Testfile

Name

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Contents

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This markdown document will provide you with a step by step process on how to make maps using the package ggplot2. The first step for any project, is to organise our files and set our working directory. I usually make a new folder on my desktop where all my data, code and outputs will go. In this example, I have make a folder called "Maps". To set the working directory use the "session" dropdown at the top of R studio, choose "Set Working Directory", and then "Choose Directory". Navigate to the folder you have created and press "open". Save all the data you need into this folder, so it is easy to access.

The next step is to load the packages that you will need - These are below. You might need to install some of these before you can load them. This is done using the "install packages..." button under the "tools" dropdown at the top of R Studio. Once they are installed, run the code below

```
library(ggplot2)
library(xfun)
library(dplyr)
library(maps)
library(mapdata)
library(ggtext)
library(SOmap)
library(gganimate)
```

Next, we will need our data. For this example, I have used Continuous Plankton Recorder phytoplankton data taken from the AODN - the data set is called "IMOS - Phytoplankton Abundance and Biovolume (CPR). AODN - https://portal.aodn.org.au/search. Once this data set was selected and the map was shown, I placed a bounding box to capture all data between 100 to 150 East, and -50 to -65 South. I placed no temporal restraints on the data set. Once downloaded, the data should look like the image below.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	TripCode	Sample_I	Region	Latitude	Longitude	SampleTir	SampleTir	Year_Loca	Month_Lo	Day_Local	Time_Loca	SatSST_de	SatChlaSu	PCI	SampleVc	Acantharii	Acanthoic	Acanthost	Acanthost A
2	ANHO200	146-1	Southern	-63.2677	139.8854	2008-01-2	########	2008	1	21	19:16	1.3952		0	0.0003	0	0	0	0
3	ANHO200	146-2	Southern	-63.1893	139.9319	2008-01-2	########	2008	1	21	19:48	1.3953		0	0.0003	0	0	0	0
4	ANHO200	146-3	Southern	-63.1072	139.9797	2008-01-2	########	2008	1	21	20:21	1.3065		0	0.0003	0	0	0	0
5	ANHO200	146-4	Southern	-63.0262	140.027	2008-01-2	########	2008	1	21	20:53	1.0216		0	0.0003	0	0	0	0
6	ANHO200	146-5	Southern	-62.9466	140.073	2008-01-2	########	2008	1	21	21:24	0.6161		0	0.0003	0	0	0	0
7	ANHO200	146-6	Southern	-62.8651	140.1185	2008-01-2	########	2008	1	21	21:58	0.482		0	0.0003	0	0	0	0
8	ANHO200	146-7	Southern	-62.7846	140.1631	2008-01-2	########	2008	1	21	22:31	0.2532		0	0.0003	0	0	0	0
9	ANHO200	146-8	Southern	-62.7041	140.2052	2008-01-2	########	2008	1	21	23:02	0.6397		0	0.0003	0	0	0	0
10	ANHO200	146-9	Southern	-62.6238	140.2472	2008-01-2	########	2008	1	21	23:34	1.1276		0	0.0003	0	0	0	0
11	ANHO200	146-10	Southern	-62.5405	140.2824	2008-01-2	########	2008	1	22	0:08	1.0578		0	0.0003	0	0	0	0
12	ANHO200	146-11	Southern	-62.4592	140.3161	2008-01-2	########	2008	1	22	0:37	0.7227		0	0.0003	0	0	0	0
13	ANHO200	146-12	Southern	-62.376	140.3479	2008-01-2	########	2008	1	22	1:02	0.6488		0	0.0003	0	0	0	0
14	ANHO200	146-13	Southern	-62.2956	140.3821	2008-01-2	########	2008	1	22	1:26	1.2621		0	0.0003	0	0	0	0
15	ANHO200	146-14	Southern	-62.2145	140.4159	2008-01-2	########	2008	1	22	1:51	2.0946		0	0.0003	0	0	0	0
16	ANHO200	146-15	Southern	-62.1327	140.4455	2008-01-2	########	2008	1	22	2:17	2.2085		0	0.0003	0	0	0	0

We need to load this data set into our R work space. When loading the data in, it will be turned into whats called a "data frame". We use the code below to load it in

```
data <- read.csv("IMOS_-_Phytoplankton_Abundance_and_Biovolume_(CPR)-abundance_-_raw_data (6).csv")
```

