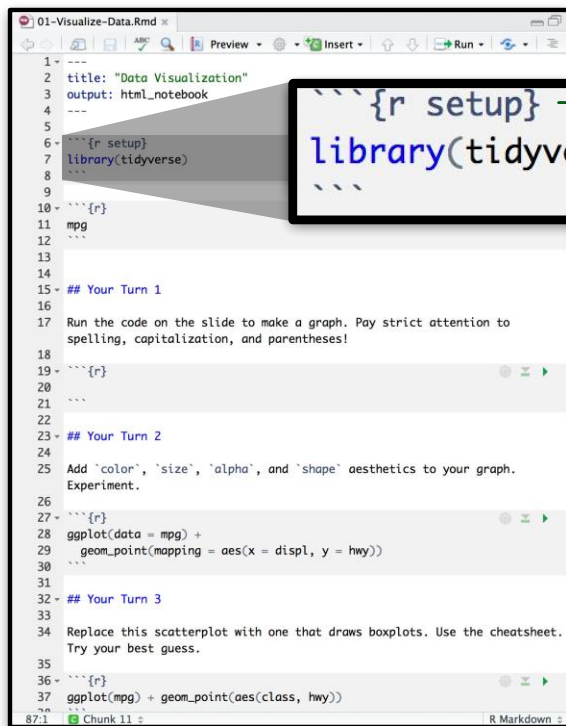
You should be
ready to go.

```
01-tidyhydat-intro.Rmd x
[Icons: Undo, Redo, Save, ABC, Search, Knit, Settings, Insert, Up, Down, Run, Refresh, List]

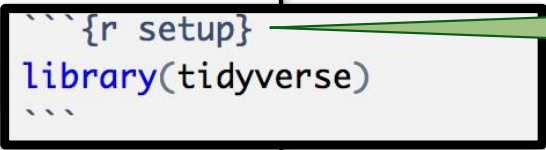
13  ...
14
15  ```{r, eval = FALSE}
16  help(package = "tidyhydat")
17  ?hy_daily_levels
18  ```
19
20  ## steps for tidyhydat
21  ### Your turn
22  - Try grabbing daily flow data for the following stations: 07EF001, 02HA013
23  - Give each resulting object a unique name
24  ```{r}
25  peace <- hy_daily_flows(station_number = "07EF001")
26
27  niagara <- hy_daily_flows(station_number = "02HA013")
28  ```
29
30  - Inspect the results
31  - In the environment pane, click `niagara` and `peace` to view each object.
   `hy_daily_flows()` creates a ***data.frame object***
...
1:1 tidyhydat intro R Markdown
```

Setup

The setup chunk is always run once before anything else



```
1 ---
2 title: "Data Visualization"
3 output: html_notebook
4 ---
5
6 {r setup}
7 library(tidyverse)
8
9
10 {r}
11 mpg
12
13
14
15 ## Your Turn 1
16
17 Run the code on the slide to make a graph. Pay strict attention to
18 spelling, capitalization, and parentheses!
19
20 {r}
21
22
23 ## Your Turn 2
24
25 Add 'color', 'size', 'alpha', and 'shape' aesthetics to your graph.
26 Experiment.
27
28 {r}
29 ggplot(data = mpg) +
30   geom_point(mapping = aes(x = displ, y = hwy))
31
32 ## Your Turn 3
33
34 Replace this scatterplot with one that draws boxplots. Use the cheatsheet.
35 Try your best guess.
36
37 {r}
38 ggplot(mpg) + geom_boxplot(aes(class, hwy))
39
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```

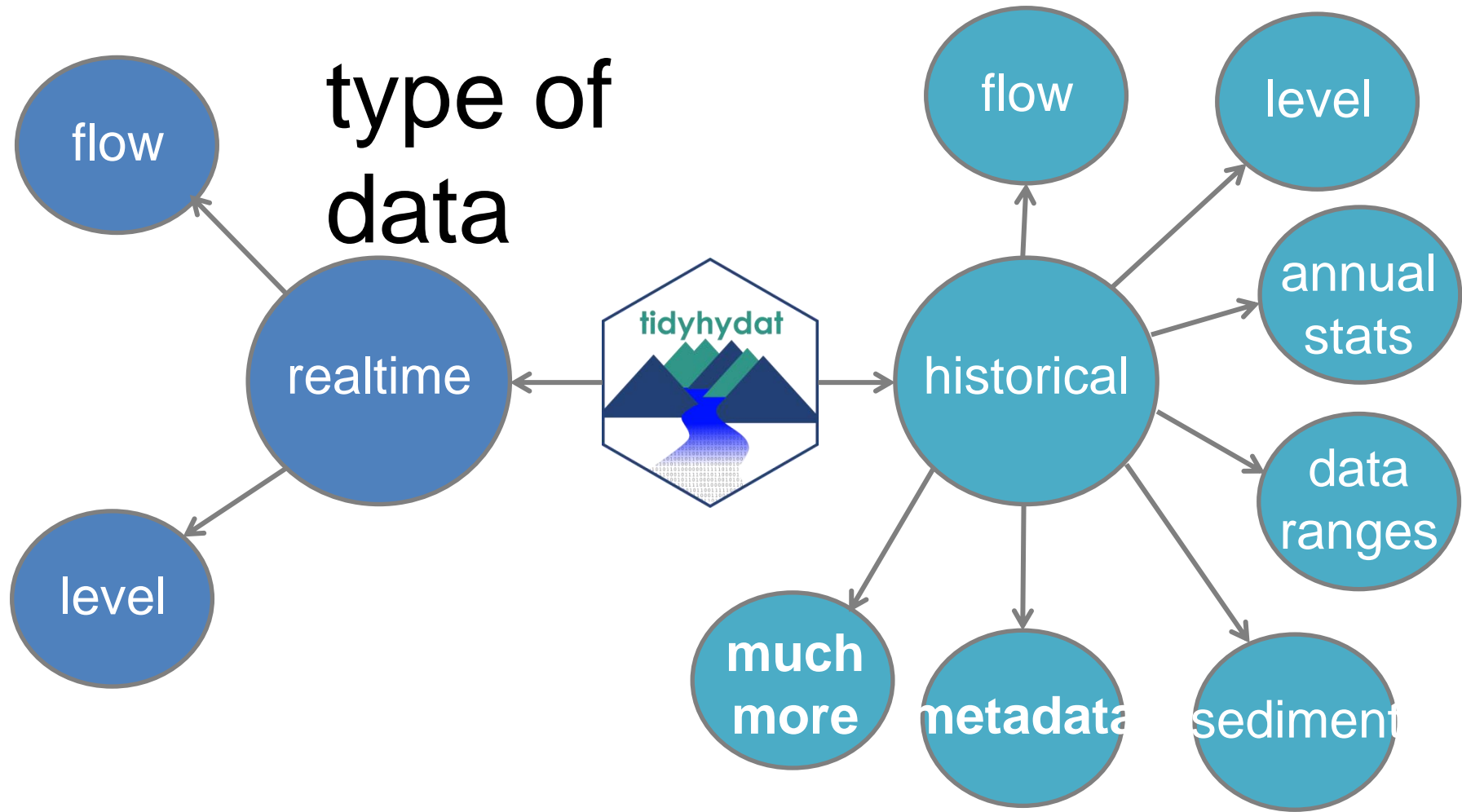


```
{r setup}
library(tidyverse)
```

(optional) label
for chunk

Steps for tidyhydat

type of data



Anatomy of an R function

```
fraser <- hy_daily_flows(station_number = "08MF005")
```



Object

Function

Argument

Value

Realtime – functions with a `realtime` prefix

Historical – functions with a `hy` prefix

Getting help

- To find all the functions in a package we can input this line:
`help(package = "tidyhydat")`
- To seek out help for an individual function type `?function_name`:
`?hy_daily_levels`

Your turn

- Try grabbing daily flow data for the following stations: 07EF001, 02HA013
- Give each resulting object a unique name
- Inspect the results

What stations are you interested in?

One station:

```
stns <- "07EF001"
```

Two or more stations:

```
stns <- c("07EF001", "02HA013")
```

Choose your station

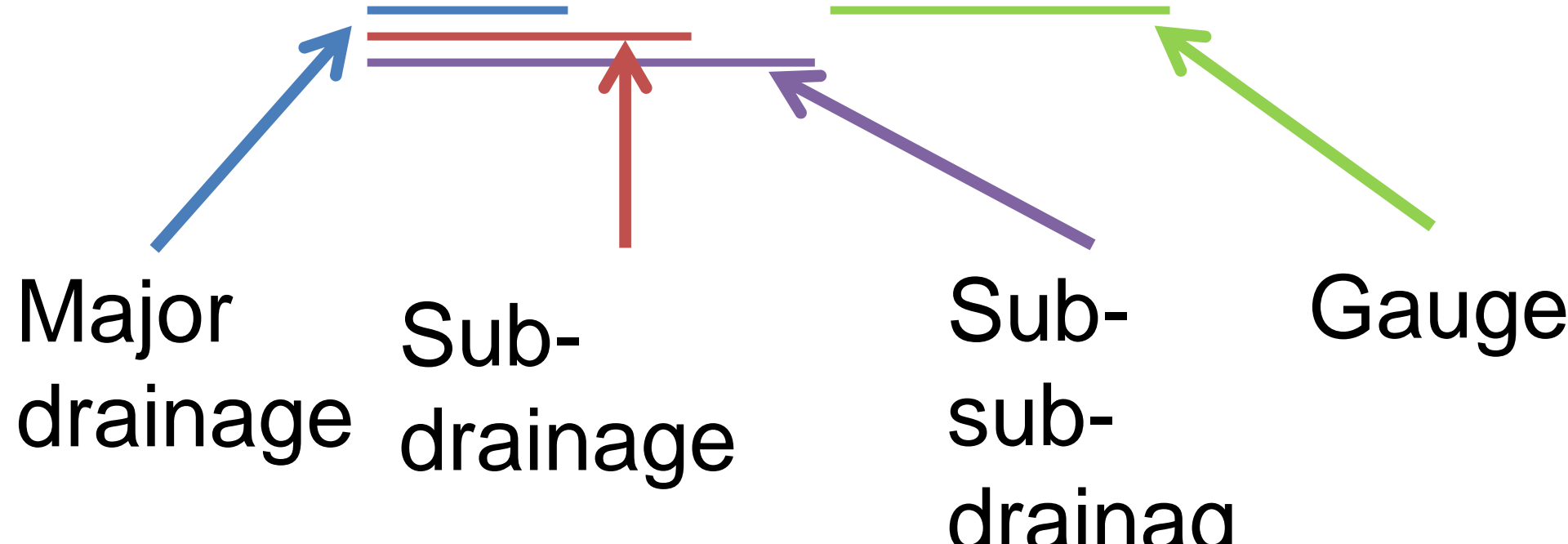


Alberta
British Columbia
Manitoba
New Brunswick
Newfoundland and Labrador
Northwest Territories
Nova Scotia
Nunavut
Ontario
Prince Edward Island
Quebec
Saskatchewan
Yukon



Anatomy of a WSC station number

08MF005



Your turn

- Create a vector using `c()` called `my_vector`
- Construct a dataframe object with `hy_daily_flows` that includes any two stations
- Inspect that `data.frame`