A data frame has now been created, and will appear in the top right of your work space (image below)
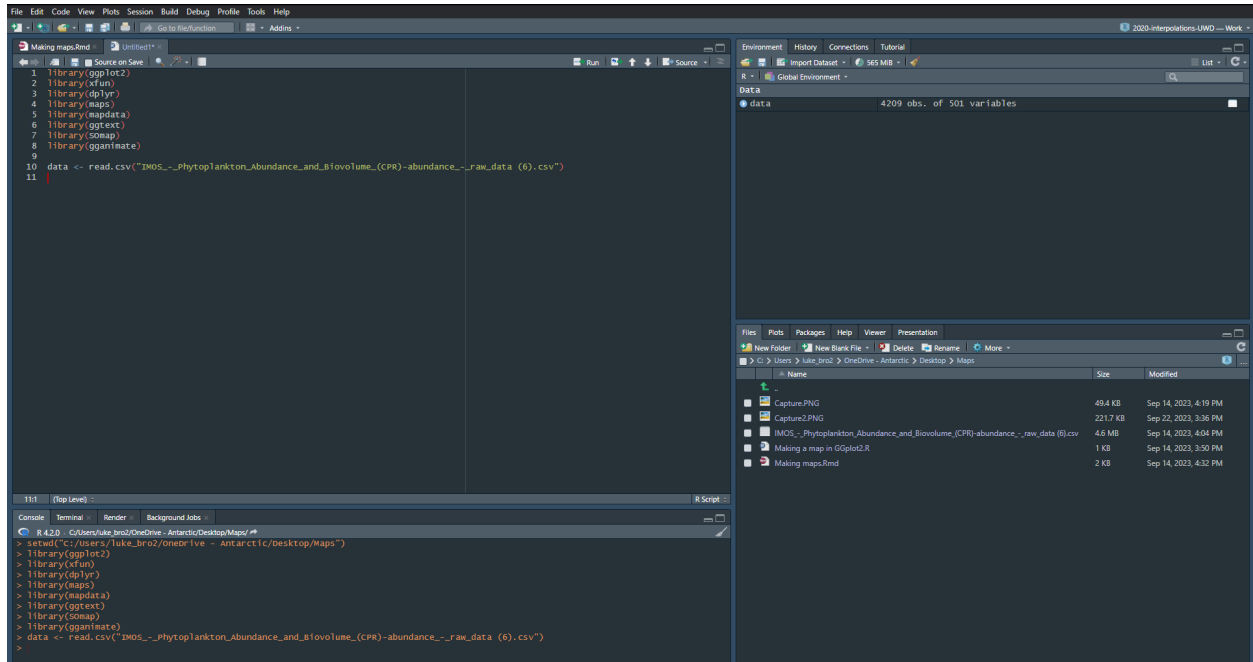
We can click on this data frame and it will open in R, showing us our rows, columns and values.

The columns we are interested in keeping for our map are "Latitude", "Longitude", "Year_Local", "Month_Local" and all the species columns at the end. To use this data effectively in a map, we need to remove the columns we don't want. We can do this with the line of code below.

```
data = subset(data, select = -c(1, 2, 3, 6, 7, 10, 11, 12, 13, 14, 15))
```

In this code, we are asking R to grab our data frame, and make a subset of it. when we use "-c", we are asking R to remove columns for us. The columns we want removed are chosen by the numbers in the parentheses. Once you run this code, the data frame should look like the image below

	Latitude	Longitude	Year_Local	Month_Local	Acantharia	Acanthoica.quattrospina	Acanthostomella.cf..conicoides	Acanthostomella.norvegica	Acanthostomella.spp.
1	-63.2677	139.8854	2008	1	0	0	0	0	
2	-63.1893	139.9319	2008	1	0	0	0	0	
3	-63.1072	139.9797	2008	1	0	0	0	0	
4	-63.0262	140.0270	2008	1	0	0	0	0	
5	-62.9466	140.0730	2008	1	0	0	0	0	
6	-62.8651	140.1185	2008	1	0	0	0	0	
7	-62.7846	140.1631	2008	1	0	0	0	0	
8	-62.7041	140.2052	2008	1	0	0	0	0	
9	-62.6238	140.2472	2008	1	0	0	0	0	
10	-62.5405	140.2824	2008	1	0	0	0	0	
11	-62.4592	140.3161	2008	1	0	0	0	0	
12	-62.3760	140.3479	2008	1	0	0	0	0	
13	-62.2956	140.3821	2008	1	0	0	0	0	
14	-62.2145	140.4159	2008	1	0	0	0	0	
15	-62.1327	140.4455	2008	1	0	0	0	0	
16	-62.0508	140.4736	2008	1	0	0	0	0	
17	-61.9655	140.5018	2008	1	0	0	0	0	
18	-61.8838	140.5357	2008	1	0	0	0	0	